

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

Ph. D Course Work Papers

Biotechnology

(with effect from the academic year 2017-18 onwards)

Course	Name of the course	Credit	Exa m hrs/ wee k
CORE I	Advanced Research Methodology	4	4
CORE II	Advanced Molecular Biology	4	4
CORE III	Advanced Bioinformatics	4	4
CORE IV	Natural Products	4	4
CORE-V	Advances in Microbial Biotechnology	4	4
CORE-VI	Molecular Toxicology	4	4
CORE-VII	Tissue Culture	4	4

Objectives of the Program

- To equip the scholars with a better understanding in specific area of research
- To enrich the researchers in proper usage of techniques in Biotechnology
- To enlighten the scholars to critically think and perform research and exercising them to write high quality manuscripts and thesis

Choice of Course Work

1. Candidates with PG qualification should obtain 16 credits as per UGC Regulations in the following options:
 - 4 Course works of 4 credits each for a total of 16 credits (or)
 - 3 Course works of 4 credits each & 1 mini project of 4 credits for a total of 8 credits
2. Candidates with M.Phil. Qualification should earn 8 credits as per UGC regulations in the following options
 - 2 Course works of 4 credits each for a total of 8 credits (or)
 - 1 Course work of 4 credits & 1 mini project of 4 credits for a total of 8 credits

Mini Project

As per University Norms

Advanced Research Methodology

Preamble:

L	T	P	C
4	0	0	4

To equip the students with the updated methodologies, techniques and instruments.

Outcome:

To obtain a thorough knowledge regarding the reagent preparations, experimental protocols and instruments.

Unit: I: Preparation of Solutions

Types of Solutions - Standard Solutions, Stock Solution, Saturated Solution, Solution of Acids, Expression of Concentration - Molarity (M), Molality (m), Preparation of one Molar (1M) Solutions, Normality (N), Mass Percent % (w/w), Percentage by Volume or % (v/v), Volume/Weight (V/W), Parts per Million (ppm), Parts per Billion (ppb), pH; Buffers and their preparation. (14L)

Unit: II: Microscopy & Microtechnique

Microscopy - Principle, Working Mechanism and applications of Light, Phase Contrast, Fluorescent, Darkfield, SEM, TEM and STEM. Preparation of Whole mount and sections, staining, mounting and preparation of permanent slides; Cyto and Histochemical techniques. (11L)

Unit: III: Quantitative & Molecular Techniques

Quantification of carbohydrate, protein, lipid, fatty acids and aminoacids (Proximate composition), Estimation of hydrolytic and detoxication enzymes. Molecular Techniques - Principle, mechanism and application of SDS, PAGE, AGE, PCR, RT-PCR; Basic principle and applications of chromatography, UV spectrophotometer. (12L)

Unit: IV: Biostatistics

Parametric - Student T test, F Test, Z -Test, Correlation, Regression and Co-efficient, ANOVA (One-way, Two-way), MANOVA, ANCOVA, Non-parametric - Chi-square, Wilcoxon Signes Rank Test, Mann-Whitney Test, Kolmogorov-Smirnov Tests, SPSS, Sigma Plot and MiniTab or Biological data analysis. (13L)

Unit: V: Manuscript, Thesis and Project Writing

Research Processing, Writing of Report, Research paper and Review Articles, Project, Proof Correction - symbols, MS word review option and other tools; Plagiarism Checking, Impact Factor, h index, citation index, Funding agencies - DST, DBT, CSIR, ICMR, ICAR,

MoEF, MoEs.

(10L)

(Total: 60L)

References:

1. Rodney F. Boyer, 2012. Biochemistry laboratory: Modern Theory & Techniques, Second Edition, Prentice Hall.
2. Rajan Katoch, 2011. Analytical Techniques in Biochemistry & Molecular Biology, Springer, New York.

Advanced Molecular Biology

L	T	P	C
4	0	0	4

Objectives of the paper: The course is to teach the students the following areas: Isolation and characterization of DNA, RNA and protein molecules.

Outcome of the paper: The students will be trained in the area of the characterization of DNA, RNA and protein molecules. The knowledge will be helpful to understand and also solve the molecular level problem in our local community.

Unit 1 (Biomolecules): Isolation of DNA, RNA molecules using Tri- reagent, preparation of protein lysate using different buffer constitutions and the functions of the reagents in the buffers. Purity check of DNA and RNA molecules. Quantification & storage of DNA, RNA and protein molecules.

Unit 2 (PCR): Working concentration & storage of dNTPs & primers. Length of primers. Designing primers for the given DNA fragment for analytical PCR. Designing primer for amplification of DNA fragments for protein over expression purpose. Agarose gel electrophoresis, Reason for the followings: 1. Smear in the PCR amplified product 2. More than one band; 3. Primer dimer, 4. DNA in the well, 5. No band and band in the unexpected size, 6. Primer degradation etc. storage of PCR products. Restriction analysis, cloning, and sequencing of PCR products. Removal of template DNA by Dpn-1. Differences between Taq DNA polymerase, Pfu DNA polymerases and the differences in their PCR products. Gradient PCR and q-PCR

Unit 3 (Proteomics): SDS-PAGE, MALDI-TOF, MS-MS for identification of protein, Immunoblot, primary antibodies, secondary antibodies, fluorescent dyes in different wave length, Horse radish peroxidase and alkaline phosphatase conjugated secondary antibodies. Protein markers and prestained markers.

Unit 4 (Sequencing): Types of DNA sequencing. Next Generation DNA sequencing. Whole exon sequencing, Transcriptome analysis, comparison of cytochrome-c oxidase & 16S RNA molecule and identification of organisms. Finding promoter, intron, exon, ORF, SNPs, mutations and insertion and deletion in a given sequence.

Unit 5 (Manipulations of gene expression): Anti-sense technique, siRNA, micro RNA, pseudo genes, TALEN nuclease and CRISPR Cas9. Difference between the above techniques.

References:

1. Molecular cell biology 7th edition by Harvey Lodish.

2. Principles of gene manipulation and genomics 7th edition by S.B. Primrose.
3. Molecular biology of the cell 5th edition by Bruce Alberts.
4. From Genes to Genomes: Concepts and Applications of DNA Technology 3rd edition by Jeremy W Dale and Malcolm von Schantz.

Advanced Bioinformatics

L	T	P	C
4	0	0	4

Objectives of the paper: The course is to teach the students the genetic relationship with organisms and the structural aspects of biomolecules.

Outcome of the paper: The students will be trained in the area of the molecular evolution and molecular depth of drugs and their applications.

Unit 1 (Comparison of Biomolecules): Basic shell programming & python programming. Different format of DNA, RNA, and protein molecules, Pairwise and multiple alignment tools, BLAST tool and their applications. Identification of new species, SNPs and mutations.

Unit 2 (Genome): Human, mouse, *Drosophila* and *Arabidopsis* genome projects in NCBI, 1000 human genome project, Flybase, and TAIR.

Unit 3 (NGS analysis and Annotation): Next Generation sequencing, NGS data analysis, Assembly: reference based denovo and related tools. Functional annotation and comparison. Differential gene expression & transcriptome analysis

Unit 4 (RNA molecules): structure of RNA, prediction of coding and noncoding RNA & related tools, types of noncoding RNA molecules. RNA editing, guide RNA, designing of siRNA,

Unit 5 (Molecular docking): Analysis of protein sequences, 3D structure of proteins, and structure of ligand in pdb format. Binding efficiency, structure based function prediction, uses of different docking tools, Ramachandran plot. Computer aided drug designing (CADD).

References:

1. Bioinformatics: Sequence and Genome Analysis 2nd edition by David W Mount.
2. A Primer of Genome Science 3rd edition by Greg Gibson and Spencer V. Muse.
3. Essential bioinformatics by Jin Xiong.
4. Proteins: Structures and Molecular Properties 2nd edition by Thomas E. Creighton.
5. Molecular Biology of the Gene 7th edition by James D Watson.

Natural Products

L	T	P	C
4	0	0	4

Objectives of the paper: The course is to teach the students the knowledge about natural resources and methods of extraction of valuable products

Outcome of the paper: The students will be trained in the area of understanding & utilization of natural products.

UNIT 1 Bioresources: Biomedical potential of marine and terrestrial natural products – Isolation techniques, structural elucidation techniques and mode of action. Application in various field of biology of Secondary Metabolites isolated from both marine and terrestrial natural products

UNIT 2 Marine resources: Important products isolated from marine organisms and their uses – Agarose, Agar, Alginates, Carrageenans, chitin, chitosans and glucosaminos, marine flavourants, Lectins, heparin and carotene. Single cell Protein. Packing and storage.

UNIT 3 Biofuel: Sources of biomass- Ethanol from biomass, Methane from biomass, Hydrogen from biomass.

UNIT 4 Phytochemicals: carbohydrates and derived products - drugs containing glycosides, tannins, lipids (fixed oils, fats and waxes), volatile oils and terpenoids, enzymes and proteins, alkaloids. Biological testing of herbal drugs - Preliminary phytochemical screening for plant products - Qualitative chemical tests - Chromatography (TLC and HPLC).

UNIT 5: Pharmaceutically important products from marine and terrestrial organisms pharmaceutical surfactants, antimicrobial compounds, hormone like materials, vitamins, immunomodulators, anticancer and cytotoxic compounds. NMR, FTIR, Single crystal preparation, X-ray diffraction, 3D structure of compounds.

REFERENCES:

1. Marine natural products: chemical and biological perspectives Paul J. Scheuer Academic Press, 392 pages
2. Bioactive Marine Natural Products Bhakuni, Dewan S., Rawat, D.S. 2005, XV, 400 p.
3. Marine natural products Hiromasa Kiyota, K. Fujiwara, T. Nagata, 2010 - 301 pages
4. Drugs from the Sea, Nobuhiro Fusetani, 2000 - 158 pages
5. Herbal plants and Drugs, Agnes Arber, 1999. Mangal Deep Publications.

6. Contribution to Indian Ethnobotany by Editor S.K.Jain, 1991 Scientific Publishers.
7. New Natural products and Plants drugs with Pharmacological, Biological (or)
8. Therapeutical activity, H.Wagner and P.Wolff, 1979. Springer, New Delhi.
9. Ayurvedic drugs and their plant source, V.V.Sivarajan and Balachandran Indra, 1994. Oxford IBH publishing Co.

Advances in Microbial Biotechnology

L	T	P	C
4	0	0	4

Preamble:

To have an in depth insight into fermentation concepts, understanding the usage of microbes as biocontrol agents, its usage in environment and industries.

Outcome:

To enrich the minds of students with microbes utility in different fields.

Unit 1

Brief history of Fermentation; Fermentation- General Concepts, Applications of Fermentation; Range of fermentation process- Microbial biomass, enzymes, metabolites, recombinant products, transformation process; Component parts of a fermentation process. Fundamentals of Microbial Biotechnology Microbial life: Microbial Cell Cultivation Systems, Cycles of Matter/Microbial Ecology (C, N, S, Fe, Cu, etc.) Methods in Microbial Biotechnology; Recombinant Gene Expression in Prokaryotes and Eukaryotes Protein Engineering .

Unit 2

Types of fermentations- Aerobic and anaerobic fermentation, Submerged and solid state fermentation; Factors affecting submerged and solid state fermentation; Aeration and agitation- Effect of aeration and agitation on fermentation, Oxygen requirement and oxygen supply, Oxygen transfer kinetics; Determination of KLa value; Effect of agitation and microbial biomass on KLa value; Newtonian and non-Newtonian fluids; Foam and antifoams, their effect on oxygen transfer; Fermentation economics.

Unit 3

Microbes as Biocontrol Agents (Baculoviruses, entomopathogenic fungi, *Bacillus thuringiensis*, *Bacillus sphaericus*, *Bacillus popillae*, Microbe derived inhibitors Biology of nitrogen fixation, preparation of different Types of inoculants (nitrogen fixers phosphate solubilizers, plant growth promoting Rhizobacteria, PGPR), composting.

Unit 4

Introduction to the use of microbes in environmental Applications, Bioremediation, bioaugmentation, Bioemulsifiers, biosurfactants, MEOR, Leaching of ores, Microbial Fuels (Methane, Hydrogen), Functional Metagenomics , syntrophic biodegradation of hydrocarbon contaminants.

Unit 5

Microbial production of organic acids, solvents and beverages (Citric acid, acetic acid, ethanol, acetone-butanol, beer, wine) therapeutic agents,(Streptomycin, cephalosporin, Anticancer agents , Vaccines aSiderophores, Ergot alkaloids),enzymes, vitamins and amino acids(proteases, amylases and lipases , B2 and B12, lysine, glutamic acid and tryptophan) and other microbial products(Microbial polysaccharides: Xanthan and Dextran, Biosurfactants, Steroid transformation, Polyhydroxyalkanoates: PHA and PHB).

References:

1. Stanbury, P. F., Whitaker and Hall, A. S. J., Principles of Fermentation Technology. Butterworth-Heinemann.
2. Shuler, M.L. and Karg, I F., Bioprocess Engineering Basic Concepts, Prentice Hall.
3. Microbial Biotechnology by A. N. Glazer and H. Nikaido.
4. SubbaRao, N. S. (1999) Soil Microbiology Science Pub Inc.

Molecular Toxicology

L	T	P	C
4	0	0	4

Preamble:

To introduce students about the chemicals and metabolic toxicity with the aim to provide sufficient knowledge about the technologies involved in toxicity assessment.

Outcome:

To nurture the minds with the lethal dose informations which is mandatory for any toxicological experiments.

UNIT I

Introduction to Toxicology: Various types of toxicity (Acute, subacute, subchronic and chronic). Chemical interactions (Additive effect, potentiation, synergism and antagonism), Dose response relationship (ED50, LD50 EC50, LC50.)

UNIT II

Routes of exposure, absorption, distribution, elimination. IN VITRO and IN VIVO models in toxicological studies. Toxicity - Factors affecting toxicity. General concepts in toxicology; Passage of a chemical through the body absorption, distribution, metabolism, Excretion.

UNIT III

Role of Phase I metabolism in toxicity: Introduction, Cytochrome P450-mediated Phase I metabolism; Flavin monooxygenase-mediated Phase I metabolism. Role of Phase II metabolism in toxicity: Introduction, Glucuronide conjugation; sulphate conjugation; Glutathione conjugation.

UNIT IV

Co-ordinated responses to toxicity: Introduction, Immediate responses to toxic insult, coordination of the response to reactive chemicals, repair of cellular damage, regulation of apoptosis and necrosis. Role of genetics in toxic response: introduction, mechanisms of genetic control, tools for studying genetic responses to toxic insult.

UNIT V

Technologies for toxicity testing: Genomics-analysis of variation within the genome, Reporter gene assays, Transgenics; Transcriptomics-Microarray analysis, real time quantitative RT-PCR; Proteomics- 2D-gel electrophoresis, MALDI-TOF mass spectroscopy, protein chip

analysis; Metabonomics; Bioinformatics.

References:

1. Subramanian, M.A., 2004. Toxicology Principles and Methods, MJP Publishers, Chennai.
2. Plant, N. (2003). Molecular Toxicology. Bios Scientific Publishers, New York.
3. Hodgson, E. and Smart, R.C. (2001). Introduction to Biochemical Toxicology. John Wiley & Sons, Inc. New York.
3. Keohavong, P. and Grant, S.G. (2005). Molecular toxicology Protocols. Humana Press, New York.
4. Josephy, P.D. and Mannervik, B. (2006). Molecular Toxicology. Oxford University Press.

Tissue Culture

L	T	P	C
4	0	0	4

Objectives

The goal of Cell Culture Techniques is for Scholars to identify and understanding the novel research findings through the necessary practical skills for the isolation of both animals and plant cells for in vitro studies, maintenance and manipulation of animal and plant cells in vitro and in vivo, and application of molecular techniques to in vitro situations.

Learning Outcome

- Develop basic aseptic skills for vertebrate and invertebrate cell culture.
- Understand media constituents and media formulation strategies for cell culture.
- Develop proficiency in vertebrate primary cell culture and the maintenance of cell lines.
- Apply cell and molecular techniques to in vitro situations.
- To know the different methods and equipments employed in the scale-up of animal and plant cell culture.

Unit I

Course Introduction - Animal models vertebrates and invertebrates Rabbit, Mouse, Drosophilla, Zebrafish, Earthworm, Bacteria, Fungi. Media Formulations for Cell Culture, Importance of Serum and Serum Free media, Preparation of primary cells from invertebrate, Insect cell culture, overview.

Unit II

Techniques and methods in animal cell culture- Animal Cell Culture: Historical Background, Importance and progress in Animal Cell Culture Technology, Biology of Animal Cells and cultured cells, Types of cells, Cellular Interactions, Organo-typic culture and specialized cell culture techniques, Maintaining the culture, Producing cell lines of a particular cell type, Quantization of cells in cell culture, harvesting of cells, Cell viability determination, characterization, differentiation and transformation cells, Culturing and Sub-Culturing of Animal

Cells, Growth Parameters, Primary Cell Culture Principles and Procedures - Primary cell culture: Keratinocytes; Adipocytes, Hepatocytes; Lymphocytes. Long term and short term storage of cells and reviving cells from cryo-preservation. cell culture application in pharmaceutical research.

Unit III

Basic techniques in plant tissue culture - Introduction to plant Cell & Tissue Culture. Design & lab setup of Tissue Culture laboratory, Tissue culture Media (Composition preparation), Types of culture. Role of Plant Hormones in growth & development of Plants. Micro propagation (Organogenesis, Somatic Embryogenesis, Shoot tip culture, Rapid clonal propagation, Embryo Culture & Embryo Rescue, Acclimatization of Plants) *In vitro* mutagenesis. Cryopreservation, Slow growth & DNA Banking for germ plasm conservation.

Unit IV

Plant cell culture, plant transformation technology & its applications. Basics of Tumor formation, Hairy root, features of Ti & Ri Plasmid, Mechanism of DNA transfer role of Virulence gene, Use of Ti & Ri as vectors, Binary vectors, Use of 35s & other promoters genetic markers methods of nuclear transformation viral vectors & their applications, Multiple gene transfers vector less or direct DNA transfer ,Use of reporter gene, Particle bombardment, electroporation, Microinjection, Transformation of monocots, Transgene stability & gene silencing in Plant transformation. Applications of Plant Transformation for Productivity & performance Herbicide resistance like atrazine, Insect resistance Bt gene, non Bt like protease inhibitors, Virus resistance, disease resistance, antibiotic stress, post harvest losses long shelf life of fruits & flowers. Chloroplast transformation, Advantage vectors & success with tobacco & potato Metabolic engineering & Industrial products.

Unit V

Cell immortalization – Steps and process of species specific cell immortalization, Methods of immortalization: integration of SV40, hTERT, HPV E6/E7, EBV, and MycT58A, RasV12, and p53^{-/-} Cell Immortalization Systems, impacts of immortalization in animal cells, Applications of immortalized cells in clinical research. Ongo genes and tumor suppressor genes.

References

1. Morgan, S. I. Animal cell culture, 1993, Bio Scientific Publishers Ltd, Oxford.
2. Freshney, R.I. Culture of Animal cells: A Manual of Basic Technique, 1994, John Wiley and Sons Inc. Publication, USA.

3. Butler, M. Mammalian, cell Biotechnology: A Practical Approach (1991), IRL Press, Oxford.
4. Jenni P. Mather and David Barnes, eds; Animal cell culture Methods, Methods in cell Biology, vol.57, Academic Press.
5. Cell Culture: Methods in enzymology, Vol-58, Academic Press 1979 or recent.
6. An introduction to Plant Tissue Culture 2nd edn. Razdan, M. K, Science Publishers, USA.
7. Textbook of plant biotechnology, Chawla P.K. 2002, Oxford & IBH, New Delhi.
8. Bhojwani, S. S. and M. K. Razdan 1996. Plant Tissue Culture: Theory and Practice, Elsevier Pub.
9. Chrispeels, M. J. 2002. Plant Tissue Culture: Genetical Aspects. Jones and Bartlett Publishers, International.
10. Chopra V. L. et al 1999. Applied Plant biotechnology. Science Publishers Inc.
11. Verpoorte, R. and A.W. Alfermann (Eds) 2000. Metabolic Engineering of plant secondary metabolism, lower Academic Publisher.

Manonmaniam Sundaranar University

Abishekapatti – 627 012

Ph. D. PROGRAM IN BOTANY

(For all affiliated colleges/Research centres and University Department)

Course Structure and Syllabus as per the Choice Based Credit System (CBCS)

(Curriculum Effective From July 2017 Onwards)

Course Structure for Ph. D. Program in Botany – 2017 onwards

S. No.	Name of the course	Hrs/week	Credits
CORE PAPERS			
1	Research and Teaching Methodology	4	4
2	Advances in Plant Science	4	4
ELECTIVE PAPERS			
3	Plant Conservation Biotechnology	4	4
4	Developmental Botany & Plant Biotechnology	4	4
5	Phytochemistry and Pharmacognosy	4	4
6	Bio fertilizers and Plant Responses	4	4
7	Soil Fertility and Plant Nutrition	4	4
8	Ecology, Biodiversity and Sustainability	4	4
9	Taxonomy of Angiosperms	4	4
10	Plant Anatomy and Reproductive Biology	4	4
11	Algal Technology	4	4
12	Bryophyte Systematics and Evolution	4	4
13	Ethnomedicine	4	4
14	Marine Botany	4	4
15	Vascular Cryptogams	4	4
MINI PROJECT			
	Mini Project	4	4

Candidates with PG qualification should earn a total of 16 credits

Candidates with M.Phil. qualification should earn a total of 8 credits

RESEARCH AND TEACHING METHODOLOGY

L	C
60	4

Objectives

- To understand the principles and operation of basic and advanced instruments required for doctoral research
- To analyse the scientific findings and data by applying certain statistical methods and software
- To learn the methods of teaching and carrying out scientific research, documentation and communication

Unit I Microscopic and Analytical techniques (15 hrs)

Microscopy-principles and applications. Properties of electromagnetic radiation- Light, Phase contrast and Fluorescence microscopy. Electron Microscopy-Principles and applications of TEM and SEM- Preparation of materials for Electron Microscope.Spectroscopic techniques- UV and Visible, Fluorescence, IR, NMR, AAS, AES and AFM. Electrochemical techniques- Radioisotope techniques-radioactivity, atomic stability and radiation-radiation decay. Detection and measurement of radioactivity and applications of Geiger-Müller and Scintillation Counter. Labelling of biological molecules and autoradiography.

Unit II Separation techniques (8 hrs)

Chromatography- Principles and applications- GC, GLC, HPLC, MS.Electrophoretic techniques- Principles and construction of horizontal and vertical electrophoresis-Buffers and electrolytic separation- detection by staining and estimation of electrophorogramsgel documentation. Molecular techniques: PCR based-RFLP, RAPD, AFLP, SSR, blotting techniques.

Unit III Statistical Methods (10 hrs)

Population and sampling, data collection, analysis and graphical representation. Measures of Central Tendency, Measures of Dispersion-Standard Deviation, Correlation and Regression analysis, Probability -normal and binomial distribution. Statistical testing: F-test, t-test and chi-square test. Experimental design, ANOVA one way and two way analysis, statistical software- MS Excel and SPSS.

Unit IV Research Methods (12 hrs)

Research- Meaning - Role of a researcher – Hypothesis - Methods-Approaches Objectives. Literature and Reference collection. Role of libraries in research, virtual libraries, Internet-Worldwide web-searching and browsing tools- e-journals and e-books. Impact factor, H- index, citation. Manuscript preparation- Citation and Proof correction, Thesis/Dissertation components - Introduction, Review, Materials and methods, Results -tables, figures, footnote, Discussion, Summary and Conclusion. Role of Supervisors/Guides in research.

Unit – V Teaching methods (15 hrs)

Teaching – Objectives of teaching, phases of Teaching – Teaching methods: lecture method, discussion method, discovery learning, Inquiry, Problem solving method, project method. Seminar- Integrating ICT in teaching: Individualised instruction, ways for effective presentation with power points, documentation - Evaluation; formative, summative & continuous and comprehensive Evaluation. Later Adolescent Psychology: meaning, physical, cognitive, emotional, Social and moral Development –Teaching later adolescents.

Reference Books:

1. Bryan C Williams and Keith Wilson 1983, A biologist's guide to practical techniques of Practical Biochemistry Second edition. Edward Arnold Publications.
2. David Plummer, 1988. An Introduction to Practical Biochemistry, Tata McGraw Hill Publishing Company, New Delhi.
3. George Casella and Roger L. Berger, 2003. Statistical Inference II Ed. Duxbury Advanced Series, Thomson Press.
4. Jayaraman, J,1985. Laboratory Manual in Biochemistry, Wiley Eastern Ltd.
5. Johansen, M., 1940. Plant Microtechnique, McGraw Hill Publishing Company, New Delhi.
6. Keith Wilson and John Walker., 2000. Practical biochemistry V Edition Cambridge Universities Press, London.
7. Stock, R and Rice, C.B. F., 1980. Chromatographic methods, Chapman and Hall Ltd. London.
8. Steel and Torrie, 1986. Principles and Procedures of Statistics with special reference to Biological Sciences.
9. Kothari, C.R., 2004. Research Methodology Methods and Techniques, New Age International
10. Isaac, S., Michael, W., 1971. Handbook in research and evaluation, (2nd ed.), San Diego, USA
11. Gomez, K.A., Gomez, A.A., 1984. Statistical procedures for agricultural research, John Wiley & Sons.
12. Townend, J., 2012. Practical statistics for environmental and biological scientists, John Wiley & Sons.
13. Sampathkumar, K, Panneerselvam, A. & Santhanam, S. 1984. Introduction to educational technology 2nd revised ed. Sterling Publishers, New Delhi.
14. Sharma, S. R. 2003. Effective classroom teaching modern methods, tools and techniques. Mangal Deep publishers, Jaipur.
15. Vedanayagam, E. G. 1989. Teaching technology for college Teachers, Sterling publishers, New York.

ADVANCES IN PLANT SCIENCE

L	C
60	4

OBJECTIVES

- To comprehend the important aspects of biodiversity and conservation methods
- To make the scholar abreast in advanced areas of plant science and the recent developments
- To equip the scholar to learn the theoretical and application concepts on economic and medicinal importance of plants

Unit 1- Climate change and plant diversity (12 hrs)

Biodiversity – Alpha, Beta, Gamma; Species, genetic and ecosystems diversity. Centres of origins of crops – Vavilov’s Theory, Megabiodiversity, centres of origin of genetic diversity, Plant Genetic Resources (IBPGR/ NBPGR). Endangered plants – IUCN categories, Red Data Books, *In Situ* and *Ex situ* conservation strategies. Components of the atmosphere, greenhouse gases & green house effect, global warming and climate change, sea level rise, increased CO₂ levels, impacts on plants. Carbon sequestration, carbon credits and economy and energy policy. Climate Change adaptation and mitigation strategies (UNEP/ FAO/ IPCC / GBIF / CBD).

Unit -2 Plant Physiology (12 hrs)

Photosynthesis recent concepts in Photosystems I & II, ATP complex. Chloroplast DNA. Water transport and utilization. Resource mobilization and allocation. Advances in auxin and cytokinin molecular synthesis and function. Biochemistry of plant animal interaction.

Unit – 3. Plant Energy (12 hrs)

The concept of energy richness in plants – lignocelluloses, sugars and terpenoids. Plants that produce fuel, wood, waxes, alcohol and hydrocarbons. Products include biodegradable plastics, industrial enzymes, industrial oils, biofuels, fibers, papers, agents for bioremediation, phytoremediation.

Unit – 4 Molecular biology (12 hrs)

Cloning vectors and Transgenics. Genetic improvement of medicinal plants through Biotechnology and Genetic engineering. Molecular diversity analysis using various types of markers. Applications of molecular techniques in herbal research. Applications of *in-vitro* culture methods in drug production. Growing and harvesting genetically engineered crops to produce compounds of industrial importance.

Unit – 5 Advances in Plant Medicines (12 hrs)

Plants as bioreactors, molecular pharming - production of pharmaceutically valuable compounds from plants. Plant made pharmaceuticals (PMP). Plantibodies Edible Vaccines / Plantigens,

Interferon's, Blood clotting factors, Anticoagulant, Hormones, Enzymes, Secondary metabolites, other proteins. IPR and medicinal plants.

References

- 1) Melchias, G. 2001. Biodiversity and Conservation. Science Publishers, NH USA
- 2) Krishnamurthy K.V. 2004. Advanced Textbook on Biodiversity: Principles and Practice. Oxford & IBH, New Delhi.
- 3) The World Conservation Strategy. IUCN, Switzerland.
- 4) Heywood, VH (Ed.). 1995. Global Biodiversity Assessment Report .UNEP.
- 5) Bidwell. R. G. S. 1979 Plant Physiology. Macmillon Delhi.
- 6) Lea, P. J. and R. C. Leegood. 1993. Plant Biochemistry and Molecular Biology, JohnWiley & Sons. New York.
- 7) Hans-walter heldt. 1997. Plant biochemistry and molecular biology. Oxford university press, New York. USA.
- 8) Jogdand. S.N.1997. Environmental Biotechnology – Industrial Pollution Management. Himalaya Publishing House.
- 9) Watson, J.D. and W.A. Benjamin. 2004. 3rd Edition. Molecular Biology of the Genes. Benjamin Cummings.
- 10) Freifelder, D. 1983. Molecular Biology. 2nd Ed. Narosa publishing house.
- 11) Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology, W.H. Freeman and Co., New York, USA.
- 12) Wolfer, S.L. 1993 Molecular and Cellular Biology, Wadsworth Publishing, USA.
- 13) Revised guidelines for research in Transgenic plants (August 1998), Department of Biotechnology, Ministry of Science & Technology, Government of India, New Delhi.

PLANT CONSERVATION BIOTECHNOLOGY

L	C
60	4

OBJECTIVES

- To study the essentiality of conservation of rare plants and their conservation status by IUCN
- To enhance the understanding on conservation and linking biotechnological tools in conservation programs
- To learn the recent theoretical and practical approaches towards conservation of germplasm

Unit –1 Conservation (12 hrs)

Introduction - Need for inventorying and documentation. Principles of conservation; extinctions; environmental distribution status of plants based on international union for conservation of nature (IUCN). Red data list of Indian plants.

Unit – 2 Plant conservation Biotechnology (12 hrs)

Integration of biotechnology into conservation practices. Molecular approaches to assessing plant diversity. Biotechnology in plant germplasm acquisition. Methods of Plant conservation, and sustainable utilization of plant genetic resources.

Unit – 3 Tissue culture techniques (12 hrs)

In vitro Plant Conservation: Culture room and lab facilities. Media composition and preparation – plant growth regulators, adjuvants; sterilization. Morphogenetic patterns. Callus culture - Subculture, differentiation, and regeneration. Organogenesis : Embryoids, Caulogenesis, Rhizogenesis, Cell Line, Somaclone, Gametoclone.

Unit – 4 Micro propagation (12 hrs)

Preparative stage: Germplasm acquisition and selection of explants. Establishment stage: Axenic and viable cultures. Multiplication stage. Plantlet production: induction of roots and acclimatization of plantlets to green house condition. Somatic embryogenesis. Synthetic seed technology. Suspension culture, in vitro production of secondary metabolites, cell immobilization.

Unit – 5Cryopreservation and Germplasm storage (12 hrs)

Slow or retarded growth. Principles, Cryoprotection, Freezing and long term cryogenic storage, protocols and recovery of germplasm. Conservation of Rare, endemic, threatened and economically important plants of India, current status and Active research stations in India. Stability assessments of conserved plant germplasm.

References

1. Dodds.I.H, and Roberts.L.W, 1995, Experiments in plant tissue culture. Cambridge University press, London.
2. Erica Benson. 1999, Plant conservation Biotechnology. Taylor and Francis Ltd., UK.
3. Dixon.R.A, 1994, Plant cell culture, A Practical approach.IRL press.Oxford, London.
4. Freifelder.D.1990.Molecular Biology.Narosa publishing house, New Delhi.
5. Murray Moo – Young. Plant biotechnology, comprehensive biotechnology series, pergamon press, Netherlands.
6. Narayanasamy.S, 1994, Plant cell and tissue culture. Tata McGraw – Hill Publishing co., Delhi.
7. Yeomen, 1987, Plant cell culture technology. Narosa Publication. New Delhi.
8. Lindsay, 1992, Plant Tissue Culture manual, Kluver Academic Publishers. Netherland.
9. George. E. F, 1994, Plant Propagation by Tissue culture. Exegetics Ltd., England.
10. Vasil.I.L, and Vasil.V.K, 1992, Plant Biotechnology and tissue culture. Kluver Academic Publishers, Netherlands.
11. Raven, Johnson, Losos, Mason and Singer 2008. BIOLOGY. 8th edition. McGraw Hill. New York, New Delhi.
12. Russell, Wolfe, Hertz and Starr 2008. Biology – THE DYNAMIC SCIENCE. Thomson Brooks/Cole, Australia, United States.

DEVELOPMENTAL BOTANY

L	C
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UNIT I -MERISTEMS

Organization of Meristem – Stem (monocot & dicot) – root (monocot & dicot) cambium and secondary growth in dicots, anomalous secondary growth, Secondary thickening meristem in monocots. Microtechnique – anatomical fingerprinting. Histochemical localization of starch, proteins, oil and phenols. **13 HRS**

UNIT II – PLANT HORMONES

– Growth hormones and their role in development and resource mobilisation : Auxin, Cytokinin and Gibberellins- Functions and genetic molecular mechanism. **8 HRS**

UNIT III – DIFFERENTIATION AND MORPHOGENESIS

Cellular mechanisms of Development – overview of development- cell differentiation – pattern formation – morphogenesis – environmental effects on development. Growth and development through tissue culture – cell, tissue, organ culture – regeneration through somatic embryogenesis. **14 HRS**

UNIT IV – WATER AND FOOD MOVEMENT

Mobilization of food reserve – Pathway of upward movement of water and mineral ions – Mechanism of upward Movement in the xylem – Pathway of Movement of Organic Assimilates – Mechanisms of movement in Phloem. Cell wall architecture Mobilization of cell wall reserves (NSPs) in grasses. **12 HRS**

UNIT V – GENETIC CONTROL IN DEVELOPMENT

Gene expression with reference to plant development- Auxin response genes: Aux/IAAs, sUAR and GH3. Reactive Oxygen Species (ROS)- Nuclear gene expression: regulation by light. Differential gene expression in fruits and seeds. **13 HRS**

References

1. Raven, Johnson, Losos, Mason and Singer 2008. Biology. 8th edition. McGraw Hill. New York, New Delhi.
2. Russell, Wolfe, Hertz and Starr 2008. Biology – THE DYNAMIC SCIENCE. Thomson Brooks/Cole, Australia, United States.
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6. Rudall 2006. Anatomy of Flowering Plants – An Introduction to Structure and Development. Cambridge University Press.
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10. Nicholl 2008 – An Introduction to Genetic Engineering 3rd edition. Cambridge University Press.
11. Primrose and Twyman 2006. Principles of Gene Manipulation and Genomics 7th edition. Blackwell.

PHYTOCHEMISTRY AND PHARMACOGNOSY

L	C
60	4

Objectives

- To have an understanding on the need for phytochemical studies which help to know the diversity of chemical compounds present in the plants.
- To learn the methods used in the extraction of the diverse compounds and their economic importance.
- To understand the need for pharmacological studies that help in the formulation of drugs for the benefit of humankind.
- To know the various analytical methods approved by WHO to standardize crude drugs.

UNIT- I Phytochemistry:

Scope, importance in pharmaceuticals industry, preparation of plant extracts - digestion, decoction, percolation, hot continuous extraction, aqueous alcoholic extraction, superficial fluid extraction and counter-current extraction. **(12 hrs)**

UNIT - II Secondary metabolites:

Definition, classification, natural sources and therapeutic applications of flavonoids: Flavones, Flavanones, Flavonols, Anthocyanins. Alkaloids: Ephedrine, Serpentine and Morphine. Volatile oils - source, constituents, extraction and uses. **(12 hrs)**

UNIT- III Glycosides:

Definition, properties, classification, natural sources, pharmacological and toxicological effects of glycosides. Terpenoids: β -Sitosterol, Glycyrrhizin. Phenolics: Coumarins and Tannins. **(12 hrs)**

UNIT-IV Pharmacognosy:

Definition, scope, Classification of drugs - morphological, taxonomical, pharmacological and chemical. Collection and processing of crude drugs - antichemical, phytochemical, antimicrobial and chemical. Preparation of plant extracts - maceration, infusion, decoction, percolation, sonication, hot continuous extraction, superficial fluid extraction and counter-current extraction. **(12 hrs)**

UNIT -V

Screening and WHO Standardization of crude drugs (WHO guidelines): Physicochemical (Ash and Extraction values), fluorescence analysis, qualitative and quantitative analysis, basic chromatographic and spectroscopic analysis of crude drugs. **(12 hrs)**

References

1. Agarwal, S.S and M. Paridhavi. 2007 Crude Drug Technology. Universities Press, Hyderabad
2. Anonymous, 1948-1976. The Wealth of India 11 Vols.
3. Bhattacharjee, S. K. 2004. Handbook on medicinal plants, Pointer publishers. Jaipur
4. Evans, W.C. 1997. Pharmacognosy. Harcourt Brace & Co., Asios Pvt., Ltd.
5. Faroogi, A.A and Sreeramu, B.S. 2001 Cultivation of Medicinal and Aromatic Crops, Universities press.
6. Gurdeep Chatwal 1983. Organic Chemistry of Natural Products. Himalaya Publishing house, Mumbai.
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9. Sharma, P. 2000. Database on Medicinal Plants used in Ayurveda. Ministry of Health and Family Welfare.
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BIOFERTILIZER AND PLANT RESPONSES

L	C
60	4

Objectives

- To enhance the understanding of the nutrient management and plant nutrient requirements
- To impart knowledge on the importance and mechanisms of the biological nutrient enhancement and availability to the plants.
- To reveal the application of potential biofertilizer agents currently used

Unit 1: Integrated Plant Nutrient Management (12 hours.)

Biofertilizers - classification, potential to improve crop production, chemically fixed Nitrogen versus biologically fixed nitrogen, and synergistic interaction between biofertilizing agents. Biofertilizing agents and plant disease control. Brief account of beneficial microorganisms – *Rhizobium*, *Azospirillum*, *Azotobacter* and mycorrhiza.

Unit 2: Nitrogen Fixation (12 hours.)

Historical review, biochemistry and regulation of biological nitrogen fixation, factors affecting nitrogen fixation, key organism fixing nitrogen - *Rhizobium*, *Azospirillum* and *Frankia*

Unit 3: Phosphate Solubilizing Microorganisms (12 hours.)

Phosphate fixation and solubilization in different soils. Factors affecting phosphate solubilization - mechanisms of action and role of acids. Biological phosphorus solubilization and effect on crop yield. key P-fixing fungal and bacteria with special emphasis on mycorrhiza.

Unit 4: Biofertilizer Application and Evaluation Techniques (12 hours.)

Different methods of biofertilizer inoculation - seed inoculation, top dressing of biofertilizers, granular biofertilizers, frequency of inoculation, liquid inoculation of biofertilizers, culture pellet, and methods of application of other biofertilizers. Preparation and use of inoculant - *Azotobacter*, *Azospirillum*, mycorrhizae, and *Rhizobium*. Role of humus in influencing the biofertilizer inoculation.

Unit 5: Crop Response to Biofertilizers (12 hours.)

Influence of symbiotic nitrogen fixation, *Azotobacter*, *Azospirillum*, and mycorrhizae in irrigated and dry crops and fodder crops. Factors affecting crop response to biofertilizers, interaction effect of microbial strains, effect of nutrient interactions, interaction of inoculants with other nutrients, multi-microbial inoculation and compatibility between biofertilizers and chemical fertilizers.

REFERENCES

1. Rai, M.K. (2006). Handbook of Microbial Biofertilizers, the Haworth Press, Inc
2. Kannaiyan, S. 2002. Biotechnology of Biofertilizers. Springer Netherlands, p.376.
3. Dubey, R.C. and Maheshwari, D.K. 2013. A Textbook of Microbiology (Revised edition). S. Chand & Company Ltd., New Delhi
4. Relevant Journal papers & Reviews

SOIL FERTILITY AND PLANT NUTRITION

L	C
60	4

Objectives

- To introduce the student with the problems of soil plant nutrient availability and the ways to manage and improve the productivity.
- To impart knowledge on the essentiality of the key elements of plant nutrition and the ways to enhance their availability in soil.
- To introduce the biological method of enhancing the nutrient availability and plant uptake

Unit 1: Soil as a medium for plant growth (12 hours.)

Abiotic and biotic elements of soils, formation of soil, classification and soil profiling. Characteristics and impact of acidic, saline, and alkaline soils on crop productivity. Importance of C: N ratio and pH in plant nutrition.

Unit 2: Soil fertility and productivity (12 hours.)

Soil properties on nutrient availability, definition of soil fertility in terms of productivity, soil types in wild and agrarian systems, soil patterns and agricultural regimes in Tamilnadu. Factors affecting soil fertility. Essential plant nutrients- NPK other major and minor nutrients, chelates. Classification of nutrients based on utilization and metabolic functions in plants. Criteria of essentiality of elements.

Unit 3: Plant Essential Nutrients (12 hours.)

Essential plant major and minor nutrient elements - functions, deficiency systems, biogeochemical cycles, transformations and availability. Effective consumption of nutrients, plant-microbe interface interactions in soils, positive and negative plant to plant interactions, changes in water table and its consequences.

Unit 4: Influence of microbes on plant nutrition (12 hours.)

Role of microorganisms in organic matter decomposition, and humus formation. Nitrogen fixation and cycling, phosphorus mobilization, calcium and potassium uptake and transport. Key microorganisms of nitrogen and phosphorus turnover in soil.

Unit 5: Fertilizer application (12 hours.)

Use of fertilizers, manures, mulch and bio supplements, concept of organic farming, and significance of green manure. Agricultural applications and dispensation of fertilizers- Methods of fertilizer application- solid and liquid forms of fertilizer application and their merits and demerits. Comparison of chemical and biological fertilizers on the basis of definition, application and crop protection potential. Analytical methods for soil nutrients.

REFERENCES

1. Western Fertilizer Handbook (9th edition). 2002. California Plant Health Association, Sacramento, Ca.
2. Brady, N.C. and R.R. Weil. 2005. The Nature and Properties of Soils (14th Ed.) Prentice-Hall, Inc.
3. Rai, M.K. (2006). Handbook of Microbial Bio fertilizers, the Haworth Press, Inc.
4. Benton Jones, Jr. J. 2012. Plant Nutrition and Soil Fertility Manual (Second Edition) CRC Press.
5. Journal review and research articles.

ECOLOGY, BIODIVERSITY AND SUSTAINABILITY

L	C
60	4

Objectives

- To gain knowledge on the biogeography, ecosystem diversity and biodiversity hotspots of India.
- To understand the concepts of vegetation analysis
- To understand the reasons for the loss of habitats/biodiversity and learn to find solutions to minimize degradation.
- To understand the need for the sustenance of habitats including man-made ones and conserve them for the benefit of humankind.
- To be aware of the existing social issues and the laws enforced to tackle the issues.

UNIT - I Biodiversity:

(12 hrs)

Introduction, definition, genetic and species diversity. Ecosystem diversity - Aquatic: ponds, lakes, streams, rivers, estuaries, oceans, desert ecosystem, grassland ecosystem, forest ecosystem, insular species diversity.

UNIT - II Biodiversity of India

(12 hrs)

India as a Megabiodiversity nation, Biogeographical classification of India, Biodiversity hotspots of India, Eastern Himalaya, Western Ghats, Eastern Ghats, Deccan Plateau, Gulf of Mannar, Andaman and Nicobar Islands. **Threats to biodiversity:** Habitat loss - Causes, effects and solutions; Poaching of wildlife - Causes, effects and solutions; Man-wildlife conflicts - Causes, effects and solutions; Endangered and endemic species of Peninsular India.

Unit-III: Vegetation Organisation and Diversity Analysis(12 hours)

Concepts of species, population and community; analysis of communities; community coefficients, inter specific associations, and concept of ecological niche; temporal and seasonal changes; island biogeography, and mangroves.

Ecophysiology and Diversity Analysis - Conceptual introduction; plant functional traits; phenological studies and their importance; analysis of density, species richness and diversity of plants; diversity indices; ecological genetics.

UNIT-IV Food and Agricultural resources and their conservation:(12 hrs)

Centres of origin of cultivated plants, Wild relatives of cultivated plants, Agriculture and food production, Agriculture and ecosystem degradation, Impacts of modern agriculture on environment - effects of fertilizers, pesticides, water logging and salinity, Sustainable agriculture and food production. Role of FAO.

UNIT – V Social issues and the environment:(12 hrs)

From unsustainable to sustainable development, Environmental ethics: issues and possible solutions, Consumerism and waste products, Environment Protection Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness. KYOTO protocols.

References

1. Annamalai, R. 2004. *Tamil Nadu Biodiversity Strategy and Action plan. Wild Plant Diversity*. Government of Tamil Nadu, Chennai.
2. Chapman, J.L. and Reiss, M.J. 1995. *Ecology: Principles and Applications*. Cambridge University Press, Cambridge.
3. Chhatwal, G.R. 1998. *Encyclopaedia of Environmental Biology*. Anmol Publications Pvt., Ltd. New Delhi.
4. Daniels, R.J.R. & Krishnaswamy, J. 2009. *Environmental Studies*. Wiley, India.
5. Dash, M.C. 2001. *Fundamentals of Ecology*, 2nd Edition. Tata McGraw Hill Publishing Company, New Delhi.
6. Gleason, H.A. & Cronquist, A. 1964. *The Natural Geography of plants*. University Press, New York.
7. Groom Bridge, B. 1995. *Global Biodiversity*. Chapman & Hall, London.
8. Krishnamurthy, K.V., Murugan, R. & Ravikumar, K. 2014. *Bioresources of the Eastern Ghats - their conservation and management*. Bishen Singh Mahendra Pal Singh, Dehra Dun.
9. Kumaresan, V. and Arumugam, N. 2015. *Plant Ecology and Phytogeography*. Saras Pub., Nagercoil.
10. Odum, E.P. & Barrett, G.W. 2005. *Fundamentals of Ecology*, 5th Edition, Affiliated East West Press Pvt. Ltd., New Delhi.
11. Odum, E.P. 1971. *Fundamentals of ecology*. W.B. Saunders Company, London.
12. Pullaiah, T., Karuppusamy, S. & Rani, S.S. 2014. *Biodiversity in India*. Vol. Astral International Pvt. Ltd. New Delhi.
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14. South Wick, C.H. 1976. *Ecology and the Quality of our Environment*. D. Van Nostrand Company, New York.
15. Turk, J. 1985. *Introduction to Environmental Studies*, 2nd Edition. Saunders College Publishers, Japan.

TAXONOMY OF ANGIOSPERMS

L	C
60	4

Objectives

- To improve the understanding of the taxonomy of angiosperms and its need
- To instill the significance of angiosperm taxonomy and its importance in conservation
- To prepare the students to become a researcher in angiosperm taxonomy

Unit I: Origin and evolution of Angiosperms (10 hours)

Ascent of angiosperms in geological time scale, major sites of origin. Theories with respect to time, place possible ancestors

Unit II: Plant nomenclature (13 hours)

Binomial Nomenclature, ICBN to IUCN; Methods of Botanical name(Latin)-Plant identification: Herbarium taxonomy, Botanical gardens, Taxonomic literature, Indented and Bracketed keys; Taxonomic hierarchy - Major categories, minor categories, species concept; Taxonomic evidences - Morphology, Anatomy, Palynology, Embryology, Cytology, Photochemistry, Genome analysis and Nucleic acid hybridization.

Unit III: Plant systematics and classification (13 hours)

Pre Darwinian Classification Based on form relationship (Bentham and Hooker); Post Darwinian classification Engler and Prantl, Bessey's, Hutchinson, Takhtajan and Cronquist; Recent modifications : Dahlgren's system of classification; Biosystematics Concept, aims and objectives, categories, methods in biosystematics, Ecotypic variations, scope and limitations, comparison of classical taxonomy and biosystematics; Angiosperm Phylogeny Group IV.

Unit IV: Numerical Taxonomy (12 hours)

Phenetic methods in taxonomy (taxometrics), principles, construction of taxonomic groups, OUTs, unit character, measurement of resemblances, cluster analysis, phenons and ranks, discrimination, nomenclature and numerical taxonomy, applications, merits and demerits, cladistics and cladogram, parsimony analysis, cladistics and classification

Unit V: Chemotaxonomy (12 hours)

Significance of chemotaxonomy, classes of compounds and their biological significance, uses of chemical criteria in plant taxonomy, protein and taxonomy, seed proteins, serology and taxonomy, application of serological data in systematic.

REFERENCES

1. Dunn G, Everitt ES. 2012. An Introduction to Mathematical Taxonomy, Dover Publications, New York
2. Singh G. 2016. Plant Systematics, Third Edition, Science Publishers, Plymouth
3. Sharma OP. 2016. Plant Taxonomy, 13th Reprint, Mc Graw Hill Education, New Delhi
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9. Takhtajan A. 2009. Flowering Plants, First Edition, Springer-Verlag, Germany

PLANT ANATOMY AND REPRODUCTIVE BIOLOGY

L	C
60	4

Objectives:

1. Understand the types of tissues and their organization.
2. Compare the tissue components of vegetative and reproductive parts of a plant.
3. Principles of histochemistry and methods of localization of important chemical constituents.

Unit I Meristems

Types: Apical, lateral and intercalary. Tissue system: simple and permanent tissues. Complex tissues- xylem and phloem. vascular cambium origin, structure and development, seasonal activity of cambium, factors affecting cambial activity. (12 hrs)

Unit II stem anatomy:

Structure of a typical young dicot stem, normal secondary growth in a dicot stem. Leaf anatomy : structure and ontogeny of a dicot leaf, petiole anatomy. Anatomy of reproductive structure flower bud and mature flower. Nodal anatomy – Uni, tri and multilacunar node. (13 hrs)

Unit III Reproductive Biology

Floral structure, Pollination types – anemophily, hydrophily entemophily, ornithophily and chaerapterophily. Pollen pistil interaction and significance of the structure of style and stigma. (10 hrs)

Unit IV External secretory structures

Trichomes and glands, Nectaries, Hydathodes Internal secretory structures : secretory cells, secretory cavities and canals, laticifers. (10 hrs)

Unit V Histochemistry

Histochemical localization of cellular components - starch, Proteins Nucleic acids and lipids. Phytochemistry - basic concepts. Qualitative tests for alkaloids flavonoids, saponins, tannins, terpenoids and glycosides. (15 hrs)

References:

1. Eames A. J. and Mac Daniels L. H., 1990. An introduction to Plant Anatomy Tata McGraw Hill Publishing Company, Bombay-New Delhi. (Unit I & II).
2. Foster and Gifford .1967. Comparative morphology of vascular plants. Second edition. Valkis Feffer and Simons pvt. Ltd. Bombay.
3. Bhojwani,S.S. and Bhatnagar, S.P. 2005. Embryology of Angiosperms. vikas publishing house Pvt. Ltd., New Delhi. (Unit IV&V)
4. Esau K. 1991. Plant Anatomy. Wiley Eastern Limited. New Delhi.
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8. Maheshwari, P.1971. An Introduction to the Embryology of Angiosperms McGraw Hill Book Company, Inc., London.
9. Shivanna, R. Jobri. B.M. and Sastri. D.C. 1985. Development and physiology Angiosperm pollen. Wiley Eastern Ltd., New Delhi. (Unit IV & V).
10. Krishnamurthy, K.V. 1988. Methods in Plant Histochemistry. Viswanathan Printers Publishers Ltd., Chennai.

ALGAL TECHNOLOGY

L	C
60	4

Objectives:

- **To understand the concept and life cycle of algae.**
- **To learn the methods and approach towards the eco friendly aspects.**
- **To gain an insight on the various advancement in algal technology**

Unit:I - General account (12 Hrs)

Introduction: General account- Distribution, resources of algae. Classification of Algae (Fritsch,1935 &1945;Chapman and Chapman,1973;and Sybil and Parker,1981).Taxonomic Key for identification of economically important algae – Intended & Bracketed keys. Identification of algae in the field. Research centres of algae-Indian algalogists and their contribution: F.Boergeson. M.O.P Iyengar (1886-1963), M.S.Randhawa (1932-1959). and T.V.Desikachary (1919-2005) Role of Centre for Seaweed Herbarium & Marine Algal Research Station (MARS).

Unit: II-Structure and Reproduction of Algae(12 Hrs)

Structure and reproduction.- Range of Thallus structure , Patterns of reproduction and life cycle. Cell structure and organelles: Fine structure and functions. Chemical composition of marine algae-Macro & Micromolecules. Economic Importance of Algae.

Unit-III-Common Algal Pigments(12 Hrs)

Introduction- Common Algal Pigments : Structure and properties of some important algal pigments -Phycocerythrin, Phycocyanin, Beta-carotene, Chlorophyll and Fucoxanthin. Extraction of Algal Pigments and Role of Algal Pigments- Dyes and Colorants from Algae: Textile dyeing- Chlorophyll (*Caulerpa taxifolia.*) and Pharmaceutical dyeing- anthocyanin(*Spirulina sp.*) .

Unit-IV- Extraction, Processing and uses of Nutraceuticals (12 Hrs)

Phycocolloids: Agar-agar (*Gelidiella sp.& Gracilaria sp.*), Carageenan (*Hypnea sp. & Eucheuma sp.*), Algin (*Sargassum sp. & Padina sp.*) Omega-3 polyunsaturated fatty acids (*Nannochloropsis*). Nutraceutical tablets & tonic from *Spirulina sp.* and β -Carotene (*Dunaliella sp.*).

Unit-V- Commercial products from algae:(12 Hrs)

Preparation and applications of the Following: Salad & Soup (*Ulva, Caulerpa*) Jelly, Candy, Gelatin, Food thickeners, Sushi, (*Gracilaria sp.*) Tooth paste (Carageenan- *Euchuma sp.*). Seaweed Liquid Fertilizer (*Sargassum sp.*), Biomedicine: Caulerpin, Caulerpicin (*Caulerpa sp.*) and Heparin (*Grateloupia sp.*)

Text Books :

1. Ashutosh Kar (2010) . Chemistry of Natural Products, Vol. 1 CBS Publishers and Distributors Pvt Ltd, e-book.
2. Boergeson, F. (1938). Contributions to the South Indian marine algal flora. III. J. Indian Bot. Soc. 17: 205 -242.
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5. Fritsch F. E. (1952) The Structure and Reproduction of the Algae ; Volume 2, First Edition. Cambridge University Press.
6. Ganguly, H.C., Kar, A. K., and S.C. Chandra (2013) College Botany, Vol-I, New Central Book Agency PVT. London.
7. Khattar, J.I.S., Singh, D.P., Kaur, (2009) Algal Biology and Biotechnology, - Microalgae: A source of natural colours, Edition: 1, I. K. International Publishing House Pvt. Ltd. New Delhi,
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10. NIIR Board of Consultants & Engineers.. ISBN: 8178330326. Code: NI160. Pages: 448. Published: 2005. The Complete book on Natural Dyes & Pigments. Publisher: Asia Pacific Business Press Inc. e-book..
11. Pandey B.P., (2000). Revised edition, *Text Book of Botany Algae*, S.Chand & Company, New Delhi .
12. Vashista. P.C. (1996). Text book of Algae, S.Chand Publishers, Meerut.
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BRYOPHYTE SYSTEMATICS AND EVOLUTION

L	C
60	4

Objectives

- To gain knowledge on the origin, evolution and distribution of bryophytes including fossil evidences globally.
- To have a knowledge on habitat preferences, diversity of bryophytes and factors influencing their growth.
- To have a brief knowledge on the morphology, anatomy and life-cycle of bryophytes.
- To be aware of the factors responsible for their loss and find measures to minimize them.

UNIT - I

Origin and evolution: Origin and distribution, Fossil bryophytes, Evolution of gametophytes, Evolution of sporophytes, Primitive and advanced features of bryophytes. **(12 hrs)**

UNIT-II

Diversity: Classification of bryophytes, Diversity, Habitat diversity, Factors influencing the growth of bryophytes, Ecological adaptations. **(12 hrs)**

UNIT-III

Mosses: A comparative study of the morphological and anatomical features of Sphagnales, Polytrichales, Fissidentales, Syrrhopodontales, Funariales, Eubryales, Hookeriales and Hypnobryales. **(12 hrs)**

UNIT-IV

Liverworts: Calobryales, Sphaerocarpaceae, Marchantiales, Metzgeriales Jungermanniales and Anthocerotales. Economic importance of bryophytes. **(12 hrs)**

UNIT-V

Special features: Life-cycle of bryophytes, types of sporogonia/elaters, gemmae/receptacles, calyptrae and operculum and peristome teeth. **(12 hrs)**

References

1. Cavers, F. 1981. The Interrelationships of the Bryophyta. Indian report S.N. Technico (Book House), Patna.
2. Chopra, R.N. & Kumar, P.K. 1988. Biology of Bryophytes. Wiley Eastern Ltd., New Delhi.
3. Daniels, A.E.D. & Daniel, P. 2013. The Bryoflora of the Southernmost Western Ghats, India. Bishen Singh Mahendra Pal Singh, Dehra Dun.
4. Puri, P. 1981. Bryophytes. Atma Ram & Sons, New Delhi.

5. Watson, E.V. 1980. British Mosses and Liverworts. Cambridge.

ETHNOMEDICINE

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- To have an insight into the various Indian Systems of medicine.
- To have a knowledge on the plants used in these systems.
- To understand the ethical values of plants involved in these systems.
- To develop methods of conservation of medicinal plants.

Unit-1 Ethnomedicine (12 hrs)

Definition, role of tribal communities in Ethnomedicine. Historical account of medicinal plants in India. Classification of medicinal plants on the basis of morphological structure viz. leaf, root, stem, rhizome, flower, fruits and seeds. Religious values of plants, faith and mythology, folk songs, plants used in rituals, tribals and medicinal plants, Holy plants in ethno medicine.

Unit-2 Distribution and Status (12 hrs)

Medicinal plants in general, distribution in Western Ghats and Eastern Ghats. Medicinal plants of Tamil Nadu: Endemic, rare and endangered species of medicinal plants.

Unit-3 Conservation (12 hrs)

Collection and conservation of medicinal plants. Sacred groves, Herbal farms, Nurseries, Medicinal gardens, Plants in Temples, Churches and Mosques. A general account of active principles found in the medicinal plants of *Aegle*, *Coriandrum*, *Cuminum*, *Piper*, *Brassica*, *Catharanthus*, *Artemisia*, *Coleus*, *Trichopus*, *Wrightia*, *Azadirachta* and *Taxus*.

Unit-4 Systems of Medicine (12 hrs)

History of Ayurvedic medicine, Ranges of Ayurveda, Significance and plants used in Ayurveda. Principles of Unani medicine, diagnosis and mode of treatment, Unani approach to common ailments. Difference between Ayurvedic and Unani medicines, safety measures in Unani medicines and plants used in Unani system.

Unit-5 Herbal remedies (12 hrs) for Gynaecological morbidity, plants in the treatment of diabetes, herbal remedies for liver diseases, Plants in the treatment of skin diseases, antivenomic and antitoxic plants.

Reference Books

1. Gurdeep Chatwal, 1983. Organic chemistry of Natural Products, Himalaya Publishing

- House, Mumbai.
2. Jean Bruneton, 1999. Pharmacognosy, Second Edition, Lavoisier Publishers, Inc. USA.
 3. Kokate, C.K., Purohit, A.P and Gokhale, S.R. 2004. Pharmacognosy, Nirali Prakashan Publications, Pune.
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 8. William Charles Evans, 2002. Pharmacognosy, Fifteenth edition, Harcourt Brase & Company, Asia Pvt. Ltd.
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 10. Bhattacharjee, S.K. 2004. Handbook on medicinal plants, Pointer Publishers. Jaipur.
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 15. Warriar, P.K., Nambiar, V.P.K & Ramamurthy, C. 1996. Indian Medicinal plants. Vols. 1 - 5. Orient Longman Ltd., Hyderabad.

MARINE BOTANY

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OUTCOMES

- Students will be introduced to marine and estuarine environments
- Students will become familiar with the major micro- and macro- algal groups and marine vascular plants.
- Students will appreciate the roles played by algae, seagrasses and aquatic vascular plants in aquatic ecosystems.
- Students will become aware of how natural events and human activities affect coastal habitats

UNIT: I

(12 hrs)

Marine plant groups and Organisms – Brief account on Marine Phytoplankton – Seaweeds, Seagrasses and Mangroves – Corals and coral reefs. Mangroves – adaptations of marine plants.

UNIT: II

(12 hrs)

Marine Ecology – Physical, chemical and biological characteristics of marine water. Zonations in the oceans (Horizontal and vertical) - Dead zones (Anoxia and Hypoxia) - Tides and their importance.

UNIT: III

(12 hrs)

Photosynthesis of algae (Micro and macro) in sea – Photosynthetic pigments – carbon fixation – Photosynthetic rate – C₃ and C₄ characters in algae. Photosynthesis of mangroves – carbon fixation – Photosynthetic enzymes – accumulation of free amino acids – photorespiration – Nutrition – Salinity regulation and Metabolism of Seaweeds and Mangroves and their methods of regeneration – Biogeochemical role of algae.

UNIT: IV

(12 hrs)

Seaweed Polysaccharides – Commercial and economical products of Seaweed (Agar, Algin and Carrageenan) and Low molecular weight compounds in algae – Methods of collection and preservation of Marine algae – Commercial cultivation of seaweeds (Traditional and Recent methods) – Application and uses of Seaweeds - Economic importance of seaweeds.

UNIT: V

(12 hrs)

Seaweed, Sea grasses, Mangroves and Coral reefs research in India and World. Marine Pollution – human Impact - Conservation strategies of Marine vegetation - Use of Remote sensing techniques in mapping of marine vegetation with GIS.

REFERENCES

- 1. Jackson, D.F. 1972.** Algae and Men. Plenum Press.
- 2. Krishnamurthy, V. 1985.** Marine Plants. Seaweed Research and utilization Association, madras.
- 3. Chapman, V.J. 1976.** Coastal Vegetation. Pergamon press. New York.
- 4. Daves, C.J. 1985.** Marine Botany Physiology and Ecology of Seaweeds.
- 5. Dawson. 1960.** Marine Botany.

VASCULAR CRYPTOGAMS

L	C
60	4

OUTCOME

- An understanding the diversity, life-cycle patterns and major evolutionary trends of Pteridophytes and gymnosperms.
- An understanding of the diversity of pteridophytes and gymnosperms
- An understanding of the evolution of pteridophytes and the fossilization process.

UNIT: I General characters of Pteridophytes

(12 hrs)

General life cycle pattern of homosporous and heterosporous pteridophytes. General ecology of Pteridophytes. Contributions of Indian Pteridologists.

UNIT: II Pteridophyte classification

(12 hrs)

A R Smith *et al.* General morphological, anatomical and reproductive characters of major classes of pteridophytes.

UNIT: III Evolution

(12 hrs)

Cytological evolution in pteridophytes; apogamy and apospory; mechanism of diplospory in apogamous ferns (Dopp and Manton, Braithwaite system).

UNIT: IV Steels

(12 hrs)

Stelar types and stelar evolution, sporangial/soral types and sporangial/soral evolution in pteridophytes.

UNIT: V Pteridophytes of India.

(12 hrs)

Pteridophytes in India:- Rare and endangered species in Western Ghats, South India. Medicinal pteridophytes; Conservation of pteridophytes in India.

REFERENCES

1. **Sporne, K.R. 1985.** The Morphology of Pteridophytes, Hutchinson & Co, London.
2. **Pandey, B.P. 1978.** Pteridophyta. S. Chand & Company Ltd., New Delhi.
3. **Vashista, P.C. 1997.** Pteridophyta. S. Chand and Company Ltd., New Delhi
4. **Rashid, A. 1990.** An introduction to Pteridophyta. Vikas Publishing House Pvt. Ltd., New Delhi.
5. **Manickam, V. S. & Irudayaraj, V. 1992.** Pteridophyte Flora of the Western Ghats,

South India. BI Publications, Pvt. Ltd. New Delhi.

6. **Manickam, V. S. & Irudayaraj, V. 2003.** Pteridophyte Flora of Nilgiris, south India. Bishen Singh & Mahendra Pal Singh. Dehradun, India.
7. **Nayar, B. K. & Kaur, S. 1971.** Gametophytes of homosporous ferns. *The Bot. Rev.* 37: 295-396.
8. **Pullaiah, T. 2003.** Pteridophytes in Andhra Pradesh India. Daya Publishing House, India.
9. **Smith *et al.*, 2006.** A classification of extant pteridophytes. *Taxon* 55(3): 705-731.
10. **Schneider *et al.*, 2016.** A community-derived classification for extant lycophytes and ferns. The Pteridophyte Phylogeny Group. *J. Syst. & Evol.* 54: 563-603.

DEPARTMENT OF CHEMISTRY
MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12
Ph.D. Course Work Papers

Sl. No.	Name of the Course	Credit
1	Analytical Methods And Instrumentation	4
2	Corrosion Science and Engineering	4
3	Research and Teaching Methodology	4
4	Advanced Scientific Techniques in Chemical Analysis	4
5	Advanced Topics in Organic Chemistry	4
6	Chromatography	4
7	Advanced Topics in Physical Chemistry	4
8	Adsorption and Catalysis	4
9	Nanomaterials And Their Applications To Solar Energy Conversion	4
10	Phyto-Biosynthesis and Applications of Metal Nanoparticles	4
11	Mini Project	4
12	Heterogenous Catalysis	4

Paper: I

ANALYTICAL METHODS AND INSTRUMENTATION

Hrs.– 60

Credit – 4

Objectives:

1. To understand the analytical data interpretation and result analysis.
2. To study about various chromatography technique for chemical analysis.
3. To study about the spectroscopic technique and instrumentation method of chemical analysis.

Unit-I Treatment of Analytical data and Interpretation (12hrs.)

Accuracy and Precision in measurements. Reliability of Analytical Data – Errors in Chemical analysis, Classification, Determination. Improving accuracy of analysis. Statistical analysis – Student t-test, F-test.

Unit-II Separation Technique (12hrs.)

Chromatographic techniques – paper, thin layer column chromatography, Gas Chromatography (GC)- Instrumentation, application. Principle and application of GCMS, LCMS, ion exchange chromatography. Flash Chromatography (FC) – Principle and application. Extraction Methods – Solvent extraction, Solid Phase extraction (SPE). Microwave Assisted Extraction (MAE), Soxhlet Extraction.

Unit- III Instrumental Methods of Chemical Analysis (12hrs.)

Atomic Absorption Spectroscopy (AAS) and Atomic Emission Spectroscopy (AES) – Principle Instrumentation and Application. X-ray Photoelectron Spectroscopy (XPS) – Theory and Instrumentation, XPS imaging, Surface analytical techniques – XRD, SEM, TEM – applications.

Unit-IV Spectroscopic Analysis (12hrs.)

UV-Vis and IR spectroscopy – UV-Vis spectra of enes, enones, arenes, and conjugated systems. Effect of solvent on UV-Vis spectra. IR- Principle, Instrumentation and Application. Characteristic group frequencies and functional group detection using IR.

Mass Spectroscopy (MS) – EI, CI, FAB, ESI and MALDI ion sources. Characteristic EIMS fragmentation and MS rearrangements. Spectral interpretation and structural determining using mass spectrum.

Unit-V NMR Spectroscopy and Structure elucidation

(12hrs.)

Basic Principle of NMR – H^1 and C^{13} Chemical Shift, spin-spin coupling, Coupling constant, J-value. Applications of NOE, DEPT and 2D techniques – COSY, HSQC and HSBC. Structure elucidation of organic compounds using spectral data – UV, IR, NMR and MS.

References:

1. Douglas A. Skoog, F James Holler; Stanley; R. Cruch, “Principle of instrumental analysis” Cole pub Co, (2006).
2. S.M. Khopkar, “ Basic Principles of Analytical Chemistry” 1st Edition, Wiley pub, (1984).
3. W. Kemp, “Organic Spectroscopy”, 3rd Edition, Palgrave Macmillan, (1991).
4. D.L. Pavia, G.M. Lampman and G.S. Kriz “ Introduction to Spectroscopy” 3rd Edition, Brooks/Cole, (2001).
5. D.H. Williams and I. Fleming “ Spectroscopic Methods in Organic Chemistry” 5th Edition, Macraw-Hill (1989).

Paper: II

CORROSION SCIENCE AND ENGINEERING

Hours : 60

Credits: 4

Objectives

1. To study the Principle and mechanism of electrochemical reactions involved in corrosion and preventive methods.
2. To gain knowledge on measurement of various adsorption and thermodynamic parameters related to corrosion.
3. To learn the basic terminology involved in electrochemical cell reaction and their application in some electrochemical based titration.
4. To understand the principles and working of some batteries and fuel cells. To impart knowledge on Classification, properties and uses of alloys.
5. To study the preparation, properties and applications of engineering materials.

Unit-1: Corrosion

(12 hrs)

Definition – causes - factors – types – chemical, electrochemical corrosion (galvanic, differential aeration), corrosion control – material selection and design aspect – electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints – constituent and function, Electroplating of copper and electroless plating of nickel

Unit-II: Non-Electrochemical methods

(12 hrs)

Adsorption - Physisorption – Chemisorption - Surface area determination - Mass loss measurements, Corrosion parameters Temperature studies – Adsorption - Temkin – Langmuir adsorption isotherm, Change in entropy, enthalpy, Gibbs free energy, Heat of adsorption, Activation energy - Green inhibitors.

Unit-III: Electrochemistry**(12 hrs)**

Electrochemical cell – redox reaction, electrode potential – origin of electrode potential – oxidation potential – reduction potential – electrochemical series and its significance – Nernst equation. Precipitation titration - Conductometric titration – Potentiometric titration – pH meter.

Unit-IV: Batteries, Fuel cells and Alloys**(12 hrs)**

Batteries - Types of batteries – alkaline battery – lead storage battery – nickel cadmium battery – lithium battery – Fuel cells – Hydrogen oxygen fuel cell.

Alloys: Introduction – Definition – Properties of alloys – Significance of alloying, Function and effects of alloying elements – Ferrous alloys – Nichrome and Stainless steel – heat treatment of steel; Non-ferrous alloys – brass and bronze.

Unit-V: Engineering Materials**(12 hrs)**

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth.

Refractories: definition, characteristics, classification properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity: Manufacture of alumina, magnesite and silicon carbide.

Reference:

1. R. Winston Revie and Herbert H. Uhlig “Corrosion and Corrosion control: An introduction to Corrosion Science and Engineering”, 4th Edition, John Wiley & Sons, Inc, 2008
2. Perez, Nestor “Electrochemistry and Corrosion Science”, 2nd Edition, Springer
3. Principles of Materials Science & Engineering, 2nd Edition by W. F. Smith, 1990
4. Robert G. Kelly, John R. Scully, David Shoesmith, Rudolph G. Buchheit
“Electrochemical Techniques in Corrosion Science and Engineering” 1st Edition, 2002
5. Volkan Cicek, Bayan Al-Numan “Corrosion Chemistry” Wiley
6. Pierre R. Roberge, “Handbook of Corrosion Engineering”, McGraw-Hill, 2005

7. B. Siva Shankar, "Engineering Chemistry", Tata Mc Graw Hill Publishing Limited, 3rd Edition, 2015.
8. S. S. Dara, Mukkanti, "Text of Engineering Chemistry", S. Chand & Co, New Delhi, 12th Edition, 2006.
9. C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.
10. R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.
11. S.L.Chawla, R.K.Gupta, "Materials selection for corrosion control, First printing, Dec.1993.
12. P.H.Reiger, "Electrochemistry", Prentice Hall, 1987.
13. Mars G. Fontana, Corrosion Engineering, McGraw Hill Education, 3rd Edition
14. S. Glasstone, An introduction to Electrochemistry, Van Nostrand, New York, 1965.
15. A. J. Bard, L.R. Faulkner, Electrochemical Methods: Fundamentals and Applications, John Wiley and Sons, New York, 1980.
16. R. Crow, Principles and Applications of Electrochemistry, Chapman and Hall, London, 1979.
17. J. D. M. Bockris, A.K.N. Reddy, Modern Electrochemistry, Vol. I & II, Plenum Press, New York, 3rd Reprint, 1977.
18. Dr.A.Ravikrishnan, " Engineering chemistry – II" , Sri Krishna Hitech Publishing Company Pvt.Ltd, Updated edition, 2015-2016.
19. Dr.A.Ravikrishnan, " Engineering chemistry " , Sri Krishna Hitech Publishing Company Pvt.Ltd, Revised edition, 2017-2018.
20. P. C. Jain, Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company, 15th Edition, 2015.
21. Shasi Chawla, "Text Book of Engineering Chemistry", Dhantpat Rai Publishing Company, New Delhi, 1st Edition.
22. Dr. V. Veeraiyan and Dr. L. Devaraj Stephen, " Engineering chemistry – II" VRS Publishers Pvt.Ltd, 2015-2016.

Paper-III

RESEARCH AND TEACHING METHODOLOGY

No. of Hrs – 4 / Week

Credits - 4

Objective

1. *To introduce the purpose and importance of research for future development.*
2. *To know the various indexes and abstracts in science and technology as a source of all information in chemistry.*
3. *To learn the ways of carrying out literature search for current awareness and for the retrospective survey.*
4. *To know the methodology of writing thesis and journal articles.*
5. *To know about the teaching methodology for teaching the scientific concepts and techniques to students*

Unit –I : Scientific Research

(12hrs.)

Introduction to Research, Selection of a research topic, reviewing the literature, preparing the proposal and design of study Experimentation and interpretation of results. Formation, testing and rejection of hypothesis. Preparation and presentation of reports, dissertation and thesis writing.

Unit-II : Chemical Literature

(12hrs.)

Primary and secondary literature: Journals, Patents, Reviews, Chemical abstracts, treatises, monographs and online journals. Web browsing for Research. ASAP alerts, CA Alerts, Scifinder, Chemport, Science direct, STN international, Journal home pages. **Impact factor, citations and h-index. Scopus, Web of Science and Google scholar.**

Unit-III: Error Analysis

(12hrs.)

Limitation of analytical methods, accuracy, precision & minimization of errors – systematic and random errors and reliability of results – Mode – Median – Mean – Standard deviation- Variance & Covariance, normal distribution and the normal probability curve.

Unit-IV: Correlation methods & Non-parametric tests

(12hrs.)

Scatter diagram and linear regression line: Spearman rank order correlation, Pearson's product moment correlation - Correlation co-efficient.

Non-parametric tests - χ^2 test, Median test, Mann-Whitney test, Sign test, Wilcoxon on matched-pairs signed ranks test.

Unit-V: Methodology of Teaching

(12hrs.)

Teaching- Objectives of Teaching, Phases of Teaching – Teaching methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project method, Seminar – Integrating ICT in Teaching: Individualized Instruction, Ways for Effective Presentation with Power Point- Documentation – Evaluation: Formative, Summative & Continuous and comprehensive Evaluation- Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development – Teaching Later Adolescents

References:

1. Rajammal P. Devadas, A Handbook of Methodology of Research, S.R.K. Vidyalaya Press, Chennai, 1976.
2. J. Anderson, B.H. Durstan and M. Poole, Thesis and assignment writing, Wiley Eastern, New Delhi, 1977.
3. R.O. Butlet, Preparing thesis and other manuscript.
4. R. L. Dominoswki, *Research Methods*, Prentice Hall, 1981.
5. J. W. Best, *Research in Education*, 4th ed. Prentice Hall of India, New Delhi, 1981.
6. H. F. Ebel, C. Bliefert and W.E. Russey, *The Art of Scientific Writing*, VCH, Weinheim, 1988.
7. Joseph, A. *Methodology for Research*; Theological Publications: Bangalore, 1986.
8. Sampath, K., Panneerselvam, A. & Santhanam, S. (1984). Introduction to educational technology. (2nd revised ed.). New Delhi: Sterling Publishers.
9. Sharma, S.R. (2003). Effective classroom teaching modern methods, tools & Techniques. Jaipur: Mangal Deep
10. Vedanayagam, E.G. (1989). Teaching technology for college teachers. New York: Sterling Publishers.

Paper-IV

ADVANCED SCIENTIFIC TECHNIQUES IN CHEMICAL ANALYSIS

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To master the basic principles of spectroscopy to apply for structural elucidation.
2. To learn the methods of characterizing compounds by spectroscopic techniques.
3. To learn the various instrumental methods studying a given compound.
4. To learn the separation techniques for organic and inorganic compounds.
5. To learn about industrial analytical processes.

Unit –I : Absorption Spectroscopy

(12hrs.)

Infrared and Raman Spectroscopy: FT-IR, basic principles, quantitative IR, resonance Raman and laser Raman spectroscopy, applications of IR and Raman spectroscopy to organic and inorganic compounds.

Electronic Spectroscopy: term symbols, spin-orbit coupling in free ions, electronic spectra of O_h and T_d complexes, charge transfer transition, structural evidence from electronic spectra.

Unit II: Applications of Advanced Organic Spectroscopy

(12hrs.)

NMR: Basic principles of two-dimensional NMR spectroscopy – HOMOCOSY, HETCOSY and NOESY spectra and their applications – use of INEPT and DEPT methods and their applications.

Mass: Molecular ions, isotope peaks, fragmentation pattern – McLafferty rearrangement - measurement techniques (EI, CI FI, FD, FAB, SIMS, MALDI) – M^{+1} and M^{+2} ions – calculation of molecular formula from P_{M+1} and P_{M+2}

Road-map problems covering UV, IR, $^1\text{H-NMR}$, $^{13}\text{C-NMR}$ and mass spectral data.

Unit-III: Spectroscopy

(12hrs.)

Nuclear Quadruple Resonance Spectroscopy: effect of magnetic field on the spectra, electric field gradient and molecular structure, structural elucidation of inorganic and coordination compounds.

Electron Paramagnetic Resonance Spectroscopy: hyperfine splitting in isotropic systems; epr spectra of systems with more than one unpaired electrons-Kramer's degeneracy, zero field

splitting, epr of triplet states, anisotropy in *g*-value, anisotropy in hyperfine splitting, nuclear quadrupleinteraction; applications of epr to organic and inorganic compounds.

Mossbauer Spectroscopy: interpretation of isomer shifts, quadruple and magnetic interactions, Mossbauer emission spectroscopy, structural elucidation.

Unit IV: Diffraction & Surface Techniques: (12hrs.)

Principles and applications of XRD, Neutron and electron diffraction – Scanning electron microscopy (SEM)- Instrumentation – applications – surface area analysis, particle size determination – Scanning Probe Microscopes – Scanning Tunneling Microscopes – Atomic force microscopes (AFM) – Principle & applications.

Unit V: Electrochemical Techniques (12hrs.)

Polarography – Chronopotentiometry – Chronoamperometry – chronocontometry- Linear Potential Sweep voltametry – Cyclic Voltametry – ImpendenceMeasurements – AC Voltametry – Principles and their applications.

References:

1. Introduction to Nanoscience- Gabor. L, Hornyak. Joydeep Dutta CRC Press 2008.
2. L. Antropov, Theoretical Electrochemistry, Mir Publication, Moscow, 1972.
3. D.A. Skoog and J.J. Leary, Principles of Instrumental Analysis, 4th Edn., Saunders College Publishing, 1992.
4. D.A. Skoog, F.S.Holler, S.R.Crouch, Principles of Instrumental Analysis, 6th Edn., Thomson Brooks/cole, 2007.
5. A.K. Cheetham, P.Day, Solid State Chemistry: Techniques, Oxford University Press, Oxford, 1987.
6. G. E. Bacon, Neutron diffraction, Oxford Universtiy Press, Oxford, 1975.
7. R.S. Drago, Physical Methods in Chemistry, Saunders, 1999.
8. Spectrometric Identification of Organic Comounds – Silverstein, Bassler and Morrill.
9. Organic Spectroscopy – William Kemp

Paper V

ADVANCED TOPICS IN ORGANIC CHEMISTRY

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To learn the various reagents and their application in organic synthesis
2. To study the retro synthetic analysis
3. To understand the concept of linear free-energy relationships
4. To know about the biochemical activities of amino acids and proteins
5. To study on the nucleic acids structure and function

Unit I: Organic Reagents

(12hrs.)

Gilman's reagents – DCC – Grignard reagents – crown ethers – NBS – BF_3 complexes – SeO_2 – 1, 3-dithiane, tri-n-butyl tin hydride – phase transfer catalysts – Wilkinson's catalyst.

Unit II: Retro synthetic Analysis

(12hrs.)

Introduction to disconnections – one group disconnections – two group disconnections – peri cyclic reactions – Heteroatoms and heterocyclic compounds – small rings: three membered, four membered, and five membered.

Unit III: Advances in Linear Free-Energy Relationships

(12hrs.)

An introduction to linear free-energy relationships (LFER) – the Hammett equation – the duality of substituent constants and the Yukawa-Tasumo equation – the general validity of the Hammett equation – deviations from the Hammett equation in its various forms; the separation of polar, steric and resonance effects – Taft's equations; the ortho-effect; application of LFER to organic reactions; Influence of solvent on organic reactivity; the reactivity-selectivity principle.

UNIT IV: Amino Acids and Proteins

(12hrs.)

Structure and Classification – abbreviated names (1 letter and 3 letter) – Physical properties of amino acids – chemical properties – codons – Structure and importance of simple peptides like glutathione, Carnosine, anserine, vasopressin – Peptide antibiotics – gramicidin,

bacitracine, actinomycin D - Peptide synthesis – Acid chloride method – DCC method – Determination of primary structure of peptide – Identification of N-terminal amino acid – Barger's method – the DNP method – identification of C-terminal amino acid – Hierarchical representation of protein Primary, Secondary, tertiary and quaternary structures – Ramachandran plot.

UNIT V: Purine, Pyrimidine and Nucleic Acids

(12hrs.)

Structure of Purines, Pyrimidines – Nucleoside – ribonucleoside, deoxyribonucleosides – nucleotides – ribonucleotides – deoxyribonucleotides – structure and functions of DNA - Watson and Crick model of DNA- Structure of types of RNA (m-RNA, t-RNA and r-RNA) – Nucleases – structure and function of DNA and RNA – polynucleotide – cyclic nucleotide – structure and function of cAMP, cGMP nucleoprotein – Types of DNA (A-DNA, B-DNA, Z-DNA)

References:

1. Reaction Mechanism and Reagents in Organic Chemistry – Gurdeep R. Chatwal
2. Designing Organic Synthesis: A Programmed Introduction to the Synthron Approach – Stuart Warren
3. N.B. Chapman and J. Shorter, Eds., Advances in Linear Free-Energy Relationships, Plenum Press, London, 1972.
4. J. Shorter, Correlation Analysis in Organic Chemistry – An Introduction to Linear Free-Energy Relationships, Clarendon Press, Oxford, 1973.
5. N.B. Chapman and J. Shorter, Eds., Correlation Analysis in Chemistry-Recent Advances, Plenum Press, New York, 1978.
6. J. Shorter, Correlation Analysis of Organic Reactivity, Research Studies Press, England, 1982.
7. Biochemistry, Lehinger J.CB S.Publishers,1993.
8. Biochemistry, U. Satyanarayana & U. Chakrapani, Books & Allied Pvt. Ltd, 1999.
9. Biochemistry — Lubert Stryer – W. H. Freeman and company, 4th Edn., New York, 1995.

CHROMATOGRAPHY

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To understand the chromatographic basic principles
2. To learn the thinlayer chromatographic techniques
3. To understand about the ion exchange concepts
4. To learn about the high performance liquid chromatography for organic analysis
5. To study about the gas chromatography technique for volatile and gas molecule analysis

UNIT I: Chromatography

(12hrs.)

Classification of Chromatography methods. Column Chromatography- Principles, experimental procedures, stationary and mobile phases, Choice of Solvent Systems, Separation techniques. Applications.

R_f values, Factors affecting R_f values, Experimental procedures, Choice of paper and solvent systems, developments of chromatogram. Detection of the spots. Ascending, Descending and Radial Paper Chromatography, Two Dimensional Chromatography –Applications.

UNIT II: THINLAYER CHROMATOGRAPHY

(12hrs.)

Principles, factors affecting R_f values. Experimental Procedures, Choice of adsorbents and Solvents. Preparation of plates, development of the Chromatogram. Detection of the spots, advantages of thin Layer Chromatography over paper chromatography and Applications.

UNIT III: ION EXCHANGE CHROMATOGRAPHY

(12hrs.)

Principle, ion exchange resins and their types- cation exchange resins, anion exchange resins, ion exchange equilibria, properties of ion exchange resins, ion exchange capacity and techniques – applications.

UNIT IV: HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (12hrs.)

Introduction, instrumentation, stationary and mobile Phases. Mobile Phase – Composition. Column – Preparation, Cleaning –regeneration and Storage Conditions. Retention time- Types of HPLC. Applications.

UNIT V: GAS CHROMATOGRAPHY (12hrs.)

Principle, instrumentation choice of injectors, column and detectors - Programmed temperature chromatography, flow programming chromatography, gas-solid chromatography, and hyphenated techniques in chromatography- Applications of Gas chromatography.

REFERENCES:

1. Fundamentals of Analytical Chemistry – D.A.Skoog, D.M. West, F.J. Holler and S.R. Crouch – 2004; Thompson Asia Private Ltd., Bangalore.
2. Instrumental Methods of Analysis – B. K. Sharma, 2003; Goel publishing House, Meerut.
3. Contemporary Chemical Analysis - Judith F. Rubinson, Prentice Hall (India).
4. Instrumental Methods of Analysis Hobart H. Willard, Lynne L. Merritt Jr, John Dean, Wadsworth Publishing Co Inc; 7th Edn., 1988.
5. Thin Layer Chromatography- A laboratory Handbook, Ashworth, Stahl. E., 1st Edn., Springer-Verlag, 1969.
6. Dynamics of Chromatography - Principles and Theory, J. Calvin Giddings, CRC Press, 2002.
7. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch, 2006.

Paper VII

ADVANCED TOPICS IN PHYSICAL CHEMISTRY

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To study about the concept of Photochemistry
2. To understand the principles about the chemical kinetics
3. To learn about the thermodynamics behavior of systems in chemistry
4. To understand the physical characteristics of biomolecules
5. To understand the various concept of Analytical techniques

Unit I: Advanced Photochemistry (12hrs.)

Artificial photosynthesis and solar energy conversion – Photo electrochemical cells – dynamics of excited state processes (excited state energy, redox properties, emission lifetime and its temperature dependence) in micelles, reverse micelles and biomembranes – Fluorescence – quenching and anisotropy concepts; fluorescence sensing – mechanism and applications; Radioactive decay engineering – metal-enhanced fluorescence and surface Plasmon-coupled emission.

Unit – II: Advanced chemical kinetics (12hrs.)

Experimental methods for fast reactions- temperature jump, pressure jump stopped flow and flash photolysis – pulse technique – short tube kinetics.

NMR studies in rate process - Enzyme kinetics of complicated systems – theory of diffusion controlled reactions.

Unit – III: Irreversible thermodynamics (12hrs.)

Internal heat & entropy production – relation of entropy production with flux & forces – phenomenological equation – Prigogine's principle of minimum entropy production at non-equilibrium stationary state.

Unit – IV: Biophysical chemistry (12hrs.)

Biomembranes (structure & function) – Active transport & passive transport – multiple equilibria – specific examples of multiple equilibria – Transport processes – general features of transport processes optical systems of the study of transport processes – self organizing systems

– (Micelles, lipids, cyclodextrins, liquid crystals, reverse micelles) their interactions and solutions properties.

Unit – V: Analytical techniques

(12hrs.)

Thermal methods: TGA, DTA, DSC, Thermometric titration - Adsorption/desorption techniques: BET and EGME methods of determination of external and total surface area.

References:

1. K. Kalyanasundaram, Photochemistry in Microheterogeneous Systems, Academic Press, Orlando, 1987.
2. Extended irreversible thermodynamics – David Jon, Jose casas Vazques, 2012
3. Understanding Non-equilibrium Thermodynamics – Geogy Lebon, David Jon- 02008
4. Chemical kinetics: Fundamentals & New developments, E.T. Denisov, Erganii tinofeerich , 2003
5. Chemical Kinetics, Laidler
6. Biophysical chemistry Alan Cooper – 2011
7. Biophysical chemistry, James P. Allen – 2008
8. Fundamentals of Analytical chemistry – Douglas A. Skoog Donal M. west 2013

Paper VIII

ADSORPTION AND CATALYSIS

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To study about the various adsorption process connected with catalysis process
2. To study about the preparation methods of adsorbents
3. To evaluate the physico chemical properties of adsorbent by spectral studies
4. To study about the vapour phase and liquid phase catalysis and adsorption parameters
5. To learn about the adsorption isotherms and product analysis

Unit: I Adsorption & Catalysis

(12hrs.)

Concept of adsorption – types of adsorption, monolayer and multilayer adsorption. Adsorption - activation energy and temperature relationships, different between adsorption and catalysis, catalysis - homogeneous catalysis, heterogeneous catalysis, Acid -- base catalysis.

Unit: II Methods of preparation

(12hrs.)

Adsorbent - adsorbent preparation from plant materials, activated carbon preparation, synthetic adsorbent/catalyst - Molecular sieves – microporous & mesoporous molecular sieves – silicates, Aluminosilicates, Aluminophosphates – structure, acidic and basic sites.

Unit: III Spectral studies on Adsorbent

(12hrs.)

Characterization of adsorbent and catalyst - X-Ray Diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), Differential thermal analysis(DTA) , Nuclear magnetic resonance spectroscopy (NMR), Temperature programmed desorption (TPD), Electron spin resonance spectroscopy(ESR) Scanning electron microscopy(SEM), BET Surface Area, pore size analysis.

Unit: IV Reactions & Factors

(12hrs.)

Liquid phase - heterogeneous reaction conditions optimization - Temperature, pH, time and molar ratios. Vapor phase reaction, Regeneration of catalyst.

Adsorption – adsorption of dye molecules, metal ions, sugar molecules and other suitable molecules, conditions optimization – time, temperature, p^H , concentration and adsorbent dosage.

Unit: V Techniques

(12hrs.)

Product analysis in catalysis reactions – Gas chromatographic technique, conversion and product selectivity. Interpretation of adsorption parameters - Adsorption kinetics, adsorption isotherms and adsorption thermodynamics.

References:

1. Environmentally stable adsorbent of tetrahedral silica and non tetrahedral alumina for removal and recovery of malachite green dye from aqueous solution, *J. Hazardous materials*, 157 (2008) 137-145.
2. Plant poisoning organic dyes adsorption on tomato plant root and green carbon from aqueous solution, *Desalination*, 249 (2009) 1132-1138.
3. Film and pore diffusion modeling for the adsorption of direct red 81 on activated carbon prepared from balsamodendron caudatum wood waste, *Digest Journal of Nanomaterials and Biostructures*, Vol. 5, No 3, July 2010, p. 911 – 919
4. Plant toxic and non-toxic nature of organic dyes through adsorption mechanism on cellulose surface, *Journal of Hazardous materials*, 189 (2011) 294–300.
5. Adsorption of cationic and anionic organic dyes from aqueous solution using Silica, *J. Environmental Science and Engineering*, volume 52, No.4 (2010) 361-366
6. Hazardous dyes removal from aqueous solution over mesoporous aluminophosphate molecular sieves with textural porosity by adsorption, *Journal of Hazardous Materials* 244– 245 (2013) 10– 20.
7. A Simple Method for the Synthesis of Thermally Stable Large Pore Mesoporous Aluminophosphate Molecular Sieves, *Materials letters*, 113 (2013) 93–95.
8. Aniline methylation over AFI and AEL type molecular sieves, *App. Catal.*, Vol. 174, **1998**, 213.
9. Adsorptive removal of metanyl yellow on mesoporous Nickel aluminophosphate molecular sieves from aqueous solution, *Asian J. of chemistry*, vol. 24, no.12(2012), 5775-5778
10. Recent trends in catalysis, Narosa publication, 1st edition 2000.

Paper IX

NANOMATERIALS AND THEIR APPLICATIONS TO SOLAR ENERGY CONVERSION

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. *To study about the Nanomaterials*
2. *To study about the dye-sensitized solar cells*
3. *To learn about the Semiconductor and microemulsion (quantum dots)*
4. *To understand the Photochemistry and corrosion principles*
5. *To understand about the solar cell concepts*

Unit I: Nanomaterials

(12hrs.)

Introduction to Nanoscience: Introduction- definition of Nanoscience, nanochemistry- classification of the nanomaterials

Synthesis of nanomaterials: Precipitative methods – hydrothermal and solvothermal methods - chemical methods - reduction methods – colloidal and micellar approach – sol-gel method – chemical vapor deposition method.

Specialized Nanomaterials: Metal oxide nanoparticles, semiconductor nanoparticles and core/shell nanoparticles

Unit II: Dye-sensitized solar cells

(12hrs.)

Solar energy conversion and storage – photo electrochemical cells – dye-sensitized solar cells – design and fabrication - power conversion efficiency

Use of metal and metal-free dye sensitizers in photovoltaic devices.

Unit III: Semiconductor and microemulsion (quantum dots)

(12hrs.)

Review of published literature – Water-soluble silica-coated semiconductor quantum dots – synthesis, characterization and properties.

Thickness-controllable silica coating of quantum dots – synthesis by microemulsion method and application in the growth of rice.

Unit IV: Photochemistry and corrosion

(12hrs.)

Review of published literature – Silica coated cadmium sulfide nanocomposites – synthesis, structure, optic and its photo catalytic properties.

Zirconia-coated carbonyl iron particles – synthesis and corrosion study.

Unit V :Solar cell

(12hrs.)

Review of published literature – Ruthenium (II) sensitizer in dye-sensitized solar cells using an organic dye as co-sensitizer – Fabrication and device characterization - photovoltaic performance.

Dye-sensitized solar cells - Co-sensitization strategy – electrochemical properties – Photo electrochemical performances – Electrochemical impedance spectroscopy – dark current measurement – Open-circuit voltage decay.

References

1. H. R. Allcock, Introduction to Materials Chemistry, John Wiley & Sons, Inc. Publication, 2008.
2. T. Pradeep, Nano: The Essentials, Tata Mc Graw-Hill, 2007.
3. A. Hagfeldt, *et al.* Chem. Rev., 2010, 110, pp. 6595–6663.
4. J. Gong, J. Liang, K. Sumathy, Renewable and Sustainable Energy Reviews, 2012, 16, 8, 5848-5860.
5. X. Chen, F. Liu, Q. Jiang, L. Sun, Q. Wang, J. Inorg. Organomet. Polym, 2012, 22:6-11.
6. A. Wang, Y. Zheng, F. Peng, J. Spectros. 2014, Article ID 169245, 1-5.
7. N. Gupta, B. Pal, J. Colloid and Int. Sci., 2010, 368, 250-256.
8. R. Chen et al. J. Colloid and Int. Sci., 2010, 342, 49-56.
9. U. Mehmood, I. A. Hussein, K. Harrabi, N. Tabet, G. R. Berdiyrov, RSC Adv., 2016, 6, 7897-7901.
10. L. Wei, Y. Na, Y. Yang, R. Fan, P. Wang, L. Li, Phys. Chem. Chem. Phys., 2015, 17, 1273-1280.

Paper X

PHYTO-BIOSYNTHESIS AND APPLICATIONS OF METAL NANOPARTICLES

No. of Hrs – 4 / Week

Credits - 4

Objectives

1. To study about the Extraction and Isolation of natural products from Medicinal plants
2. To synthesis nanomaterial by using natural products
3. To understand the physico chemical properties of Nanoparticles
4. To utilize the nanoparticles for Biological Applications
5. To study the Nanoparticles application on Green catalysis

Unit I - Extraction and Isolation of some Indian Medicinal plants (12hrs.)

- i) Solid-Phase Extraction and LC–MS analysis of Pyrrolizidine Alkaloids in Honeys.
- ii) Comparative study of phytochemical screening, antioxidant and antimicrobial capacities of fresh and dry leaves crude plant extracts of *Datura metel* L.

Unit II – Biosynthesis of Metal Nanoparticles (12hrs.)

- i) Green synthesis of silver nanoparticles using *Ixora coccinea* leaves extract.
- ii) Ultrasmall Copper Nanoparticles Synthesized with a Plant Tea Reducing Agent.

Unit III – Characterization of Nanoparticles (12hrs.)

- i) Phytosynthesis of silver nanoparticles using *Coccinia grandis* leaf extract and its application in the photocatalytic degradation
- ii) A facile synthesis of high optical quality silver nanoparticles by ascorbic acid reduction in reverse micelles at room temperature.

Unit IV – Biological Applications of Nanoparticles (12hrs.)

- i) The green synthesis, characterization and evaluation of the biological activities of silver nanoparticles synthesized from *Iresine herbstii* leaf aqueous extracts
- ii) In vitro evaluation of antioxidant and anticancer potential of *Morinda pubescens* synthesized silver nanoparticles.

Unit V – Green catalytic activity of Nanoparticles (12hrs.)

- i) Catalytic Reduction of 4-Nitrophenol using Biogenic Gold and Silver Nanoparticles Derived from *Breynia rhamnoides*.
- ii) Catalytic degradation of organic dyes using biosynthesized silver nanoparticles.

References

1. K. A. Beales, K. Betteridge, S.M. Colegate, J.A. Edgar. *Journal of Agric. Food Chem.* 2015, 63, 7421–7427
2. Tahiya Hilal Ali Alabri, Amira Hamood Salim Al Musalami, Mohammad Amzad Hossain, Afaf Mohammed Weli, Qasim Al-Riyami. *Journal of King Saud University – Science* 2014, 26, 237–243
3. Muthu Karupiah, Rangasamy Rajmohan. *Materials Letters* 97 (2013) 141–143.
4. Aaron D. Brumbaugh, Katelyn A. Cohen, and Sarah K. St. Angelo. *ACS Sustainable Chem. Eng.* 2014, 2, 1933–1939.
5. Rajeswari Arunachalam, Sujatha Dhanasingh, Balasaraswathi Kalimuthu, Mani Uthirappan, Chellan Rose, Asit Baran Mandal. *Colloids and Surfaces B: Biointerfaces* 94, 2012, 226-230
6. Debabrata Singha, Nabajeet Barman, Kalyanasis Sahu. *Journal of Colloid and Interface Science* 413 (2014) 37–42.
7. C. Dipankar, S. Murugan. *Colloids and Surfaces B: Biointerfaces* 98 (2012) 112– 119
8. L. Inbathamizh, T. Mekalai Ponnu, E. Jancy Mary. *Journal of pharmacy research* 6 (2013) 32-38.
9. Abilash Gangula, Ramakrishna Podila, Ramakrishna M, Lohith Karanam, Chelli Janardhana, and Apparao M. Rao. *Langmuir* 2011, 27, 15268 – 15274.
10. V.K. Vidhu, D. Philip. *Micron* 56 (2014) 54–62.

Objectives

- 1. To Learn about the porous materials**
- 2. To Understand the concept of metal doping and photocatalytic function of the material.**
- 3. To study the catalytic and photocatalytic activity of the materials.**

Unit I

Zeolite-based photocatalysts - Zeolites and molecular sieves acting as hosts for photoactive guests - Electron donor photosensitisers - organic dye - electron acceptor photosensitisers - Zeolites encapsulating clusters of semiconductor oxides - Zeolites having photocatalytically active framework.

Efficient photocatalytic degradation of organics diluted in water and air using TiO₂ designed with zeolites and mesoporous silica materials.

Unit II

Effect of metal-doping of TiO₂ nanoparticles on their photocatalytic activities toward removal of organic dyes.

Solar photocatalytic degradation of phenol using nanosized ZnO and α -Fe₂O₃.

Unit III

Network Structured SnO₂/ZnO Heterojunction Nanocatalyst with High Photocatalytic Activity.

Green synthesis of copper nanoparticles for the efficient removal (degradation) of dye from aqueous phase.

Unit IV

Visible Light Photodegradation of Phenol Using Nanoscale TiO₂ and ZnO Impregnated with Merbromin Dye: A Mechanistic Investigation.

Fe(III)/TiO₂-Montmorillonite Photocatalyst in Photo-Fenton-Like Degradation of Methylene Blue.

Unit V

TiO₂ nanoparticles immobilized on carbon nanotubes for enhanced visible-light photo-induced activity.

Preparation of a Titania/X-Zeolite/Porous Glass Composite Photocatalyst Using Hydrothermal and Drop Coating Processes.

References

1. Chem. Communi., 2004, 1443-1459
2. J. Mater. Chem., **2011**, 21, 2407–2416 | 2407
3. Egyptian Journal of Petroleum (**2014**) 23, 419–426
4. Journal of Chemical Engineering and Materials Science, Vol. 4(7), pp. 87-92, November **2013**
5. Inorganic Chemistry, Vol. 48, No. 5, **2009 1819-1825**
6. ENVIRONMENTAL SCIENCE AND POLLUTION RESEARCH · AUGUST **2015**, DOI 10.1007/s11356-015-5223-y
7. Iran. J. Chem. Chem. Eng, Vol. 33, No. 2, **2014**
8. International Journal of Chemical Engineering, Volume **2015**, Article ID 485463,
9. J. Mater. Res. Technol. **2015**;4(2):126–132
10. Molecules **2015**, 20, 2349-2363; doi:10.3390/molecules20022349

MANONMANIAM SUNDARANAR UNIVERSITY

DEPARTMENT OF COMMERCE

Ph.D - Course Work Papers

Sl.No	COURSE TITLE	CREDIT
1.	Teaching and Research methodology	4
2.	Human Resource Management	4
3.	Industrial relations and Labour Welfare	4
4.	Stress Management	4
5.	Training and Development	4
6.	Entrepreneurship Development	4
7.	Business Ethics and corporate Governance	4
8.	Banking theory Law and Practice	4
9.	Security Analysis and portfolio Management	4
10.	Merchant Banking and Financial services	4
11.	International Trade	4
12.	International Finance	4
13.	Financial Management	4
14.	Accounting for Financial decision making	4
15.	Indian Financial System	4
16.	Customer Relationship Management	4
17.	Marketing Management	4
18.	Supply chain Management	4
19.	Integrated Marketing Communication	4
20.	Rural Marketing	4
21.	International Marketing	4
22.	Consumer Behaviour	4
23.	Service Marketing	4
24.	Mini Project	4

Course Objectives :

- To develop understanding of the basic framework of research process.
- To understand the various research designs and techniques.
- To identify various sources of information for literature review, data collection, concept of research and its methodologies
- To organize and conduct research in a more appropriate manner to write research reports and theses.

UNIT – I INTRODUCTION

Meaning and Significance – the research process – Types of Research – Exploratory and causal Research – Theoretical and empirical Research – Cross –Sectional and time – series Research – Research questions / Problems – Research objectives – Research hypotheses – characteristics.

UNIT – II RESEARCH DESIGN AND MEASUREMENT

Research design – Definition – types of research design – exploratory and causal research design – Descriptive and experimental design – different types of experimental design – Validity of findings – internal and external validity – Variables in Research – Measurement and scaling – Different scales – Construction of instrument – Validity and Reliability of instrument.

UNIT – III DATA COLLECTION

Types of data – Primary Vs Secondary data – Methods of primary data collection – Survey Vs Observation – Experiments – Construction of questionnaire and instrument – Validation of questionnaire – Sampling plan – Sample size – determinants optimal sample size – sampling techniques – Probability Vs Non–probability sampling methods.

UNIT – IV DATA PREPARATION AND REPORT WRITING

Data Preparation – editing – Coding –Data entry – Validity of data – Qualitative Vs Quantitative data analyses – Bivariate and Multivariate statistical techniques – Factor analysis – Discriminant analysis – cluster analysis – multiple regression and correlation – multidimensional scaling – Conjoint Analysis - Application of statistical software for data analysis - Research report – Different types – Contents of report

UNIT – V TEACHING METHODS

Teaching – Objectives of teaching, phases of Teaching – Teaching methods: lecture method, discussion method, discovery learning, Inquiry, Problem solving method, project method. Seminar- Integrating ICT in teaching: Individualised instruction, ways for effective presentation with power points, documentation - Evaluation; formative, summative & continuous and comprehensive Evaluation. Later Adolescent Psychology: meaning, physical, cognitive, emotional, Social and moral Development –Teaching later adolescents

REFERENCES:

- 01 Kothari C.R, *Research Methodology Methods and Techniques*, New Age International Publishers, 2015.
- 02 Saravanel . P, *Research Methodology*, Margham Publishers, Chennai, 2013.
- 03 Srivastava, Shenoy and Sharma: *Quantitative Techniques for Managerial Decision*: New Delhi.2016.

HUMAN RESOURCE MANAGEMENT

L	T	P	C
4	0	0	4

Course Objectives :

- To make the participant understand the role of HR Department in an organization
- To know the various functional areas of Human Resource Management.
- To understand the recent developments in Human Resource Management.

UNIT – I INTRODUCTION

Introduction to HRM – Definition, Importance, Objective, Evolution of Concept, Changing Environment of HR, Labour legislation – meaning, Line and Staff Functions of HR. Strategic HR – Role in Strategy Formulation and Execution, Creating Strategy oriented HR System, HR Scorecard – Meaning, Information Requirements and Steps in Preparing Scorecard.

UNIT – II PROCUREMENT

Job Analysis – Meaning, Process and Methods, Human Resource Planning – Importance, Process, HR Demand and Supply Forecasting Techniques, Recruitment – Importance, Process and Sources, Selection – Process, Selection Test – Types and Validation Process, Interview Methods, Socialization – Importance and Types.

UNIT – III DEVELOPMENT

Training – Purpose, Process – Need Identification, Methods and Evaluation of Effectiveness, Executive Development Programmes – Difference from training, Common Practices, Performance Appraisal – Process, Techniques, MBO, 360 Degree Feedback. Career Development – Career Choices, Career Stages, Techniques. Talent Management – meaning, Process. Job Changes - Promotion, Demotion and Transfer.

UNIT – IV COMPENSATION AND INTEGRATION

Job Evaluation – Meaning, Process and Techniques, Compensation Plan – Deciding factors, Framing Process, Strategies, Variable Compensation and Employee Benefits. Human Needs – Motivation Theories, Employee Engagement, Leadership Theories and Quality of Work life. Grievances – Causes and Redressal methods.

UNIT – V MAINTENANCE AND SEPARATION

Safety – Safety Procedure and Safety Programme, Change management – Process, Nature, forces and Resistance Separation – Retirement, Layoff, Out-placement and Discharge HR Policies – Importance, Types, Process of Framing Policies, Human Resource Accounting & Audit – Meaning, Types, E-HRM – ERecruitment, E-Selection, E-Training and E-Compensation..

REFERENCES:

- 01 Dessler, “Human Resource Management”, (12th ed.), Pearson Education Limited, 2016.
- 02 Aswathappa K., “Human Resource and Personnel Management”, (8th ed.), Tata McGraw Hill, New Delhi, 2016
- 03 Decenzo and Robbins, “Human Resource Management”, (10th ed.), Wiley, 2010.
- 04 Mamoria C.B & Mamoria S., “Personnel Management”, Himalaya Publishing Co., 2016.
- 05 Snell and Scott, “Human Resource Management: A South Asian Perspective”, 1/e, Cengage Learning, India.

INDUSTRIAL RELATIONS AND LABOUR WELFARE

Course Objectives :

L	T	P	C
4	0	0	4

- To explore contemporary knowledge and gain a conceptual understanding of industrial relations.
- To understand the meaning of industrial relations, industrialization and organization structures.
- To examine the theoretical aspects, problems and issues in arbitration and bargaining
- To understand the various models of bargaining and arbitration. .

UNIT - I INDUSTRIAL RELATIONS

Concepts – Importance – Industrial Relations problems in the Public Sector – Growth of Trade Unions – Codes of conduct.

UNIT – II INDUSTRIAL CONFLICT

Disputes – Impact – Causes – Strikes – Prevention – Industrial Peace – Government Machinery – Conciliation – Arbitration – Adjudication.

UNIT - III LABOUR WELFARE

Concept – Objectives – Scope – Need – Voluntary Welfare Measures – Statutory Welfare Measures – Labour – Welfare Funds – Education and Training Schemes.

UNIT - IV INDUSTRIAL SAFETY

Causes of Accidents – Prevention – Safety Provisions – Industrial Health and Hygiene – Importance – Problems – Occupational Hazards – Diseases – Psychological problems – Counseling – Statutory Provisions.

UNIT - V WELFARE OF SPECIAL CATEGORIES OF LABOUR

Child Labour – Female Labour – Contract Labour – Construction Labour – Agricultural Labour – Differently abled Labour –BPO & KPO Labour - Social Assistance – Social Security – Implications

REFERENCES:

- 01 Mamoria C.B. and Sathish Mamoria, Dynamics of Industrial Relations, Himalaya Publishing House, New Delhi, 2014.
- 02 Arun Monappa, Ranjeet Nambudiri, Patturaja Selvaraj. Industrial relations & Labour Laws. Tata McGraw Hill. 2012
- 03 Ratna Sen, Industrial Relations in India, Shifting Paradigms, Macmillan India Ltd., New Delhi, 2012
- 04 Srivastava, Industrial Relations and Labour laws, Vikas Publications, 2016.

STRESS MANAGEMENT

L	T	P	C
4	0	0	4

Course Objectives :

- To provide a broad physical, social and psychological understanding of human stress.
- To present a broad background knowledge of stress management.
- To understand the management of work related stress at an individual and organizational level.
- To develop and implement effective strategies to prevent and manage stress at work.

UNIT - I UNDERSTANDING STRESS

Meaning – Symptoms – Works Related Stress – Individual Stress – Reducing Stress – Burnout.

UNIT – II COMMON STRESS FACTORS

Time Management – Techniques – Importance of planning the day – Time management schedule – Developing concentration – Organizing the Work Area – Prioritizing – Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks.

UNIT - III CRISIS MANAGEMENT

Implications – People issues – Environmental issues – Psychological fall outs – Learning to keep calm – Preventing interruptions – Controlling crisis – Importance of good communication – Taking advantage of crisis – Pushing new ideas – Empowerment.

UNIT - IV WORK PLACE HUMOUR

Developing a sense of Humour – Learning to laugh – Role of group cohesion and team spirit – Using humour at work – Reducing conflicts with humour.

UNIT - V SELF DEVELOPMENT

Improving Personality – Leading with Integrity – Enhancing Creativity – Effective decision Making – Sensible Communication – The Listening Game – Managing Self – Meditation for peace – Yoga for Life.

REFERENCES:

- 01 Cooper, Managing Stress, Sage Publications, 2014
- 02 Waltschafer, Stress Management, 4th Edition 2009Tata McGraw Hill. 2012
- 03 Argyle. The Psychology of Happiness. Tata McGraw Hill. 2014
- 04 Bartlet. Stress – Perspectives & Process. Tata McGraw Hill. 2014
- 05 Juan R. Alascal, Brucata, Laurel Brucata, Daisy Chauhan. Stress Mastery. Pearson,2014

Course Objectives :

- To improve the participant's understanding of training needs
- To focus on assessment of training needs by assessing the existing skill sets of the employees
- To make aware of the various training programs as well as of knowledge of new training program.

UNIT - I INTRODUCTION

Training Concept: Definition, Meaning, Need for Training, Objectives of Training, Concept of Education, Role, Need and Importance of Training, Overview of Training Functions, Types of Training

UNIT – II TRAINING PROCESS

Process of Training: Steps In Training, Assessment of Training Needs (Person Analysis, Task Analysis, Organization Analysis), Scope of need assessment, Principles of Learning, Theories of Learning (Reinforcement Theory, Social Learning Theory, Andragogy), Learning Process

UNIT - III MANAGING TRAINING PROGRAMME

Designing and Implementing a Training Program: Transfer of Training, Training Design, Traditional Methods and Techniques of Training, Designing a Training Module (Cross Cultural, Leadership, Training the Trainer, Change), Management Development Program, Training Budget, Resistance to Training

UNIT - IV EVALUATION OF TRAINING

Evaluation of Training Program: Kirkpatrick Model of Evaluation, CIRO Model, Cost-Benefit Analysis, ROI of Training

UNIT - V TECHNOLOGY IN TRAINING

CBT, Multimedia Training, E-Learning / Online Learning, Distance Learning, New training methods, NLP, Various training instruments.

REFERENCES:

- 01 Lynton Rolf P and Pareek, Udai "Training for Development", (3rd ed.), Sage pub., 2012.
- 02 Noe, Raymond A and Kodwani , Amitabh Deo "Employee Training and Development", (5th ed.), Tata McGraw Hill New Delhi, 2014
- 03 Rothwell William J "Beyond Training and Development", Jaico, 2007
- 04 Phillips, Patricia Pulliam "ASTD Handbook for Measuring & Evaluating Training", (1st ed.), Cengage, 2012

ENTREPRENEURSHIP DEVELOPMENT

L T P C

Course Objectives :

4 0 0 4

- To develop and strengthen entrepreneurial quality among the students.
- To impart knowledge of basic entrepreneurial skills.
- To get practical knowledge to run a business efficiently and effectively. .

UNIT - I ENTREPRENEURIAL COMPETENCE

Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT – II ENTREPRENEURIAL ENVIRONMENT

Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services - Central and State Government Industrial Policies and Regulations - International Business

UNIT - III BUSINESS PLAN PREPARATION

Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT startups

UNIT - IV LAUNCHING OF SMALL BUSINESS

Positioning of services – Designing service delivery System, Service Channel – Pricing of services, methods – Service marketing triangle - Integrated Service marketing communication

UNIT - V MANAGEMENT OF SMALL BUSINESS

Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

REFERENCES:

- 01 Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2014..
- 02 S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2016.
- 03 Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra ,4th Edition ,2014
- 04 Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 2015.
- 05 P.Saravanel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai 2014.

BUSINESS ETHICS & CORPORATE GOVERNANCE

Course Objectives

- To enhance responsibility and accountability towards business and community through ethical practices.
- To recognize and resolve ethical issues in business.
- To grasp the current issues and implications of CSR on social development and progress
- To familiarize the students with the knowledge of emerging trends in good governance practices and corporate social responsibility in the global and Indian context.

UNIT I ENVIRONMENTAL ETHICS

Economic Environment - Philosophy of economic growth and its implications for business - Main features of Economic Planning with respect to business - Industrial policy and framework of government contract over Business - Role of chamber of commerce and confederation of Indian Industries.

UNIT II MANAGING ETHICAL DILEMMA

Characteristics - ethical decision making - ethical reasoning - the dilemma resolution process - ethical dilemmas in different business areas of finance – marketing - HRM, international business - Ethical culture in Organization - Developing codes of ethics and conduct - ethical and value based leadership - Indian Wisdom & Indian approaches towards business ethics.

UNIT – III CORPORATE SOCIAL RESPONSIBILITY

Introduction to CSR: Meaning & Definition of CSR - History & evolution of CSR. Concept of Charity - Corporate philanthropy -Corporate Citizenship - Concept of sustainability & Stakeholder Management - Relation between CSR and Corporate governance; environmental aspect of CSR; models of CSR in India

UNIT – IV CORPORATE GOVERNANCE

Meaning – need- scope- importance – benefits – role of corporate governance - corporate governance code - transparency & disclosure - role of auditors - board of directors and share holders - Global issues of governance - accounting and regulatory frame work - corporate scams - committees in India and abroad - Future of governance- innovative practices.

UNIT – V CORPORATE MANAGEMENT

Management vs. Governance; internal constituents of the corporate governance; key managerial personnel (KMP); chairman- qualities of a chairman - powers, responsibilities and duties of a chairman - chief executive officer (CEO) - role and responsibilities of the CEO - separation of roles of chairman and CEO; CFO; manager; company secretary; auditor.

REFERENCES:

- 01 Murthy C.S.V. Business Ethics and Corporate Governance, Himalaya Publishing, 2016 Edition
- 02 S K Mandal, Ethics in Business and Corporate Governance, Tata McGraw Hill, 2015
- 03 A.C. Fernando, Business Ethics: An Indian Perspective, Pearson, 2015
- 04 Riya Rupani, Business Ethics and Corporate Governance, Himalaya Publishing, 2017.

Course Objectives:

- To acquire specialized knowledge of law and practice relating to Banking.
- To understand Banking theory and to know about the banking innovations.
- To understand the conceptual and legal parameters including the judicial interpretation of banking law.
- To acquaint students with the banking technology and their recent developments.
- To enhance their knowledge on modern banking concepts and techniques.

UNIT- I STRUCTURE OF INDIAN BANKING BUSINESS

Banking Business Development and Evolution/Innovation in India - Investment policy and cash reserve ratio of commercial bank - Window dressing - KYC - Concepts of CAMELS in banking.

UNIT – II BRANCH OPERATION AND CORE BANKING

Introduction and evolution of bank management – Technological impact in banking operation – Total branch computerization – Concept of opportunities – Centralized banking – Concept, opportunities, challenges and implementation

UNIT –III REGULATORY FRAMEWORK AND COMPLIANCES

Reserve Bank of India Act, 1934 - Banking Regulation Act, 1949 - New Bank Licensing Policy, 2013 - Prevention of Money Laundering Act, 2002 (PMLA) - Banking Codes and Standards Board of India (BSCSBI)- The Banking Ombudsman Scheme - Bankers' Book Evidence Act, 1891- Recovery of Debts Due to Banks and Financial institutions Act, 1993 (DRT Act).

UNIT –IV INDIAN ELECTRONIC BANKING SYSTEM

Core banking solution - Telebanking - Mobile banking - Forms of E-banking - ATM - Credit card - Debit card - Smart card - Electronic Money – E- Cheques- Electronic Token - Electronic Purse - SWIFT - RTGS - NEFT – CHIPS – ECS –IFCS –CBS - Online IPOs - Green shoe option –international Payment System.

UNIT – V CONTEMPORARY ISSUES IN BANKING

Techniques Analysis of Rangarajan committee reports – E Banking budgeting – Banking software's - Future of Indian Banking.

REFERENCES:

01 P M Sundaram and P N Varshney, - Banking Law and Practice “,Sultan chand & Sons Publishing House,2016.

02 C Shekar, Lekshmy Shekar, - Banking theory and practice “,Vikas Publishing House Pvt Ltd.2016.

03 Vasant Desai - Bank Management “,Himalaya Publishing House”.2015.

04 E.Gordon & K. Natrajan, —*Banking Theory, Law & Practice*”, Himalaya Publishing House, Mumbai, 24th revised edition, 2015.

05 *Banking Theory and Practice*” by Dr. P.K. Srivastava, Himalaya Publishing House, Mumbai, 2015..

SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

L T P C

Course Objectives :

4 0 0 4

- To Analyze and understand Economic, Industry and Company information.
- To apply fundamental and technical analysis for security valuation.
- To interpret the published information and value the share price movements.
- To understand the various alternatives available for investment and to measure risk and return.

UNIT – I INVESTMENT SETTING AND SECURITIES MARKETS

Financial and economic meaning of Investment – Characteristics and objectives of Investment – Types of Investment – Making a trade at market place: Primary and Secondary Markets - Methods of floating new issues Market - Regulation of primary market, Stock exchanges in India - Trading system in stock exchanges.

UNIT – II FUNDAMENTAL ANALYSIS

Economic Analysis – Economic forecasting and stock Investment Decisions – Forecasting techniques Industry Analysis : Industry classification, Industry life cycle – Company Analysis - Measuring Earnings – Forecasting Earnings – Applied Valuation Techniques – Graham and Dodds investor ratios.

UNIT – III TECHNICAL ANALYSIS

Fundamental Analysis Vs Technical Analysis – Charting methods – Market Indicators Trend – Trend reversals – Patterns - Moving Average – Exponential moving Average – Oscillators – Market Indicators – Efficient Market theory.

UNIT – IV PORTFOLIO MANAGEMENT AND SELECTION

Portfolio analysis and selection: Portfolio concept, Portfolio risk and return, Beta as a measure of risk, Calculation of Beta, Selection of Portfolio: Markowitz's theory, Single Index Model – Capital Asset Pricing model – Arbitrage pricing theory.

UNIT – V PORTFOLIO MANAGEMENT AND PERFORMANCE EVALUATION

Portfolio management and performance evaluation: Performance evaluation of Existing Portfolio, Sharpe and Trynor measures; Finding alternatives and revision of portfolio.

REFERENCES:

- 01 Donald E.Fischer & Ronald J.Jordan, Security Analysis & Portfolio Management, PHI Learning., New Delhi, 8th edition, 2014.
- 02 Prasannachandra, Investment analysis and Portfolio Management, Tata McGraw Hill, 2014.
- 03 V.A.Avadhan, Securities Analysis and Portfolio Management, Himalaya Publishing House, 2016.
- 04 Preeti Singh, Investment Management, Himalaya Publishing House, 2016.
- 05 Punithavathy Pandian, Securities Analysis and Portfolio Management, Himalaya Publishing House, 2015.

MERCHANT BANKING AND FINANCIAL SERVICES

L T P C

Course Objectives :

4 0 0 4

- To outline the linkage between Merchant Banking, Retail Banking and central banking.
- To expose the important legislations affecting merchant banking activities.
- To identify the various segments of merchant banking industry.
- To identify the scope and opportunities in the field of Foreign Exchange and Investments.

UNIT – I INTRODUCTION OF FINANCIAL SYSTEM

Indian Financial System – Merchant Banking in India – Recent Developments and Challenges ahead – Functions of Merchant Bank Legal and Regulatory Framework – Relevant Provisions of Companies Act - Securities Contract Regulation Act, 1956 - SEBI Act,1992 – SEBI Guidelines relating to Investor Protection - Relation with Stock Exchanges and OTCEI.

UNIT – II NEW ISSUES MANAGEMENT

Role of Merchant Banker in Appraisal of Projects, Designing Capital Structure and Instruments – Issue Pricing – Book Building – Preparation of Prospectus Selection of Bankers, Advertising Consultants, etc. - Role of Registrars –Bankers to the Issue, Underwriters, and Brokers. – Offer for Sale.

UNIT – III MERGERS AND ACQUISITIONS

Mergers and Acquisitions – Portfolio Management Services – Credit Syndication -- Credit Rating – Meaning, Significance Agencies, National & International - Business Valuation

UNIT- IV LEASING AND HIRE PURCHASING

Leasing and Hire Purchasing – Hire Purchase act, 1972 - Financial Evaluation - Factoring and Forfeiting – Venture Capital.

UNIT- V FOREX SERVICES

Forex Services - Related Regulations - RBI Guidelines – FDI Policy 2013 - FII – SEBI Guidelines relating to FII, Mutual Funds – Organisation, types & Objectives , SEBI guidelines relating to Mutual Funds - Foreign Pension Funds – Investment Banking.

REFERENCES:

- 01 S.Gurusamy,"Merchant Banking & Financial Services", (2nd ed.),Tata McGraw Hill Publications, 2014.
- 02 M.Y.Khan, "Financial Services", (11th ed.), Tata McGraw-Hill, 2014.
- 03 Nalini Prava Tripathy, "Financial Services", PHI Learning, 2014.
- 04 Varshney P.N. "Indian Financial System", Sultan Chand & Sons, New,Delhi.

INTERNATIONAL TRADE FINANCE

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Course Objectives :

- To describe the importance of balance of trade, balance of payment and various international commercial terms to the development of macroeconomic policy
- To evaluate the foreign exchange rate and the risk reduction strategies of Forex To Describe and distinguish among alternative trade documents of both export and import
- To Highlight the Indian government's export promotion schemes.

UNIT- I INTERNATIONAL TRADE

International Trade – Meaning and Benefits – Basis of International Trade – Foreign Trade and Economic Growth – Balance of Trade – Balance of Payment – Current Trends in India – Barriers to International Trade – WTO – Indian EXIM Policy.

UNIT- II EXPORT AND IMPORT FINANCE

Special need for Finance in International Trade – INCO Terms (FOB, CIF, etc.,) – Payment Terms – Letters of Credit – Pre Shipment and Post Shipment Finance – Forfeiting – Deferred Payment Terms – EXIM Bank – ECGC and its schemes – Import Licensing – Financing methods for import of Capital goods.

UNIT-III FOREX MANAGEMENT

Foreign Exchange Markets – Spot Prices and Forward Prices – Factors influencing Exchange rates – The effects of Exchange rates in Foreign Trade – Tools for hedging against Exchange rate variations – Forward, Futures and Currency options – FEMA – Determination of Foreign Exchange rate and Forecasting.

UNIT-IV DOCUMENTATION IN INTERNATIONAL TRADE

Export Trade Documents: Financial Documents – Bill of Exchange- Type- Commercial Documents - Proforma, Commercial, Consular, Customs, Legalized Invoice, Certificate of Origin Certificate Value, Packing List, Weight Certificate, Certificate of Analysis and Quality, Certificate of Inspection, Health certificate. Transport Documents - Bill of Lading, Airway Bill, Postal Receipt, Multimodal Transport Document. Risk Covering Document: Insurance Policy, Insurance Cover Note. Official Document: Export Declaration Forms, GR Form, PP Form, COD Form, Softer Forms, Export Certification, GSPS – UPCDC Norms.

UNIT- V EXPORT PROMOTION SCHEMES

Government Organizations Promoting Exports – Export Incentives : Duty Exemption – IT Concession – Marketing Assistance – EPCG, DEPB – Advance License – Other efforts I Export Promotion – EPZ – EQU – SEZ and Export House.

REFERENCES:

- 01 Apte P.G., International Financial Management, Tata McGraw Hill, 2014.
- 02 Jeff Madura, International Corporate Finance, Cengage Learning, 9th Edition, 2014.
- 03 Alan C. Shapiro, Multinational Financial Management, PHI Learning, 5th Edition, 2016.
- 04 Eun and Resnik, International Financial Management, Tata McGraw Hill, 5th Edition, 2015.
- 05 Website of Indian Government on EXIM policy.

INTERNATIONAL FINANCE

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Course Objectives :

- To get an insight of the International Monetary and Financial System.
- To know about Balance of payments and its components.
- To get an basic idea about calculation of Foreign Exchange Rates and Risks.
- To understand the factors influencing the Foreign Exchange rates

UNIT- I INTERNATIONAL MONETARY AND FINANCIAL SYSTEM

International Monetary and Financial System: Importance of international finance; Bretton woods conference and afterwards, IMF and the World Bank; European monetary system – meaning and scope

UNIT- II BALANCE OF PAYMENTS AND ITS COMPONENTS

Balance of Payment and International Linkages: Balance of payments and its components; International flow of goods, services and capital; Coping with current account deficit.

UNIT- III INTERNATIONAL FINANCIAL MARKETS AND INSTRUMENTS

International Financial Markets and Instruments: International capital and money markets; Money and capital market instruments; Salient features of different international markets; Arbitrage opportunities; Integration of markets; Role of financial intermediaries.

UNIT- IV FOREIGN EXCHANGE MARKETS

Foreign Exchange Markets: determining exchange rates; fixed and flexible exchange rate system; exchange rate theories; participants in the foreign exchange markets; foreign exchange markets – cash and spot markets; Exchange rate quotes; LERMS; Factors affecting exchange rates – spot rates, forward exchange rates, forward exchange contracts; Foreign exchange and currency futures; Exchange rate arrangement in India ; Exchange dealings and currency possession; Information and communication; Foreign exchange trades

UNIT - V FOREIGN EXCHANGE RISK

Foreign Exchange Risk: Transaction exposure, translation exposure and economic exposure; Management of exposure – internal techniques, netting, marketing, leading and lagging, pricing policy, assets and liability management and techniques.

REFERENCES:

- 01 Apte P.G., International Financial Management, Tata McGraw Hill, 2014.
- 02 Eitman, D.K. and A.I Stenehill : Multinational Business Cash Finance, Addison Wesley, New York. 2016
- 03 Henning, C.N., W Piggot and W.H Scott: International Financial Management, McGraw Hill, International Edition. 2016..
- 04 Levi, Maurice D : International Finance, McGraw – Hill, International Edition. 2014, 2015.
- 05 Rodriquefe, R.M. and E.E.Carter: International Financial Management, Prentice Hall, International Edition.2016
- 06 Yadav, SurendraS, P.K Jain and Max Peyrard: Foreign Exchange Markets, Macmillan, New Delhi. 2012.

Course Objectives:

- To understand the theoretical framework of financial management in business corporations.
- To understand the goals of the finance manager.
- To help the students gain a detailed account of various financial functions of business organizations.
- To understand and to apply financial concepts and principles in overall management..

UNIT –I COST OF CAPITAL

Factors affecting cost of capital - Methods of computation of cost of capital - Methods of Ranking investment proposal - Capital structure - Theories of capital structure.

UNIT –II PORTFOLIO MANAGEMENT

Portfolio theory - Reducing risk through diversification - Investment preference Factors contributing to M&A and M&A Wave - Synergies of M&A - Managing M&A.

UNIT – III MANAGEMENT OF CASH AND MARKETABLE SECURITIES

Motives for Holding Cash; Objectives of Cash Management; Factors Determining Cash Needs; Basic Strategies of Cash Management; Cash Management Techniques / Processes; Marketable Securities; and Cash Management Practices in India.

UNIT – IV CORPORATE RESTRUCTURING

Conceptual Framework - Financial Framework - Tax Aspect of Amalgamation -Merger and Demergers - Legal and Procedural Aspects of Mergers/Amalgamations and Acquisition/Takeovers - and other forms of Corporate Restructuring.

UNIT – V FINANCIAL MANAGEMENT OF PUBLIC SECTOR UNDERTAKINGS (PSUS)

Peculiarities of PSUs with Focus on Accounting and Finance - Financial Decisions in PSUs - Memorandum of Understanding (MoU) in PSUs - and Disinvestment in Public Sector Enterprises.

REFERENCES:

- 01 Kishore M Ravi, Strategic Financial Management, Taxmann Publication Pvt. Ltd. New Delhi,2015.
- 02 Dhamija Sanjay and Van Horne J.C, Financial Management and Policy, 12th Edition, Pearson Education, 2016
- 03 Pandey I. M, Financial Management, Vikas Publishing House, New Delhi, 2016.
- 04 Khan M Y, and Jain P. K, Financial Management: Text, Problems & Cases,Tata McGraw Hill,Education Private Limited., 2015.
- 05 Fundamentals of Financial Management -", J. Srinivasan P. Periasamy."2016.

ACCOUNTING FOR FINANCIAL DECISION MAKING

Course Objectives:

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- To attain Sustainable Knowledge with decision making in financial related issues.
- To develop a critical understanding of financial tools and techniques.
- To understand both the theoretical and practical role of financial management in business corporations.
- To have a greater appreciation and understanding of the importance of risk within the context of financial decision making.

UNIT – I FINANCIAL PLANNING AND STRATEGY

Strategy decision making and planning for Sustainable growth -Risk appraisal methods - Balancing risk and return - Portfolio theory and asset pricing models -

UNIT – II BETA ESTIMATION AND THE COST OF EQUITY

CAPM and the opportunity cost of equity capital - Options and their valuations - Binomial model for option valuation - Financial ratio analysis - Trading Legitimacy.

UNIT – III CAPITAL BUDGETING DECISIONS

Investment decision - investment evaluation criteria -Accounting rate of return - Net Present Value - Internal Rate of Return - Profitability Index - Discounting Payback

UNIT – IV CAPITAL STRUCTURE DECISION

Capital structure & market value of a firm. Theories of capital structure – NI approach, NOI approach, Modigliani Miller approach, traditional approach. Arbitrage process in capital structure - Planning the capital structure: EBIT and EPS analysis. ROI & ROE analysis. Capital structure policy.

UNIT – V WORKING CAPITAL CYCLE

Interpretation of working capital ratios - Capital structure Planning and Policy - Trade-off theory - Pecking Order theory - Flow-to-Equity Approach - Adjusted Present value (WACC and Miles-Ezzel).

REFERENCES

01 Khan M.Y and Pillai P.K, “Financial Management”, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, Edition 2016.

02 Palanivelu V.R “Financial Management”, S.Chand Publishing House, New Delhi, Edition 2016.

03 I M Pandey, “Financial Management” , Vikas Publishing House Pvt.Ltd., New Delhi, Edition 2017.

04 Pearson, “Financial Management and Policy”, James C.Van Horne and Sanjay Dhamija , Dorling Kindersley (india) Pvt.Ltd.2015.

05 Chandra, Prasana: Financial Management; Tata McGraw Hill, New Delhi, 2008.

Course Objectives:

- To have a Bird's view of the Indian Financial System and in Global Indian Banking System.
- To provide conceptual understanding and in-depth knowledge of securities markets in India
- To understand the structure of financial markets and institutions.
- To equip the students with the knowledge of sources of the funds and also of investing the funds.

UNIT – I FINANCIAL MARKETS

Money and capital markets - Money market – meaning, constituents, participants – functions. Money market instruments – call money, treasury bills, certificate of deposit, commercial bills, trade bills, commercial paper, recent trends in Indian money market; capital market – primary and secondary markets; capital market instruments.

UNIT – II SECURITIES MARKET

Financial Market – Segments – Types — Participants in financial Market – Regulatory Environment, Primary Market – Methods of floating new issues, Book building – Role of primary market – Regulation of primary market, Stock exchanges in India – BSE, OTCEI , NSE, ISE, and Regulations of stock exchanges – Trading system in stock exchanges –systematic and unsystematic risk – SEBI – money market – Debt market.

UNIT III FOREIGN EXCHANGE MARKET

Foreign Exchange Markets – Spot Prices and Forward Prices – Factors influencing Exchange rates – The effects of Exchange rates in Foreign Trade – Tools for hedging against Exchange rate variations – Forward, Futures and Currency options – FEMA – Determination of Foreign Exchange rate and Forecasting.

UNIT IV DERIVATIVES MARKET

Derivatives – Definition – Types – Forward Contracts – Futures Contracts – Options – Swaps – Differences between Cash and Future Markets – Types of Traders – OTC and Exchange Traded Securities – Types of Settlement – Uses and Advantages of Derivatives – Risks in Derivatives – Derivatives market in India.

UNIT – V MARKET PARTICIPANTS & PUBLIC ISSUES

Depository – role and functions – Depository participants' issuers and registrars (RTs) – Role of FIIs, and Investment Bankers – New public issue - book building process – IPOs, FPOs – Private placement QIP, QIBs, offer for sale – grading of new issues – content of offer document.

REFERENCES:

- 01 Padmalatha Suresh and Justin Paul, —Management of Banking and Financial Services, Pearson, Delhi, 2016.
- 02 Prasannachandra, Investment analysis and Portfolio Management, Tata McGraw Hill, 6th edition 2017.
- 03 Keith Redhead, 'Financial Derivatives – An Introduction to Futures, Forwards, Options and SWAPs', – PHI Learning, 2011.
- 04 Jeff Madura, International Corporate Finance, Cengage Learning, 9th Edition, 2011.
- 05 M.Y Khan, Indian Financial System, Tata McGraw Hill, 6th Edition, 2011

Course Objectives

- To impart skill based knowledge of Customer Relationship Management.
- To understand the concepts and principles of CRM.
- To understand the need and importance of maintaining a good customer relationship.
- To gain knowledge of strategic customer acquisition and retention techniques in CRM.
- To recognize the basic technological infrastructure and organizations involved in current and emerging CRM practices.

UNIT I UNDERSTANDING CUSTOMERS

Customer information Database – Customer Profile Analysis - Customer perception, Expectations analysis – Customer behaviour in relationship perspectives; individual and group customer's - Customer life time value – Selection of Profitable customer segments.

UNIT II CRM STRUCTURES

Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications.

UNIT III CRM PLANNING AND IMPLEMENTATION

Strategic CRM planning process – Implementation issues – CRM Tools- Analytical CRM – Operational CRM – Call centre management – Role of CRM Managers - CRM Implementation Road Map- Developing a Relationship Orientation - Customer-centric Marketing and Processes - customer retention plans

UNIT – IV SERVICE QUALITY

Concept of Quality - Meaning and Definition of Service Quality - Factors influencing customer expectation and perception - Types of Service Quality - Service Quality Dimensions - Service Quality Gaps - Measuring Service Quality - Service Quality measurement Scales.

UNIT V TRENDS IN CRM

e- CRM Solutions – Data Warehousing – Data mining for CRM – an introduction to CRM software packages - The Technological Revolution: Relationship Management – Changing Corporate Cultures.

REFERENCES

- 01 G.Shainesh, Jagdish, N.Sheth, Customer Relationships Management Strategic Perspective, Macmillan 2015.
- 02 Alok Kumar et al, Customer Relationship Management : Concepts and applications, Biztantra, 2015.
- 03 H.Peeru Mohamed and A.Sahadevan, Customer Relation Management, Vikas Publishing 2017.
- 04 Jim Catheart, The Eight Competencies of Relationship selling, Macmillan India, 2016.
- 05 Zikmund. Customer Relationship Management, Wiley 2012 .

MARKETING MANAGEMENT

L T P C
4 0 0 4

Course Objectives:

- To study the strategies for developing new products and services that are consistent with evolving market needs.
- To evaluate the viability of marketing a product or service in an international market or markets.
- To know the contemporary issues in marketing.
- To understand the concept of green marketing.

UNIT-I STRATEGIC MARKETING PLANNING

Market Analysis and Selection: Marketing environment – macro and micro components and their impact on marketing decisions; Market segmentation and positioning; Buyer behaviour; consumer versus organizational buyers; Consumer decision making process.

UNIT-II MARKETING RESEARCH

Meaning and scope of marketing research; Marketing research process. Marketing Organisation and Control: Organising and controlling marketing operations. - Understanding the Marketing-Information Systems (MIS)- Introduction, - Characteristics of MIS- Benefits – Types – Components of Marketing Research.

UNIT – III CRM AND OTHER CONTEMPORARY ISSUES

Introduction - Relationship Marketing Vs. Relationship Management - Definitions of Customer Relationship Management (CRM) - Forms of Relationship Management - Managing Customer Loyalty and Development - Reasons Behind Losing Customers by Organisations - Significance of Customer Relationship Management - Social Actions Affecting Buyer-Seller Relationships - Rural Marketing - Services Marketing - E-Marketing or Online Marketing - cyber marketing.

UNIT – IV INTERNATIONAL MARKETING MANAGEMENT

Introduction - Nature of International Marketing - International Marketing Concept - International Market Entry Strategies - Approaches to International Marketing - International Product Policy - International Promotions Policy - International Branding - Country of Origin Effects - International Pricing.

UNIT – V GREEN MARKETING

Green marketing concept Eco-friendly marketing - principles and challenges of green marketing - Environmentalism concepts - problems in green marketing - green marketing strategies - Stakeholders of green marketing

REFERENCES:

- 01 Philip Kotler , Kevin Lane Keller — Marketing Managementll 15th Edition, Person Publications Limited, 2017.
- 02 Noel Capon and Siddharth Shekar Singh, ll managing Marketing–An Applied Approachll, Wiley India Pvt Limited 2017.
- 03 Kenneth E.Clow. Donald Baack, —cases in marketing management, ll 5 th edition, Person India Ltd, 2014.
- 04 Arunkumar and Meenakshi, —Marketing Management, ll Vikas Publishing House, 2015.

SUPPLY CHAIN MANAGEMENT

L T P C
4 0 0 4

Course Objectives :

- To create awareness on the functions of Supply Chain Management and to lay down the path to enter the supply chain business.
- To facilitate the development of skills for practical problem solving approach to complex areas of supply chain management.
- To learn various issues related to demand, inventory and supply management along with practical implementation.
- To appraise the recent trends, design and redesign of a supply chain Network as key components of an organization's strategic plan.

UNIT – I INTRODUCTION OF SUPPLY CHAIN MANAGEMENT

Supply Chain – Fundamentals –Evolution- Role in Economy - Importance - Decision Phases - Supplier- Manufacturer-Customer chain. - Enablers/ Drivers of Supply Chain Performance - Supply chain strategy - Supply Chain Performance Measures.

UNIT – II STRATEGICSOURCING

Outsourcing – Make Vs buy - Identifying core processes - Market Vs Hierarchy - Make Vs buy continuum -Sourcing strategy - Supplier Selection and Contract Negotiation - Creating a world class supply base- Supplier Development - World Wide Sourcing

UNIT – III SUPPLY CHAIN NETWORK

Distribution Network Design – Role - Factors Influencing Options, Value Addition – Distribution Strategies - Models for Facility Location and Capacity allocation. Distribution Center Location Models Supply Chain Network optimization models Impact of uncertainty on Network Design - Network Design decisions using Decision trees.

UNIT – IV PLANNING DEMAND, INVENTORY AND SUPPLY

Managing supply chain cycle inventory Uncertainty in the supply chain – Analysing impact of supply chain redesign on the inventory - Risk Pooling - Managing inventory for short life – cycle products -multiple item -multiple location inventory management - Pricing and Revenue Management

UNIT – V CURRENT TRENDS

Supply Chain Integration - Building partnership and trust in SC Value of Information: Bullwhip Effect - Effective forecasting - Coordinating the supply chain - SC Restructuring - SC Mapping - SC process restructuring, Postpone the point of differentiation – IT in Supply Chain - Agile Supply Chains -Reverse Supply chain. Agro Supply Chains

REFERENCES:

- 01 Janat Shah, Supply Chain Management – Text and Cases, Pearson Education,2016.
- 02 Sunil Chopra and Peter Meindl, Supply Chain Management-Strategy Planning and Operation, PHI Learning / Pearson Education, 2016.
- 03 Sunil Chopra and Peter Meindl, Supply Chain Management-Strategy Planning and Operation, PHI Learning / Pearson Education, 2016
- 04 David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, Designing and Managing the Supply Chain: Concepts, Strategies, and Cases, Tata McGraw-Hill, 2014
- 05 Altekar Rahul V, Supply Chain Management-Concept and Cases, PHI, 20142.

INTEGRATED MARKETING COMMUNICATION

L T P C

Course Objectives :

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- To get an insight of the importance of advertising and sales promotion campaigns in relation to consumer decision making processes.
- To draft oral and written integrated marketing communications plan based on primary and secondary research.
- To ensure a substantive assessment of corporate strengths, weaknesses, opportunities and threats (SWOT analysis) and create a substantive research plan for one's project.
- To construct IMC creative strategies and tactics, including digital & social media executions, advertising, promotions, and public relations initiatives.

UNIT – I INTRODUCTION TO ADVERTISEMENT

Concept – Definition-scope – Objectives-functions – principles of advertisement – Social, Economic and Legal Implications of advertisements – setting advertisement objectives – Advertisement Agencies – Selection and remuneration – Advertisement campaigns.

UNIT – II ADVERTISEMENT MEDIA

Media plan – Type and choice criteria – Reach and frequency of advertisements – Cost of advertisements – related to sales – Media strategy and scheduling design and execution of advertisements – Message development – Different types of advertisements – Layout – Design appeal – Copy structure – Advertisement production – Print – Radio. T.V. and Web advertisements.

UNIT – III SALES PROMOTION

Scope and role of sale promotion – Definition – Objectives of sales promotion – sales promotion techniques – Trade oriented and consumer oriented. Sales promotion – Requirement identification – Designing of sales promotion campaign – Involvement of salesmen and dealers – Out sourcing sales promotion national and international promotion strategies.

UNIT – IV PUBLIC RELATIONS

Introduction – Meaning – Objectives –Scope-Functions-integrating PR in to Promotional Mix-Marketing Public Relation function- Process of Public Relations-advantages and disadvantages of PR-Measuring the Effectiveness of PR- PR tools and techniques. PR and Media Relations, - PR consultancy: Pros and Cons.

UNIT – V PUBLICITY

Introduction – Meaning – Objectives – Tools – Goals of Publicity – Scope of Publicity – Importance of Publicity – Difference between Marketing, PR and Publicity – Social publicity – Web Publicity and Social media – Publicity Campaigns

REFERENCES:

- 01 George E Belch and Michel A Belch, Advertising & Promotion, Tata McGraw Hill, 7th edition, 2016.
- 02 S. H. H. Kazmi and Satish K Batra, Advertising & Sales Promotion, Excel Books, New Delhi, 2014.
- 03 Julian Cummings, Sales Promotion, Kogan Page, London 2015.
- 04 Jaishri Jefhwaney, Advertising Management, Oxford, 2014

L T P C

RURAL MARKETING

Course Objectives :

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- To gain insight into the socio-economic structure of rural India.
- To explore the various facets of rural marketing and to develop an insight into rural marketing regarding different concepts and basic practices in this area.
- To understand the buying behaviour, the consuming pattern, the needs and wants of the rural consumer.
- To understand the concept and methodology for conducting the research in rural markets.

UNIT – I OVERVIEW OF RURAL MARKETING

Introduction of Rural marketing –Evolution of Rural Marketing in Indian and Global Context- Definition- Nature –Scope-Characteristics and potential of Rural Marketing - Importance of Rural Marketing- Socio-Cultural-economic & other environmental factors affecting in Rural Marketing- Emerging challenges & Opportunities in Rural Marketing.

UNIT – II RURAL MARKETS & DECISION

Profile of Rural Marketing Dimensions & Consumer Profile- Rural Market Equilibrium- Classification of Rural Marketing – Regulated- Non Regulated Marketing Mix- Segmentation- Targeting- Position- Rural Marketing Strategies- Role of Central, State Government and other Institutions in Rural Marketing Integrated Marketing Communication in Rural Marketing.

UNIT – III PRODUCT & DISTRIBUTION

Product / Service Classification in Rural Marketing - New Product Development in Rural Marketing- Brand Management in Rural Marketing- Rural Distribution in channel management- Managing Physical distribution in Rural Marketing- Fostering Creativity& Innovation in Rural Marketing- Sales force Management in Rural Marketing.

UNIT – IV RURAL CONSUMER BEHAVIOUR IN MARKETING RESEARCH

Consumer Buyer Behaviour Model in Rural Marketing- Rural Marketing Research-Retail &IT models in Rural Marketing-CSR and Marketing Ethics in Rural Marketing- Source of Financing and credit agencies- Consumer Education & Consumer Methods in Promotion of Rural Marketing- Advertisement & Media Role in Rural Marketing Promotion Methods.

UNIT – V TRENDS IN RURAL MARKETING

e- Rural Marketing-CRM &e-CRM in Rural Marketing- Advanced Practices in Rural Marketing- Social Marketing-Network Marketing- Green Marketing in Indian and Global Context-Co-operative Marketing- Micro Credit Marketing- Public Private Partnership Model in Rural Marketing- Advancement of Technology in Rural Marketing- Structure of Competition in Rural India.

REFERENCES:

- 01 Rural Marketing – C G Krishnamacharyulu, Lalitha Ramakrishnan – Pearson Education,2016.
- 02 Rural Marketing: Indian Perspective by Awadhesh Kumar Singh Satyaprakash pandey, New age publishers, 2014.
- 03 New Perspectives on Rural Marketing: Includes Agricultural Marketing By Ramkishan Y., 2016.
- 04 Rural Marketing, Pradeep Kashyap & Siddhartha Raut, Biztantra Publications, 2016.

INTERNATIONAL MARKETING

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Course Objectives :

- To gain knowledge of basic elements of International Marketing.
- To know the Marketing environment in the context of Globalisation.
- To understand the Policy Framework and Procedural Aspects of International Marketing.

UNIT- I INTRODUCTION OF INTERNATIONAL MARKETING

International markets – Definition – Basic modes of entry – Nature of International Marketing- Benefits of International Marketing— International Marketing Task – World Trade – India’s Foreign Trade – Characteristics of MNCs - Global and Domestic marketing - International Product Life cycle – EPRG Framework - Institutional set up – Advisory bodies – Commodity organizations – Service Institutions – Government participation in Foreign Trade

UNIT- II INTERNATIONAL MARKETING ENVIRONMENT

Business culture around the world- language, customs, attitudes - marketing strategy adjustments - product adaptations. Geographic Description of Market – Political risk – Political Environment - Import quotas – tariffs - customs restrictions - required licenses – registrations – permits. Development and scope of International law – INCOTERMS – WTO – GATT

UNIT- III POLICY FRAMEWORK AND PROCEDURAL ASPECTS

India’s Export – Import policy – EXIM Policy – promotional measures - Export oriented Units – Deemed Exports - Export- Import Documentation – Kinds of Documents – Principal Export Documents – Auxiliary documents – Documents in Import Trade – Export Documentation and procedures - Demand Estimation – GDP – Producer consumer target – Market segmentation

UNIT - IV INTERNATIONAL MARKETING PLANNING

International Market Selection – Factors influencing – Process – Strategies and approaches – Competition-International Marketing research – Global scene- International marketing research procedure – Techniques – survey – interview techniques – Analysis of field data – Research report-International Marketing Planning and Control – Framework – marketing control – Control sequence

UNIT - V INTERNATIONAL MARKETING MIX

Developing an International Product Line, Foreign Product Diversification, International Branding Decisions, International Packaging, International Warranties and Services. International Pricing Strategy - International Promotion Strategies- Promotion Mix-International Sales Negotiations - Patterns of Global Advertising -Current trends in international Marketing

REFERENCES:

- 01 Varshney “International Marketing”, McGraw Hill, International Edition. 2016
- 02 Global Marketing, Third Edition, by Warren J. Keegan and Mark C. Green, Prentice Hall, 2015.
- 03 Philip .R. Cateora, John.L.Graham. Prasanth Salwan. International Marketing, Tata McGraw Hill,13 th edition, 2014
- 04 Onkvisit, Sak., and John J.Shaw., International Marketing, Prentice Hall of India, New Delhi, 2012.

CONSUMER BEHAVIOUR

L T P C

Course Objectives :

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- To understand the dimensions of consumer behavior and their decision making process
- To know the Consumer Behaviour Models.
- To Understand the Internal and External Influences on Consumer Behaviour.
- To recognize the social and ethical implications of marketing on consumer behavior.

UNIT - I INTRODUCTION

Concepts – Significance – Dimensions of Consumer Behavior – Application of knowledge of Consumer Behaviour in marketing decisions.

UNIT - II CONSUMER BEHAVIOR MODELS

Industrial and individual consumer behaviour models - Howard- Sheth, Engel – Kollat, Webster and wind Consumer Behaviour Models – Implications of the models on marketing decisions.

UNIT - III INTERNAL INFLUENCES

Psychological Influences on consumer behavior – motivation – perception – personality Learning and Attitude- Self Image and Life styles – Consumer expectation and satisfaction.

UNIT - IV EXTERNAL INFLUENCES

Socio-Cultural, Cross Culture - Family group – Reference group – Communication -Influences on Consumer behavior

UNIT - V PURCHASE DECISION PROCESS

High and low involvement - Pre-purchase and post-purchase behavior – Online purchase decision process – Diffusion of Innovation – Managing Dissonance - Emerging Issues.

REFERENCES:

- 01 Leon G.Schiffman, Leslie Lazar Kanuk and S. Ramesh Kumar, Consumer Behavior, Pearson Education, India, 11th Edition, 2015..
- 02 Jay D. Lindquist and Joseph Sirgy, Shopper, Buyer and Consumer Behavior, Biztranza, 2012.
- 03 David L. Loudon and Albert J Della Bitta, Consumer Behavior, McGraw Hill, New Delhi 2012.
- 04 Sheth Mittal, Consumer Behavior- A Managerial Perspective, Thomson Asia (P) Ltd., 2013

SERVICE MARKETING

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Course Objectives :

- To understand the role of consumer behavior in marketing and to identify qualitative and quantitative methods of measuring consumer behavior.
- To Know the Service Design and Development of Service Marketing.
- To Understand the Service Delivery and Promotion of Service Marketing..
- To know the importance of Service Strategies for Health, Tourism, Financial, Logistics and Educational Institutions.

UNIT - I INTRODUCTION

Definition – Service Economy – Evolution and growth of service sector – Nature and Scope of Services – Unique characteristics of services - Challenges and issues in Services Marketing.

UNIT - II SERVICE MARKETING OPPORTUNITIES

Assessing service market potential - Classification of services – Expanded marketing mix – Service marketing – Environment and trends – Service market segmentation, targeting and positioning.

UNIT - III SERVICE DESIGN AND DEVELOPMENT

Service Life Cycle – New service development – Service Blue Printing – GAP model of service quality – Measuring service quality – SERVQUAL – Service Quality function development.

UNIT - IV SERVICE DELIVERY AND PROMOTION

Positioning of services – Designing service delivery System, Service Channel – Pricing of services, methods – Service marketing triangle - Integrated Service marketing communication

UNIT - V SERVICE STRATEGIES

Service Marketing Strategies for health – Hospitality – Tourism – Financial – Logistics - Educational – Entertainment & public utility Information technique Services

REFERENCES:

- 01 Christopher Lovelock, Jochen Wirtz & Jayantha Chatterjee, Services Marketing - People, Technology, Strategy, Pearson Education, New Delhi, 7th edition, 2015.
- 02 Hoffman, Marketing of Services, Cengage Learning, 1st Edition, 2014.
- 03 Kenneth E Clow, et al, Services Marketing Operation Management and Strategy, Biztantra, 2nd Edition, New Delhi, 2014.
- 04 Christian Gronroos, Services Management and Marketing a CRM Approach, John Wiley, 2015.
- 05 Valarie Zeithaml et al, Services Marketing, 5th International Edition, Tata McGraw Hill, 2014

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI 627 012.

Syllabus for Ph.D., Course Work in Communication

(with effect from the academic year 2018-2019 onwards)

Following is the list of 10 courses carrying 4 credits each available to the Ph.D., candidates of Communication for selection according to their requirements:

S.No.	Course
1	Research Methods in Communication
2	Media Uses and Effects
3	Journalism
4	Semiotics
5	Development Communication
6	New Media Studies
7	Media, Gender and Human Rights
8	Film Studies
9	Media Audience Studies
10	Mini Project

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Paper 1 - RESEARCH METHODS IN COMMUNICATION

UNIT 1

Introduction to Communication Research

Fundamentals of research- Basic principles of research, Theory building, facts, concepts, constructs and definitions, Variable and its attributes, Ethics in research, Preparation of proposal, Review of literature, formation and types of hypothesis and testing of the hypothesis, Research designs, sampling designs, methods, techniques and tools of research.

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UNIT 2

Research Approaches

Methods/techniques of research; Hypothesis and variables; Research design and its types of Research Design; Experimental Research; Descriptive research; Exploratory Research; Conclusive Research; Sources and collection of Secondary Data; Types of data; Secondary data; Advantages & Limitations of secondary data ; Internal Sources; External Sources.

12 L

UNIT 3

Sampling Techniques

Scaling Techniques; Concept of Attitude; Types of Scales; Criterion for good scale; General Procedure in Attitude Scaling; Selected Attitude Scales; Limitations of Attitude Scale.

Sampling Design; Some basic Terms; Advantages of Sampling; Disadvantages of Sampling; The sampling process; Sampling methods; Characteristics of Good Sampling Design; sampling and non sampling errors; Sample size calculation (Numerical expected); Practical considerations in determining sample size.

Tools and methods of research; Sources of data - primary and secondary source; Questionnaire and schedules; Observation - participatory and non participatory; Interview method; Case study; Content analysis of audio and video.

12 L

UNIT 4

Research Applications, Analysis and Report

Areas of Research – Communication and Society – Process and Product Aspects – Media problems and Issues – Mass media and traditional media – Research problems in information and Communication society; Telecommunication – Convergence of technologies – Media ownership and Regulation aspects. Importance of research in media; Application of research in electronic media, Print, Advertising, New Media; Formative and summative research; Ethical issues in media research; Media research as a tool of reporting. Application of Statistics; Data analysis, Inferential statistics: Indexing, citation and bibliography; Research report writing.

12 L

UNIT 5

Methodology of Teaching

Teaching Objectives of Teaching, Phases of Teaching - Teaching Methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project method, Seminar- Integrating ICT in Teaching: Individualized Instruction, Ways for Effective Presentation with Power Point- Documentation - Evaluation: Formative, Summative & Continuous and Comprehensive Evaluation Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional Moral Development - Teaching Later Adolescents, Social and Moral Development - Teaching later Adolescents.

10 L

REFERENCES

- Mass media research by Dominick and Wimmer
- Research methods in social relations by Clarie Selitz et al
- Mass media and the national experience: essays in communication history by Farrpr and Stevens
- Methods in social research by Kothari
- Sampath, K., Panneerselvam, A. & Santhanam, S. (1984). Introduction to educational technolog. (2nd revised ed.). New Delhi: Sterling Publishers.
- Sharma, S.R. (2003). Effective classroom teaching modern methods, tools & techniques. Jaipur: Mangal Deep.
- Vedanayagam, E.G. (1989). Teaching technology for college teachers. New York: Sterling Publishers.

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Paper 2 -MEDIA USES AND EFFECTS

UNIT I

Present media context: Socio, Economic, Political and Cultural changes New Communication Technologies: Cable and Satellite Television, Telecommunications and Internet. **14 L**

UNIT II

New media Technology – characteristics: Information Superhighway, Convergence, Structure and Functions; - social and cultural consequences: fragmentation and digital Isolation; Social Control and Democracy – Privatization and Competition – New media access and control – Digital Divide: - E-governance – process, social and legal frameworks – Policy initiatives. **12 L**

UNIT III

Information and Knowledge society – Definitions and characteristics of Information Society, Post-industrial society – Information Society Theories: Daniel Bell, Machlup, Webster, Schiller – Evolution of New media audiences: Elite, Mass, Specialized and Interactive – New media uses and gratifications – Influencing factors. **12 L**

UNIT IV

Social and Cultural effects of New Media: Social Networking, Information Overload, Information Rich and Information Poor, Knowledge Gap and Cultural Alienation New media impact on old media – ICTs for Development – Empowerment, right to information. **12 L**

UNIT V

New Media Theory – Perspectives, Technological Determinism, Constructivism, Functionalism, Postmodernism, Characteristics of New Media – Uses, Adoption ICT and Social Transformation – socio-technical paradigm, Information commodification new consumption norms – knowledge gap. New media issues: Invasion of Privacy, Piracy, Cybercrimes and Pornography IT policies, Information Bill and Regulations **10 L**

REFERENCES

- Global Communication in Transition: The end of diversity – By Hamid Mowlana, Sage Publications, Newbury Park, 1996
- Information and Communication Technology in Development: Cases from India –Ed. By SubhashBhatnagar and Robert Schwann, Sage Publications, New Delhi, 2000
- Electronic Communication Convergence: Policy challenges in Asia – Ed. By Mark Hukill et al. Sage publications, New Delhi, 2000
- Global Information and World Communication (2nd edition)– by Hamid Mowlana Sage Publications, New Delhi, 1997

- New media and Politics – Ed. By Barrie Oxford and Richard Huggins, Sage Publications, New Delhi, 2001
- World Communication Report: The media and the challenge of the new technologies – Ed. By AlaineModouz, UNESCO Publishing 1997
- Reshaping Communications: Technology, Information and Social change – By Paschel Preston, Sage Publications, New Delhi, 2001

- Internationalizing media theory: Transition, Power, Culture – By John DH Downing, Sage Publications, New York 1997
- The media and cultural production – By P. Eric Louw, Sage publications, New Delhi, 2001
- Media morphosis – By Roger Fidler, Sage publications, 1998
- New media – By Ronald Rice, Sage Publications, 1984
- Media Policy – Ed. By Denis McQuail, Sage Publications, London, 1998
- Media performance – By Denis McQuail, Sage Publications London, 1992
- New Communications Technology and the Public Interest: Comparative perspectives on policy and research – Ed. By Marjorie Ferguson, Sage publications, 1986
- Theories of Information Society – by Frank Webster, Routledge Publications, London, 1995
- New Media Technology – Cultural and Commercial Perspectives – by John V. Pavlik, Allyn and Bacon Publications
- E-Governance – by Pankaj Sharma, APH Publishing Corporation, 2004

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Paper 3 - JOURNALISM

UNIT I

Imperialism and globalization; Media and cultural studies; Critical attitudes to the Four theories of the Press; Media as political subjects; Media ethics studies; Globalization theories and media Internationalization: a critical appraisal ; Globalizing media law and policy. **14 L**

UNIT II

Origin and development of press – importance of Hudson to the rise of modern journalism – Guard dog theory of journalism - black era of Indian press – Indian media in the age of Globalization – characteristics of yellow journalism. **12 L**

UNIT III

Historical perspective of mass media laws – press commissions – objects and functions of press council: general powers, guidelines and policy formulations - Report on Deshar Katha, Ayodhya, AIDS and Media, etc. – impropriety and press freedom – code of conduct for newspapers – Small and Medium Newspaper Development Corporation – protection of confidential sources of information – controversies over confidentiality **12 L**

UNIT IV

Ethical Issues and Challenges of Electronic News Gathering (ENG) – news in the global public space - peak and valley theory of producing - opening and closing the package: merits and demerits – off-the-record comments – Freedom of Information Act - Government control of media – leak, trial balloon, false light, back time - developing sources. **12 L**

UNIT V

Thick Journalism – formation of public opinion – emerging chaos of global news culture – the local press and the McDonaldization thesis - centrality of banal journalism in news discourse – gendered news practices in different national contexts – Concepts and case studies: Annotative reporting – Interpretative and Investigative journalism - Chequebook journalism - political, international relations, current affairs - journalism of record emerging forms and practices of online journalism – basic tools of computer assisted reporting. **10 L**

REFERENCES:

- Boyd- Barrett, O. & Rantanen, T (eds) (1999) The Globalization of News. London: Corwin Press
- Clausen, L (2003) Global News Production. Copenhagen: Copenhagen Business School Press
- Elliott, W.A. (1986) Us and Them: A Study of Group Consciousness. Aberdeen: Aberdeen University Press.
- Franklin, Bob et al (2005) Key Concepts in Journalism Studies. New Delhi: Vistaar Publications
- Keeble, Richard (2009) The newspapers handbook. NY:Routledge
- Singh, Manorama (2007) History of Journalism. New Delhi: Discovery Publishing House
 - White, Ted (2005) Broadcast news: Writing, Reporting and Producing. USA: Elsevier

Paper 4 - SEMIOTICS

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UNIT I:

Definitions - Origins of semiotics – semiotics and the philosophy of language, Russian formalism, Bakhtin school, Prague structuralism, Jakobson's communication paradigm, the advent of structuralism, post-structuralism - Buhler and intimations of semiotics, Sebeok's Thomism, branches and scope of Peirce's semiotic. **14 L**

UNIT II:

Signs as the medium of semiotic - concept - sign systems: vocabulary, function, syntax, psychological aspects of signification - critique of sign – theories: principle of difference, paradigmatic-syntagmatic relationships, code-message, denotation-connotation, anchorage-relay, modality-representation, literary Semiotics-Doctrine of Signs - sign production: semiotics and factual elements, the problem of a typology of signs, critique of iconism, typology of modes of production. **12 L**

UNIT III:

Textual analysis - aesthetic text as invention - the models: discursive, narrative, deep or abstract. **12 L**

UNIT IV:

Codes – the sign function, expression and content, message and text, content and referent, meaning as cultural unit, the interpretant, KF model, Q model, over coding under coding, interplay of codes, message as an open form. **12 L**

UNIT V: Possessions and commercial communication - Cine-semiology: the cinematic sign, syntagmatic types, codes-subcodes, semiotics of narrative, cinematic realism, the nature of reflexivity - Decoding advertisements: role of semiotics in consumer aesthetics research, advertising as social discourse: positioning and image creation, immunization - Television drama: the naturalism debate, Morse code, emergence of expressionism - Crisell's semiotics of radio drama - Esslin's radio drama signs - Marketing and semiotics: defining the scope, ideology of consumption, product conceptualization and design, signs in consumer aesthetics, consumer identity. **10 L**

References:

- Allen, Robert C. (1992) Channels of Discourse, Reassembled: Television and Contemporary Criticism. University of North Carolina Press.
- Beasley, Ron & Danesi, Marcel (2002) Persuasive Signs: The Semiotics of Advertising. Berlin: Walter de Gruyter GmbH & Co.
- Buckland, Warren (2000) The Cognitive Semiotics of Film. UK: Cambridge University Press.
- Chandler, Daniel (2007) Semiotics –the Basics. NY: Taylor and Francis.
- Crook, Tim (1999) Radio Drama: Theory and Practice. NY: Routledge
- Deely, John (2004) Basics of semiotics. St. Augustine's Press.
- Eco, Umberto (1979) A theory of semiotics. Milan: Indiana University Press.
- Holbrook, Morris B. & Hirschman, Elizabeth .C. (1993) The Semiotics of Consumption: Interpreting Symbolic Consumer Behavior in Popular Culture and Works of Art. Berlin: Walter de Gruyter GmbH & Co. Innis, Robert E. (1985) Semiotics - An Introductory Anthology. Milan: Indiana University Press.

- Jean, Donna & Sebeok, Umiker (1987) *Marketing and Semiotics: New Directions in the Study of Signs for Sale* Berlin: Walter de Gruyter GmbH & Co
- Krampen, Martin (1981) *Classics of semiotics*
- Lidov, David (1999) *Elements of Semiotics*. NY: St. Martin's Press
- Martin, Bronwen (2006) *Key Terms in Semiotics*. Continuum books
- Page, Adrian (2000) *Cracking Morse Code: Semiotics and Television Drama*. UK: University of Luton Press
- Stam, Robert, Robert Burgoyne, Sandy Flitterman, Lewis (1992) *New Vocabularies in Film Semiotics: Structuralism, Post-Structuralism and Beyond*. NY: Routledge.
- Tejera, Victorino (1988) *Semiotics from Peirce to Barthes: A Conceptual Introduction to the Study of Communication, Interpretation and Expression*. Netherlands: E.J.Brill, Leiden

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Paper 5 - DEVELOPMENT COMMUNICATION

UNIT I

Development: meaning, concept, process - Evolution of the theory and practice of development communication - Critical perspectives - characteristics of developing societies, development dichotomies, gap between developed and developing societies - Critique of communication approaches in Third World development - Enterprise of modernization and the dominant discourse of development - Liberation theology and development - Communication strategies for empowerment - Agricultural communication and rural development.

14 L

UNIT II

Demography as development indicators - political profile (Indian constitution, Parliament, Legislative, Judiciary, political processes, centre-state relations, local governments: urban and rural) - Right to Information, Human Rights - Social stratification: development implications in rural-urban context - Pluralism and its implications - Conflict and Consensus in Indian Society - Development of behaviour, perception, learning, motivation and attitude.

12 L

UNIT III

Changing structure of Indian economy: Role and performance of agriculture - Organized and unorganized sectors - Poverty and Unemployment problems - Liberalization and Globalization - Consumer movements and Environmental movements - Role of government - Foreign investments and Role of multinational corporations - International organizations for development such as World Bank, UNDP, IMF. Development related concepts of cultural heritage, Cultural determinants of social values, beliefs and behaviour, Regional culture and ethnic identity.

12 L

UNIT IV

Comparing communication profiles and policies of Developed and Developing countries - Population, Health, Agriculture, Education, Communication/media, Industrial, Economic, Science and technology, Environment, National integration, Communalism, Religion and politics, Class and Caste conflict, Gender equality, Minimum needs, Child labour - Major Development Programmes such as Tribal development, Watershed management.

12 L

UNIT V Media credibility, Ethics, Code and Analysis – impact of new communication technology: Quality of life, Access to information, Privacy, Interactive communication, Rich-poor divide, New World Information and Communication order – Emerging issues: influence on Women, Children, Religion - Foreign channels, Commercialization, Globalization, etc.

10 L

REFERENCES

- Agunga, R.A. (1997) *Developing the Third world. A communication approach*. Commack, NY: Nova Science.
- Altafin, I. (1991) *Participatory Communication in Social Development Evaluation*. *Community Development Journal*, 26 (4), 312-314.
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- Bowes, J.E. (1997) *Communication and community development for health information: Constructs and models for evaluation*, www.nlm.nih.gov/pnr/eval/bowes/
- Brawley, E.A. & Martinez-Brawley, E.E. (1999) *Promoting Social Justice in Partnership with the Mass Media*, *Journal of Sociology & Social Welfare*, 26 (2), 63-86.
- Buchanan, D.R., Reddy, S. & Hossian Z. (1994) *Social marketing: A critical appraisal*, *Health promotion international*, 9 (1), 49-57.
- Carey, J.W. (1989) *Communication as culture : essays on media and society*. Boston: Unwin Hyman.
- Diaz-Bordenave, J. (1977) *Communication and rural development*. Paris: Unesco.
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- Hamelink, C. (1990) *Integrated approaches to development communication: A study and training kit*, *Journal of development communication*.
- Holder, H.D. & Treno, A.J. (1997) *Media advocacy in community prevention: News as a means to advance policy change*,
- Hornik, R.C. (1989) *Channel effectiveness in development communication programs*. In Rice, R.E. & Atkin, C. K. (Eds.) *Public information campaigns*, 2nd edition, (pp. 309- 330). Newbury Park: Sage.
- Inkeles A. & Smith D.H. (1974) *Becoming modern*. Cambridge, MA: Harvard University Press.
- Kavinya A., Alam S. & Decock A. (1994) *Applying DSC methodologies to population issues: A case study in Malawi*. Rome: FAO.
- Kotler, P. & Zaltman, G. (1971) *Social marketing: An approach to planned social change*, *Journal of marketing*, 35, 3-12.
- Kotler, P. & Roberto, E. (1989) *Social marketing: Strategies for changing public behavior*. New York: Free Press.
- Lerner D. (1958) *The passing of traditional society*. New York: Free Press.
- McKee, Neill (1999) *Social Mobilization & Social Marketing in Developing Communities: Lessons for Communicators*. Southbound.
- Melkote, S.R. (1991) *Communication for development in the Third world*. Newbury Park: Sage.
- Mita, R. & Simmons, R. (1995) *Diffusion of the culture of contraception: Program effects on young women in rural Bangladesh*, *Studies in family planning*, 26 (1), 1-13.

- Mlama, P.M. (1991) Women's participation in "communication for development": The popular theater alternative in Africa, *Research in African Literatures*, 22 (3), 41-53.
- Mody, B (1991) *Designing messages for development communication: An audience participation-based approach*. Newbury Park, CA: Sage.
- Ogundimu, F. (1994) Communicating knowledge of immunization for development: A case study from Nigeria, in Moemeka, A.A. (Ed.) *Communicating for development*
- Zinanga, A. & Ikim, Y.M. (1992) Changing men's attitudes and behavior: The Zimbabwe male motivation project, *Studies in Family Planning* 23 (6), 365-375.
- Quarmyne, W. (1991) Towards a more participatory environment: Cross-linking establishment and alternative media, In K. Bofo (Ed.), *Communication processes: Alternative channels and strategies for development support*. Ottawa: IDRC.
- Rockefeller Foundation (1999) *Communication for social change: A position paper and conference report*. New York: Rockefeller Foundation.
- Rogers, E.M. (1976) Communication and development: The passing of the dominant paradigm, *Communication research* 3 (2), 213-240.

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Paper 6 - NEW MEDIA STUDIES

UNIT I:

Foundations and theories of media, technology, & culture-Historical Foundations of New Media: What is Technology? Digitization, Remediation, & Convergence. **14 L**

UNIT II:

Theories of Media Technology-Technological Determinism, Social Construction of Technology, Social and Technical Affordances, Diffusion of Innovation, Information Society, Network Society, Networked Individualism, Social Networks, Networked Publics. **12 L**

UNIT III:

Using the networks- Social production of knowledge, creative cultural production, Identity formation, Sociality, connectivity, social media, locative and mobile media. Identity formation, the body and information technology- selfies, blogs, wearable devices. **12 L**

UNIT IV:

Controlling the networks- Governance of Infrastructures and Platforms, Surveillance and Privacy, Race Online, Economics and Ownership, youth media, Digital Literacy, Digital Education. **12 L**

UNIT V:

Digital Inequality: Social, political and infrastructural contexts, Public sphere, polarization, citizen journalism, digital activism, Cyber culture. **10 L**

REFERENCES:

1. *Understanding Digital Culture*, Vincent Miller
2. *The Culture of Connectivity: A critical history of social media*, Jose Van Dijck
3. *Seeing Ourselves through Technology*, Jill Walker Rettberg
4. *Spreadable Media: Creating value and meaning in a networked culture*, Jenkins, Ford, & Green
5. *Smartphones as Locative Media* –Jordan Frith
6. Tim O’Reilly and John Battelle – “Web Squared: Web 2.0 Five Years On”
7. Frank Webster – “Theories of the Information Society” (Ch. 1-3)
8. David R. Brake – “Are we all online content creators now?: Web 2.0 and digital divides”
9. Niels van Doorn – “Digital spaces, material traces: how matter comes to matter in online performances of gender, sexuality and embodiment”
10. Jill Walker Rettberg – *Seeing Ourselves through Technology*
11. Henry Jenkins, Sam Ford, & Joshua Green – *Spreadable Media: Creating value and meaning in a networked culture*
12. David Buckingham – “Is there a digital generation?”
13. Mark Deuze – “The changing context of news work: liquid journalism and monitorial citizenship”
14. Heather Horst, Becky Herr-Stephenson, & Laura Robinson – “Media Ecologies”
15. Jose van Dijck – “Users like you?: theorizing agency of user-generated content”

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Paper 7 - Media, Gender and Human Rights

Unit I

Gender - Understanding gender – Sex and Gender – Types of gender - Gender roles – Social construction of femininity and masculinity - Feminist theories –First wave-Second wave and Third wave feminists thinkers Feminist language – Post Modern Feminist thoughts – Masculinities – Queer theory – Transgender politics, cyber feminism – Feminism in Indian context – Tamilnadu – Periyar and Bharathiar - Feminism in literature – writers.

14 L

Unit II

Feminist Communication Theories- Feminist epistemology – empiricism – feminist ethnography – The Structuralist Paradigm – muted group theory – standpoint theory –Critical theories of communication – Sociological theories of mass communication - Judith Butler, Gaye Tuchman, Laura Mulvey, - Foucault – Derrida - intersectionality – Framing – Discourse analysis – Popular culture.

12 L

Unit III

Human Rights - Human rights –Meaning – Nature - Principles of Human Rights – Characteristics of Human Rights - UN – - UDHR - Classification of human rights– International Human Rights Conventions – Special focus to CEDAW – Indian constitution and human rights –Protection of Human Rights Act 1993 - National and international Human rights institutions – Role of civil society organizations – Human rights organizations – national and international – human rights of marginalized people

12 L

Unit IV

Media stereotypes and popular culture - Media stereotypes in entertainment media – news media – representation – film, serials, news, reality shows, advertisements etc – Commercialization and Objectification

12 L

Unit V

Human Rights Reporting - Role of mass media in protection of human rights – monitoring techniques – complaint mechanism - Media and Contemporary Issues on Human Rights: Children’s Rights - International standards on reporting human rights violations relating to Women’s Rights - Dalit’s Rights - Bonded Labour and Wages - Refugees - Capital Punishment

10 L

REFERENCES

1. Gaye Tuchman, “The Symbolic Annihilation of Women by the Mass Media
2. Laura Mulvey, “Visual Pleasure and Narrative Cinema” (GMR)
3. Sandra Lee Bartky, “Femininity, Foucault and the Modernization of Patriarchal Power”
4. Marita Sturken and Lisa Cartwright, “Spectatorship, Power and Desire”

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Paper 8 - Film Studies

Unit I

Film theories- Film form – film language - Film theory – realist and formalist film theory – neo formalism - auteur theory- structuralism- Marxist film theory - psychoanalysis – Freudian film theory – feminist film theory - film and identity – audiences and spectatorship – modern film theory.

14 L

Unit II

Film form and culture -Image and reality – formal structures of film – film narratives – Film in the realm of culture – theories of culture – Cultural meanings - The Frankfurt school – the critique of American popular culture – high culture, masscult and midcult – The Birmingham School of Cultural Studies – Cultural criticism – Modernity, modernism and the postmodernism.

12 L

Unit III

Film and representation -Encoding and decoding - Representation – Stuart Hall – Representations of Race – Class – Caste – Gender – physically challenged – Muslim representation – minority representation – constructions of social reality – intersectionality.

12 L

Unit IV

Film and society- Film – popular culture – Cinema and propaganda - film and politics – film and everyday life - influence studies –crime films and society – film in different political contexts around the world – film festivals.

12 L

Unit V

Research methodology in Film studies - Content analysis – Critical Discourse Analysis (CDA) in Film - Reception studies in film – Reception and negotiation - Intertextuality and postmodernism.

10 L

REFERENCES

1. Adorno,Theodor (2002) The Culture Industry, Routledge.
2. Baskaran, Theodore (1981)The Message Bearers: The Nationalist Politics and the Entertainment Media in South India, Cre-A.
3. David Bordwell and Kristin Thompson (2010), Film Art: An Introduction, McGraw Hill.
4. John Hill and Pamela Church Gibson (1998), The Oxford Guide to Film Studies, Oxford,1998.
5. Hayward,Susan (1996) Key Concepts in Cinema Studies, Routledge.

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Paper 9 – Media Audience Studies

UNIT I-

Introduction to Media Audiences - Early Audience Research - The Effects Tradition Introduction to audience analysis - Patterns of audiences: nature and characteristics - Audience demographics Audience lifestyles and psychographics.

14 L

UNIT II-

Cultural Studies and the Audience - Cross-cultural audiences: “the rest” look at the west and Cross-cultural audiences: the west looks at “the rest” - Theorizing the pleasures of popular culture - The scary world of television: Cultural Indicators & Cultivation theory.

12 L

UNIT III-

Audiences as publics Audiences, identification, and realism Audiences, - Fans and Fandom - Theories and applications of the active audience - Conceptual models of the audience - Measuring Audiences: The Role of the Media Industry

12 L

UNIT IV-

Race, Identity and Media Consumption - Audiences and modernity - Audiences and new media technologies - New Media Audiences: Interactivity and Fragmentation - Media ethnography: a contested concept

12 L

UNIT V-

Trends in consumer habits and response - Media impact on audiences Techniques and strategies of collecting information - Design of a basic audience research survey - Data analysis, interpretation techniques, and research application: audience rating and experimental research

12 L

REFERENCES

1. Culture, Media, Language edited by Stuart Hall, Dorothy Hobson, Andrew Lowe and Paul Willis, London: Hutchinson, 1980
2. Beville, H.M., Jr. (1988). Audience ratings: Radio, television, cable (rev.ed). Hillsdale, NJ, Lawrence Erlbaum Associates
3. Buckingham, D. (1993). Reading Audiences: Young people and the media. Manchester and New York, Manchester University Press.
4. Livingstone, S. (1998). Making Sense of Television: The Psychology of Audience Interpretation. London, Routledge.
5. Moores, S. (1993). Interpreting audiences: The ethnography of media consumption. Thousand Oaks, CA, Sage.

Paper 10 - Mini Project

For dissertation the student has to take up a research study with the permission and approval from the guide allotted. He/she should Choose from the broad field of Journalism and Mass Communication and submit the research report. The viva-voce will be held at the end of the semester.

MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI - 12.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Ph.D., (Computer Science / Computer Application /

Information Technology & Engineering / Computer Science & Engineering

From the Academic Year - (2017-2018)

Admission Norms, Scheme of Examination and Syllabus

S.No	Subject	Credits
1	Research and Teaching Methodology	4
2	Recent Research Topics in Computing	4
3	Elective - I	4
	& Elective - II	4
	(Or)	
	Elective - I	4
	& Elective -II/Dissertation	4

Total No. of. Credits : 16

List of Electives Offered:

1. Network and Information Security
2. Advanced Wireless Network Architecture
3. Software Defined Networks
4. Internet of Things(IoT)
5. Digital Video Acquisition and Analysis
6. Pattern Recognition
7. Video Data Management and Information Retrieval
8. Advanced Digital Image Processing
9. Data Mining and Data Warehousing
10. Big Data Analytics

11. Deep Learning
12. Machine Learning Techniques
13. Cloud Computing
14. Bio-Inspired Computing
15. Multi-core Architectures

MANDATORY COURSE WORKS

Computer Science / Computer Application /
Information Technology & Engineering / Computer Science & Engineering

2017-2018

CORE I - RESEARCH AND TEACHING METHODOLOGY

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OBJECTIVES :

- To understand the importance of Research Methodology
- To ensure the reliability and validity of experiments
- To perform exploratory data analysis
- To apply the statistical testing to prove the hypothesis
- To provide the inference using quantitative data analysis
- To make use of computer aids to analyse the data, prepare reports and presentations
- Able to evaluate methodology of teaching

UNIT - I

12(10L+2S)

INTRODUCTION OF RESEARCH AND FORMULATION

Motivation and Objectives - Research methods vs Methodology. Types of research - Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Defining and formulating the research problem - Selecting the problem - Necessity of Primary and secondary sources - Reviews, treatise, monographs, patents -Critical literature review defining the problem - Importance of literature review in defining a problem - Literature review -Primary and secondary sources-Reviews,treatise,monographs,patents-Critical Literature review

RESEARCH DESIGN AND METHODS

Research design - Basic Principles- Need of research design -- Features of good design - Important concepts relating to research design.

UNIT- II

12(10L+2S)

Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models - Developing a research plan - Exploration, Description, Diagnosis, Experimentation - Determining experimental and sample designs.

DATA COLLECTION

Execution of the research - Observation and Collection of data - Methods of data collection.

UNIT- III

12(10L+2S)

DATA ANALYSIS

Quantitative Methods: Online Quantitative Design and Survey - Descriptive Measures - Probability - Random Variables and Distribution Functions - Discrete Probability Distributions - Continuous Probability Distribution - Sampling Distributions - Theory of Estimation - Hypothesis Testing - Correlation - Regression - Principles of Sample Survey - Types of Sampling - Design of Experiments - CRD-RBD-LSD-Factor Analysis - Cluster Analysis -Discriminant Analysis - Multiple Regression and Correlation - Canonical Correlation - Application of Statistical Software Packages.

REPORTING AND THESIS WRITING

Reporting and thesis writing - Structure and components of scientific reports - Types of report - Technical reports and thesis - Significance - Different steps in the preparation - Layout, structure and Language of typical reports - Illustrations and tables - Bibliography, referencing and footnotes - Use of Oral presentation - Software Packages for thesis Preparation- Planning - Preparation - Practice - Making presentation - Use of visual aids - Importance of effective communication.

UNIT-IV APPLICATION OF RESULTS AND ETHICS

12(10L+2S)

Application of results and ethics - Environmental impacts - Ethical issues - ethical committees - Commercialization - Copy right - royalty - Intellectual property rights and patent law - Trade Related aspects of Intellectual Property Rights - Reproduction of published material - Plagiarism - Application of Plagiarism detection tools - Citation and acknowledgement - Reproducibility and accountability.

UNIT V

12(10L+2S)

METHODOLOGY OF TEACHING

Teaching - Objectives of Teaching, Phases of Teaching - Teaching Methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project method, Seminar - Integrating ICT in Teaching: Individualized Instruction, Ways for Effective Presentation with PowerPoint - Documentation - Evaluation: Formative, Summative & Continuous and Comprehensive Evaluation - Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development - Teaching Later Adolescents.

**TOTAL: 60 PERIODS
(L- Lecture : S - Seminar)**

OUTCOMES:

- Explain the importance of the research methodology
- To validate the reliability
- Select and apply different research approaches and methodologies
- Develop data collection instrument according to the underlying theoretical framework.
- Analyse quantitative data and qualitative data using software packages
- Provide valid inference
- Construct and document an appropriate research design
- Discuss limitations and potential contribution to theory and practice of research
- Effectively apply the appropriate computer tools in each stage of research
- Ability to implement effective ICT based Teaching Methods

REFERENCES

1. C R Kothari, Paperback "Research Methodology: Methods and Techniques", 2014
2. Modern Language Association Handbook, Eight Edition, 2016
3. R. Paneerselvam, "Research Methodology" 2nd Edition, PHI, 2014
4. John W Creswel, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 3rd Edition, 2014
5. S.C. Gupta & V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi, 2014 Edition.
6. S.C. Gupta & V.K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & Sons. 2014 Edition.
7. Sampath.K, Panneerselvam.A & Santhanam.S (1984), Introduction to Educational Technology (2nd Revised Ed.) New Delhi: Sterling Publishers.
8. Sharma.S.R(2003).Effective Classroom teaching modern methods, tools & techniques, Jaipur: Mangal Deep.
9. Vedanayagam.E.G (1989). Teaching Technology for College Teachers, Newyark: SterlingPublishers.

CORE II- RECENT RESEARCH TOPICS IN COMPUTING

L T P C
4 0 0 4

OBJECTIVES:

- To apply AI techniques primarily for machine learning, vision, and robotics.
- To understand the fundamentals of Internet of Things
- To study about virtualization and cloud resource management
- To model and visualize the social network
- To introduce visual perception and core skills for visual analysis
- Learn developmental and artificial immune systems
- To get exposed to the domain of bioinformatics
- To know about various applications of natural language processing
- Understand behavioural systems especially in the context of Robotics

UNIT I SOFT COMPUTING

12(10 L +2 S)

Introduction of soft computing - soft computing vs. hard computing- various types of soft computing techniques- applications of soft computing-Neuron- Nerve structure and synapse Artificial Neuron and its model- activation functions- Neural network architecture- single layer and multilayer feed forward networks- McCullochPitts neuron model- Perceptron model- Adeline and Madeline- multilayer perception model- back propagation learning methods- effect of learning rule coefficient -back propagation algorithm- factors affecting back propagation training applications.Introduction to Deep Learning.

UNIT II CLOUD ARCHITECTURE AND INTERNET OF THINGS

12(10 L + 2 S)

Introduction: Cloud delivery model, Cloud Storage Architectures, Software as a Service (SaaS): SaaS service providers - Google App Engine, Salesforce.com and googleplatform - Benefits - Operational benefits - Economic benefits - Evaluating SaaS - Platform as a Service (PaaS): PaaS service providers - Right Scale - Salesforce.com - Rackspace - Force.com - Services and Benefits - Infrastructure-as-a -Service (IaaS): IaaS Service Providers - Amazon EC2 - GoGrid.

Introduction to Distributed Computing: architectural models - fundamental models - P2P systems - Introduction to inter process communications - external data representation and marshalling- client server communication - group communication- multicast/pubsub - Energy Efficient Computing - Cloud computing.

Definitions and Functional Requirements -Motivation - Architecture - Web 3.0 View of IoT- Ubiquitous IoT Applications - Four Pillars of IoT - DNA of IoT - The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview - Communication middleware for IoT -IoT Information Security.

UNIT III BIG DATA AND VIRTUALIZATION

12(10 L + 2 S)

Big Data - Map Reduce - Hadoop, Hive, MapR - Sharding - NoSQL Databases - Cloud databases - S3 - Hadoop Distributed File Systems - Visualizations - Visual Data Analysis Techniques - Interaction Techniques - Social Network Analysis - Collective Inferencing - Egonets - Systems and Applications

Linux System- Basic Concepts ;System Administration-Requirements for Linux System Administrator, Setting up a LINUX Multifunction Server, Domain Name System, Setting Up Local Network Services; Virtualization- Basic Concepts, Setting Up Xen,VMware on Linux Host and Adding Guest OS.

UNIT IV BIO INSPIRED COMPUTING AND BIO INFORMATICS

12(10 L + 2 S)

Introduction of Foundations of evolutionary theory - Genotype - artificial evolution - genetic representations - initial population - fitness functions - selection and reproduction - genetic operators - evolutionary measures - evolutionary algorithms - evolutionary electronics - evolutionary algorithm case study Cellular systems - cellular automata - modeling with cellular systems - other cellular systems - computation with cellular systems - artificial life - analysis and synthesis of cellular systems

Need for Bioinformatics technologies - Overview of Bioinformatics technologies - Structural bioinformatics - Data format and processing - secondary resources- Applications - Role of Structural bioinformatics - Biological Data Integration System.

UNIT V NATURAL LANGUAGE PROCESSING AND ROBOTICS

12(10 L + 2 S)

Natural Language Processing - Mathematical Foundations - Elementary Probability Theory - Essential information Theory - Linguistics Essentials - Parts of Speech and Morphology - Phrase Structure - Semantics - Corpus Based Work

Specifications of Robots- Classifications of robots - Work envelope - Flexible automation versus Robotic technology - Applications of Robots

Tool Maker's microscope - Co-ordinate measuring machines - Universal measuring machine - Laser viewers for production profile checks - Image shearing microscope - Use of computers - Machine vision technology - Microprocessors in metrology.

TOTAL: 60 PERIODS

OUTCOMES:

- Provides a basic exposition to the goals and methods of Artificial Intelligence.
- Design a portable IoT using Arduino/ equivalent boards and relevant protocols
- To implement virtualization and cloud resource management
- Predict the possible next outcome of the social network
- Explain principles of visual perception

REFERENCES

1. Arshdeep Bahga, vijay Madiseti, "Internet Of Things -A hands-on approach", Universities Press-2015.
2. Kevin P. Murphy, "Machine learning: A probabilistic perspective ". MIT press, 2012.
3. Charu C. Aggarwal, "Social Network Data Analytics" Springer, 2011
4. Evan Stubbs, "The value of business analytics: Identifying the path to profitability", Wiley, 2011.
5. A.E Elben and J.E Smith, "Introduction to Evolutionary computing ", Springer, 2010

ELECTIVE PAPERS

PAPER 1 - NETWORK AND INFORMATION SECURITY

L T P C
4 0 0 4

OBJECTIVES:

- To understand the fundamentals of Cryptography
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand the various key distribution and management schemes
- To understand how to deploy encryption techniques to secure data in transit across data networks
- To design security applications in the field of Information technology

UNIT I INTRODUCTION 12(10L+2S)

An Overview of Computer Security-Security Services-Security Mechanisms-Security Attacks Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies.

UNIT II CRYPTOSYSTEMS & AUTHENTICATION 12(10L+2S)

Classical Cryptography-Substitution Ciphers-permutation Ciphers-Block Ciphers-DES- Modes of Operation- AES-Linear Cryptanalysis, Differential Cryptanalysis- Hash Function - SHA 512- Message Authentication Codes-HMAC - Authentication Protocols -

UNIT III PUBLIC KEY CRYPTOSYSTEMS 12(10L+2S)

Introduction to Public key Cryptography- Number theory- The RSA Cryptosystem and Factoring Integer- Attacks on RSA-The ELGamal Cryptosystem-Digital Signature Algorithm-Finite Fields Elliptic Curves Cryptography- Key management - Session and Interchange keys, Key exchange and generation-PKI

UNIT IV SYSTEM IMPLEMENTATION 12(10L+2S)

Design Principles, Representing Identity, Access Control Mechanisms, Information Flow and Confinement Problem Secure Software Development: Secured Coding - OWASP/SANS Top Vulnerabilities - Buffer Overflows - Incomplete mediation - XSS - Anti Cross Site Scripting Libraries - Canonical Data Format - Command Injection - Redirection - Inference - Application Controls

UNIT V NETWORK SECURITY 12(10L+2S)

Secret Sharing Schemes-Kerberos- Pretty Good Privacy (PGP)-Secure Socket Layer (SSL)- Intruders - HIDS- NIDS - Firewalls - Viruses

TOTAL: 60 PERIODS

OUTCOMES:

- Upon Completion of the course, the students will be able to
- Implement basic security algorithms required by any computing system.
- Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
- Analyze the possible security attacks in complex real time systems and their effective countermeasures Identify the security issues in the network and resolve it.
- Evaluate security mechanisms using rigorous approaches, including theoretical derivation, modeling, and simulations
- Formulate research problems in the computer security field

REFERENCES:

1. William Stallings, "Cryptography and Network Security: Principles and Practices", Third Edition, Pearson Education, 2006.
2. Matt Bishop, "Computer Security art and science ", Second Edition, Pearson Education, 2002
3. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007
4. Jonathan Katz, and Yehuda Lindell, Introduction to Modern Cryptography, CRC Press, 2007
5. Douglas R. Stinson, "Cryptography Theory and Practice", Third Edition, Chapman & Hall/CRC, 2006 6.
6. Wenbo Mao, "Modern Cryptography - Theory and Practice", Pearson Education, First Edition, 2006.
7. Network Security and Cryptography, Menezes Bernard, Cengage Learning, New Delhi, 2011
8. Man Young Rhee, Internet Security, Wiley, 2003 9. OWASP top ten security vulnerabilities: <http://xml.coverpages.org/OWASP-TopTen.pdf>

PAPER 2 - ADVANCED WIRELESS NETWORK ARCHITECTURE

L T P C
4 0 0 4

OBJECTIVES:

- To understand the fundamentals of Wireless and Sensor Networks.
- To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
- To understand VLC and LI-FI Networks.
- To understand the Modulation Schemes.

UNIT I INTRODUCCION -WIRELESS NETWORKS 12(10L+2S)

Migration to 3G Networks - IMT 2000 and UMTS - UMTS Architecture - User Equipment - Radio Network Subsystem - UTRAN - Node B - RNC functions - USIM - Protocol Stack - CS and PS Domains - IMS Architecture - Handover - 3.5G and 3.9G a brief discussion - 4G LAN and Cellular Networks - LTE - Control Plane - NAS and RRC - User Plane - PDCP, RLC and MAC - WiMax IEEE 802.16d/e - WiMax Internetworking with 3GPP

UNIT II WIRELESS SENSOR NETWORKS (WSN) 12(10L+2S)

Unique constraints and challenges - advantages of WSNs - Sensor network applications - Collaborative processing - Key definitions of sensor networks Canonical Problem: Localization and tracing - tracking scenario - Problem formulation - distributed representation and inference of states - tracking multiple objects - sensor models - performance comparison and metrics. Networking sensors: Key assumptions - Medium access control - General issues - Geographic energy aware routing - attribute based routing. Infrastructure Establishment: Topology control - clustering

UNIT III ADHOC AND HETEROGENOUS NETWORKS 12(10L+2S)

Introduction to Adhoc networks, characteristics features and applications. of Wireless channel Characteristics, Adhoc Mobility Models:- Indoor and outdoor mobility models, Entity Vs Group mobility models. Handover - basic definition, Handover Characteristics -Hard and Soft handover-Handover mechanisms. Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithms, Energy aware routing algorithms, Hierarchical Routing, QOS aware routing.

UNIT-IV VLC and LI-FI networks 12(10L+2S)

Introduction History of OWC-Advantages-Application areas. Introduction of Li-Fi-Terminologies .Challenges of OWC. OWC Communication scenarios, optical Front-ends, optical wireless channel. Cellular network :Case study in an aircraft cabin. Front-end non-Linearity

UNIT-V VLC MODULATION SCHEMES 12(10L+2S)

Digital Modulation Schemes-optical signals, Single carrier, Multicarrier. Spectral efficiency and information rate- Constraints -Modulation schemes with AWGN. Information rate of OFDM-based with non-linear distortion. Modulation Schemes in the dispersive channel with AWGN.MIMO Transmission-System model-Techniques-BER performance. Throughput of Cellular OWC networks-Introduction-System throughput-Interference coordination in optical cells-System throughput with busy burst and fair reservation mechanism.

TOTAL PERIODS: 60 PERIODS

OUTCOMES:

- Student will be able to know working of modern wireless and cellular Networks.
- Student will utilize the different models of wireless network to overcome path loss in large and small propagations.
- Student will be able to differentiate between the development of fixed and wireless networks.

REFERENCES:

1. C.Siva Ram Murthy and B.S.Manoj, Adhoc Wireless Networks Architectures and protocols, 2ndedition, Pearson Education.
2. Pei Zheng and Lionel M Li, 'Smart Phone & Next Generation Mobile Computing', Morgan Kaufmann Publishers, 2006.
3. Charles E. Perkins, Ad hoc Networking, Addison - Wesley
4. Wireless Sensor networks : Feng Zhao,Leonidas Guibas -Morgan Kaufmann Publications - 2012.
5. Fundamentals of Wireless sensor networks Theory and Practice - Walteneus Dargie, Christian Poellabauer - Wiley - 2010
6. Principles of LED Light Communications: Towards Networked Li-Fi, Svilen Dimitrov, Harald Haas

PAPER 3 - SOFTWARE DEFINED NETWORKS

L T P C
4 0 0 4

OBJECTIVES:

- To learn about what software defined networks are
- To understand the separation of the data plane and the control plane
- To learn about the use of SDN in data centers
- To learn about different applications of SDN

UNIT I INTRODUCTION 12(10L+2S)

History of Software Defined Networking (SDN) - Modern Data Center - Traditional Switch Architecture - Why SDN - Evolution of SDN - How SDN Works - Centralized and Distributed Control and Data Planes

UNIT II OPEN FLOW & SDN CONTROLLER 12(10L+2S)

Open Flow Specification - Drawbacks of Open SDN, SDN via APIs, SDN via Hypervisor-Based Overlays - SDN via Opening up the Device - SDN Controllers - General Concepts

UNIT III DATA CENTERS 12(10L+2S)

Multitenant and Virtualized Multitenant Data Center - SDN Solutions for the Data Center Network - VLANs - EVPN - VxLAN - NVGRE

UNIT IV SDN PROGRAMMING 12(10L+2S)

Programming SDNs: Northbound Application Programming Interface, Current Languages and Tools, Composition of SDNs - Network Functions Virtualization (NFV) and Software Defined Networks: Concepts, Implementation and Applications.

UNIT V SDN 12(10L+2S)

Juniper SDN Framework - IETF SDN Framework - Open Daylight Controller - Floodlight Controller - Bandwidth Calendaring - Data Center Orchestration

TOTAL: 60 PERIODS

OUTCOMES:

Upon completion of the course, the students will be able to:

- Critically analyze and appreciate the evolution of software defined networks
- Point out the various components of SDN and their uses
- Explain the use of SDN in the current networking scenario

- Design and develop various applications of SDN

TEXT BOOKS:

1. Thomas D. Nadeau, Ken Gray, —SDN: Software Defined Networks, O'Reilly Media, 2013.
2. Paul Goransson and Chuck Black, —Software Defined Networks: A Comprehensive Approach, First Edition, Morgan Kaufmann, 2014.

REFERENCES:

1. Siamak Azodolmolky, —Software Defined Networking with Open Flow, Packet Publishing, 2013.
2. Vivek Tiwari, —SDN and Open Flow for Beginners, Amazon Digital Services, Inc., 2013.
3. Fei Hu, Editor, —Network Innovation through Open Flow and SDN: Principles and Design, CRC Press, 2014.

PAPER 4 - INTERNET OF THINGS (IoT)

L T P C
4 0 0 4

OBJECTIVES:

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi.
- To apply the concept of Internet of Things in the real world scenario

UNIT I INTRODUCTION TO IoT 12(10L+2S)

Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology

UNIT II IoT ARCHITECTURE 12(10L+2S)

M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

UNIT III IoT PROTOCOL 12(10L+2S)

Protocol Standardization for IoT - Efforts - M2M and WSN Protocols - SCADA and RFID Protocols - Unified Data Standards - Protocols - IEEE 802.15.4 - BACNet Protocol - Modbus- Zigbee Architecture - Network layer - 6LowPAN - CoAP - Security

UNIT IV BUILDING IoT WITH RASPBERRY PI & ARDUINO 12(10L+2S)

Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python - IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.

UNIT V CASE STUDIES AND REAL-WORLD APPLICATIONS 12(10L+2S)

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT- Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

TOTAL PERIODS: 60

OUTCOMES:

- Upon completion of this course, the students should be able to:
- Analyze various protocols for IoT
- Develop web services to access/control IoT devices.
- Design a portable IoT using Raspberry Pi
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCES:

1. Arshdeep Bahga, Vijay Madiseti, —Internet of Things - A hands-on approach , Universities Press, 2015
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things , Springer, 2011.
3. Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspective , CRCPress, 2012.
4. Jan Ho" ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , —The Internet of Things - Key applications and Protocols , Wiley, 2012

PAPER 5 - DIGITAL VIDEO ACQUISITION AND ANALYSIS

L T P C
4 0 0 4

OBJECTIVES:

- This course serves as a baseline course to provide students with a basic understanding of digital video processing
- It emphasize on video segmentation, video standards, compression and content based retrieval

UNIT I VIDEO ACQUISITION AND REPRESENTATION & MOTION ANALYSIS

12(10L+2 S)

Spatio Temporal Sampling - Sampling Structure Conversion - Interpolation - Color spaces - Video formats. 2D and 3D Motion Estimation and Compensation - Optical Flow methods - Block based - point correspondences - Gradient based - Intensity matching - Feature matching - Frequency domain motion estimation - Depth from motion - Structure from stereo - 3D Reconstruction -Motion analysis Applications: Video Summarization, Video Surveillance, Video Watermarking, Video Mosaicing

UNIT II VIDEO OBJECT TRACKING AND SEGMENTATION **12(10 L +2 S)**

2D and 3D motion tracking - blob tracking - kernel based - Contour tracking - Feature matching - Filtering - mosaicing - Video Segmentation - Mean Shift based - Active shape model - Video shot boundary detection.

UNIT III VIDEO FILTERING

12(10 L +2 S)

Motion Compensation - Noise Filtering - Enhancement and Restoration - Video Stabilization and Super Resolution.

UNIT IV VIDEO CODING, REPRESENTATION

12(10 L +2 S)

Video Standards: MPEG 1,2, MPEG-4, MPEG-7, H.261, H.263, H.264. Video compression - Inter frame Compression - 3D Waveform based - Motion Compensation.

UNIT V CONTENT BASED VIDEO RETRIEVAL AND VIDEO BASED RENDERING

12(10 L +2 S)

Object based coding - Content based representation - Feature extraction - MPEG 7 Visual descriptors - Low to high level representation (CSS, Poly, B-Splines etc.) - Video Indexing and retrieval - search engines. Generation of mosaics from video; Detection of Video object alpha-matte and Video cut & paste for Virtual Reality applications.

TOTAL: 60 PERIODS

OUTCOME:

- After the course, students could have sufficient understanding of digital video processing and its relevant processing tasks

TEXT BOOKS:

1. Digital Image Sequence Processing, Compression and Analysis – Todd R. Reed, CRC Press, 2004.
2. H.264 and MPEG-4 Video Compression: Video Coding for Next Generation Multimedia – Iain E.G. Richardson, Wiley, 2003
3. Digital Video Processing – A. Murat Tekalp, Prentice Hall, 1995.

REFERENCES:

1. Video Processing and Communications by Yao wang, Joern Ostermann and YaQin Zhang, Prentice Hall, 2002, ISBN 0-13-017547-1.
2. Handbook of Image and Video processing – AI Bovik (Alan C Bovik), Academic

PAPER 6 - PATTERN RECOGNITION

L T P C
4 0 0 4

OBJECTIVES :

- This course provides students with understanding of pattern classification techniques, feature extraction and discuss recent techniques in classification.
- Provide knowledge of learning an unsupervised modes of classification techniques

UNIT I PATTERN CLASSIFIER

12 (10 L+2S)

Overview of pattern recognition - Discriminant functions - Supervised learning - Parametric estimation - Maximum likelihood estimation - Bayesian parameter estimation - Perceptron algorithm - LMSE algorithm - Problems with Bayes approach - Pattern classification by distance functions - Minimum distance pattern classifier.

UNIT II UNSUPERVISED CLASSIFICATION

12 (10 L+2S)

Clustering for unsupervised learning and classification - Clustering concept - C-means algorithm - Hierarchical clustering procedures - Graph theoretic approach to pattern clustering - Validity of clustering solutions.

UNIT III STRUCTURAL PATTERN RECOGNITION

12 (10 L+2S)

Elements of formal grammars - String generation as pattern description - Recognition of syntactic description - Parsing - Stochastic grammars and applications - Graph based structural representation.

UNIT IV FEATURE EXTRACTION AND SELECTION

12 (10 L+2S)

Entropy minimization - Karhunen - Loeve transformation - Feature selection through functions approximation - Binary feature selection.

UNIT V RECENT ADVANCES

12 (10 L+2S)

Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy - Pattern classification using Genetic Algorithms.

TOTAL: 60 PERIODS

OUTCOMES:

- After the course, students could earn sufficient knowledge on pattern classification and feature extraction.
- With these backgrounds, students would be able to learn more advanced classification techniques

REFERENCES:

1. Robert J.Schalkoff, Pattern Recognition Statistical, Structural and Neural Approaches, John Wiley & Sons Inc., New York, 1992.
2. Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.
3. Duda R.O., and Har P.E., Pattern Classification and Scene Analysis, Wiley, New York, 1973.
4. Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, New York, 1993.
5. Statistical pattern Recognition; K. Fukunaga; Academic Press, 2000.
6. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009

PAPER 7 - VIDEO DATA MANAGEMENT AND INFORMATION RETRIEVAL

L T P C
4 0 0 4

OBJECTIVES:

- To understand the fundamentals of video processing
- To learn and understand the video abstraction
- To understand video data management and retrieval

UNIT I FUNDAMENTALS OF VIDEO PROCESSING 12 (10 L+2S)

Video Capture and Display - Principles of Color Video, Video Cameras, Video Display. Composite versus Component Models. Gamma Connection, Video Formation, Perception and Representation, Video Modeling- Camera Model, Object Model, Scene Model, Digital Video Notation. ITU-R.BT.601 Digital Video Format. Other Digital Video Formats and Applications. Digital Video Quality Measure.

UNIT II FEATAURES OF VIDEO SIGNALS 12 (10 L+2S)

Color -Color Space Transformations, Representation of Color Features; Texture - statistical Texture Analysis, Spectral Features of Texture; Edge Analysis - Edge Detection by Gradient Operators, Edge Characterization by second Derivative, Edge Finding and Consistency Analysis, Edge Model Fitting, Description and Analysis of Edge Properties, Contour and Shape Analysis, Moment Analysis, Motion Analysis - Mapping of motion into the image plane, Motion Estimation by the Optical Flow Principle, Motion Estimation by Matching, Multi resolution Motion Estimation.

UNIT III HIGH LEVEL FEATURES OF VIDEO 12 (10 L+2S)

Mosaics Face Detection and Description, Audio Signal Features- Basic Features, Speech Signal Analysis, Musical Signals, Instruments and Sounds.

UNIT IV VIDEO ABSTRACTION 12 (10 L+2S)

Video Abstraction, Types of video abstraction, Applications, Video Summarization and techniques, Dynamic Summary - Highlight Detection and Summary sequence Generation, Types of visualization.

UNIT V VIDEO DATA MANAGEMENT AND RETRIEVAL 12 (10 L+2S)

An Overview of Video Information Retrieval Techniques, Shot Boundary Detection, Innovative Shot Boundary Detection for Video Indexing, Scene Changed Detection, Content based video retrieval

TOTAL: 60 PERIODS

OUTCOME

- Demonstrate a broad range of fundamental of video processing
- Demonstrate and apply the knowledge by analysing the video signals
- Understand various features of video and video data management

REFERENCES:

1. Yao Wang, JörnOstermann, and Ya-Qin Zhang, 'Video Processing and Communications', Prentice Hall, 2002 (Published September 2001) ISBN 0-13-017547-1
2. J.R.Ohm , 'Multimedia Communication Technology', Springer Publication, 2004.
3. Sagarmay Deb, 'Video Data Management and Information Retrieval', Idea Group Inc (IGI), 2005.
4. "Handbook on Image and Video Processing", A.I.Bovik, Academic Press. 5. "Digital Video", Tekalp, Prentice Hall.

PAPER 8 - ADVANCED DIGITAL IMAGE PROCESSING

L T P C
4 0 0 4

OBJECTIVES:

- To understand the image fundamentals and mathematical transforms necessary for image processing and to study the image enhancement techniques.
- To understand the image segmentation and representation techniques.
- To understand how images are analyzed to extract features of interest.
- To introduce the concepts of image registration and image fusion.
- To analyze the constraints in image processing when dealing with 3D datasets.

UNIT I FUNDAMENTALS OF DIGITAL IMAGE PROCESSING 12 (10 L+2S)

Elements of visual perception, brightness, contrast, hue, saturation, Mach band effect, 2D image transforms-DFT, DCT, KLT, and SVD. Image enhancement in spatial and frequency domain, Review of morphological image processing

UNIT II SEGMENTATION 12 (10 L+2S)

Edge detection, Thresholding, Region growing, Fuzzy clustering, Watershed algorithm, Active contour methods-Level set method, Texture feature based segmentation, Model based segmentation, Atlas based segmentation, Wavelet based Segmentation methods

UNIT III FEATURE EXTRACTION 12(10 L+2S)

First and second order edge detection operators, Phase congruency, Localized feature extraction-detecting image curvature, shape features Hough transform, shape skeletonization, Boundary descriptors, Moments, Texture descriptors- Autocorrelation, Co-occurrence features, Runlength features, Fractal model based features, Gabor filter, wavelet features

UNIT IV REGISTRATION AND IMAGE FUSION 12 (10 L+2S)

Registration- Preprocessing, Feature selection-points, lines, regions and templates Feature correspondence-Point pattern matching, Line matching, region matching Template matching .Transformation functions-Similarity transformation and Affine Transformation. Resampling- Nearest Neighbour and Cubic Splines Image Fusion-Overview of image fusion, pixel fusion, Multiresolution based fusion discrete wavelet transform, Curvelet transform. Region based fusion.

UNIT V 3D IMAGE VISUALIZATION

12(10 L+2S)

Sources of 3D Data sets, Slicing the Data set, Arbitrary section planes, The use of color, Volumetric display, Stereo Viewing, Ray tracing, Reflection, Surfaces, Multiply connected surfaces, Image processing in 3D, Measurements on 3D images.

TOTAL: 60 PERIODS

OUTCOMES:

- To apply image processing techniques in both the spatial and frequency domains.
- To design image analysis techniques in the form of image segmentation and to evaluate the methodologies for segmentation.
- To conduct independent study and analysis of feature extraction techniques.

TEXT BOOK:

1. John C.Russ, "The Image Processing Handbook", CRC Press,2007.
2. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
3. Ardeshir Goshtasby, " 2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications", John Wiley and Sons,2005.
4. H.B.Mitchell, "Image Fusion Theories, Techniques and Applications", Springer,2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, , Digital Image Processing', Pearson, Education, Inc., Second Edition, 2004.
2. Anil K. Jain, Fundamentals of Digital Image Processing', Pearson Education, Inc., 2002.
3. Rick S.Blum, Zheng Liu," Multisensor image fusion and its Applications",Taylor& Francis,2006. Faulty of I and C Engg (Approved in 16th AC(Ad hoc) 02.12.2010) ITEM NO. FI 16.01(10)

PAPER 9 - DATA MINING AND DATA WAREHOUSING

L T P C
4 0 0 4

Objectives:

- This course will introduce the concepts, techniques, design and applications of data warehousing and data mining.
- Learning Outcome and End use:
- Appreciate the strengths and limitations of various data mining and data warehousing models.
- Describe and utilize a range of techniques for designing data warehousing and data mining systems for real-world applications.

Unit I : **12(10L+2S)**

DATA MINING: Motivation -Steps in Data Mining - Architecture - Data Mining and Databases - Data Warehouses - Data Mining functionalities - Classification - Data Mining Primitives - Major issues. DATA PREPROCESSING: Descriptive data summarization -Data Cleaning - Data integration and transformation - Data Reduction- Data discretization and concept hierarchy generation.

Unit II: **12(10L+2S)**

DATA WAREHOUSE and OLAP TECHNOLOGY: Need for Data Warehouse-multidimensional data model- Data Warehouse architecture - Data Warehousing to Data mining. MINING FREQUENT PATTERNS, ASSOCIATIONS AND CORRELATIONS: Frequent itemsets, Association rules - Efficient and Scalable frequent itemset mining methods - mining various kinds of Association rules.

Unit III: **12(10L+2S)**

CLASSIFICATION AND PREDICTION: Issues regarding classification and prediction - Classification by Decision Tree induction -Bayesian Classification - Rule based classification - Classification using Neural Networks Prediction - Accuracy and error measures - Evaluating the accuracy of classifiers and predictors.

Unit IV: **12(10L+2S)**

CLUSTER ANALYSIS: Types of data - Partitioning Methods: k means and k Medoids - Hierarchical Methods: Agglomerative and Divisive hierarchical clustering- Outlier analysis.

Unit V: **12(10L+2S)**

MINING TIME SERIES, SEQUENCE DATA: Trend analysis - similarity search - sequence patterns in transactional databases sequential pattern mining: concepts and primitives. MINING TEXT, MULTIMEDIA AND THE WORLD WIDE WEB: Text data analysis and information retrieval- Dimensionality reduction for text - text mining

approaches - similarity search in multimedia data - classification and prediction analysis - mining the web page layout structure - mining multimedia data on the web - web usage mining

TOTAL: 60 PERIODS

OUTCOMES:

- Interpret the contribution of data warehousing and data mining to the decision-support level of organizations
- Evaluate different models used for OLAP and data pre-processing
- Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis

REFERENCES:

1. Han Jiawei, Micheline Kamber and Jian Pei "Data Mining: Concepts and Techniques", Morgan Kaufmann, 2011.
2. Soman K P, Shyam Diwakar and Ajay V, "Insight into Data Mining Theory and Practice", PHI Learning, 2009.
3. Arun K Pujari, "Data Mining Techniques", University Press, 2013.

PAPER 10 - BIG DATA ANALYTICS

L T P C
4 0 0 4

OBJECTIVES:

- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I

(12=10L+2S)

INTRODUCTION TO DATA SCIENCE Introduction: Introduction of Data Science-Getting started with R- Exploratory Data Analysis- Review of probability and probability distributions- Bayes Rule Supervised Learning- Regression- polynomial regression- local regression- knearest neighbors.

UNIT II

(12=10L+2S)

UNSUPERVISED LEARNING Unsupervised Learning- Kernel density estimation- k-means- Naive Bayes- Data and Data Scraping Classification-ranking- logistic regression. Ethics- time seriesadvanced regression- Decision trees- Best practices- feature selection.

UNIT III

(12=10L+2S)

BIG DATA FROM DIFFERENT PERSPECTIVES Big data from business Perspective: Introduction of big data-Characteristics of big data-Data in the warehouse and data in Hadoop- Importance of Big data- Big data Use cases: Patterns for Big data deployment. Big data from Technology Perspective: History of Hadoop-Components of Hadoop-Application Development in Hadoop-Getting your data in Hadoop-other Hadoop Component.

UNIT IV

(12=10L+2S)

INFOSPHERE BIGINSIGHTS Infosphere Big Insights: Analytics for Big data at rest-A Hadoop -Ready Enterprise-Quality file system-Compression -Administrative

tooling-SecurityEnterprise Integration -Improved workload scheduling-Adaptive map reduce-Data discovery and visualization-Machine Analytics

UNIT V

(12=10L+2S)

INFOSPHERE STREAMS Infosphere Streams: Analytics for Big data in motion-Infosphere Streams Basicsworking of Infosphere Streams-Stream processing language-Operators-Stream toolkits-Enterprise class

TOTAL: 60 PERIODS

OUTCOMES:

- Apply the statistical analysis methods.
- Design distributed file systems.
- Apply Stream data model.
- Use Visualization techniques
-

REFERENCES

1. Noreen Burlingame and Lars Nielsen, "A Simple Introduction To Data Science", 2012.
2. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data", The McGraw-Hill Companies, 2012.

PAPER 11 - DEEP LEARNING

L T P C

4 0 0 4

Objectives

- The objective of this course is to cover the fundamentals of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolution neural networks. The course also requires students to implement programming assignments related to these topics.

UNIT I

12(10L +2S)

Basics: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm. **Feedforward Networks:** Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.

UNIT II

12(10L +2S)

Deep Neural Networks: Difficulty of training deep neural networks, Greedy layerwise training.

UNIT III

12(10L +2S)

Better Training of Neural Networks: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT IV

12(10L +2S)

Recurrent Neural Networks: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs **Convolutional Neural Networks:** LeNet, AlexNet. **Generative models:** Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

Unit V

12(10L +2S)

Recent trends: Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning **Applications:** Vision, NLP, Speech (just an overview of different applications in 2-3 lectures)

TOTAL PERIODS: 60

OUTCOMES:

- **Deep learning** is a set of student educational **outcomes**.
- Including acquisition of robust core academic content, higher-order thinking skills, and **learning** dispositions.

Textbooks

1. Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

References:

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

PAPER 12 - MACHINE LEARNING TECHNIQUES

L T P C
4 0 0 4

Objectives:

- To prepare the students to understand and learn the machine learning techniques and to apply them for the practical problems.

UNIT I

12(10L+2S)

FOUNDATIONS OF LEARNING Components of learning - learning models - geometric models - probabilistic models - logic models - grouping and grading - learning versus design - types of learning - supervised - unsupervised - reinforcement - theory of learning - feasibility of learning - error and noise - training versus testing - theory of generalization - generalization bound - approximation generalization tradeoff - bias and variance - learning curve 3

UNIT II

12(10L+2S)

LINEAR MODELS Linear classification - univariate linear regression - multivariate linear regression - regularized regression - Logistic regression - perceptrons - multilayer neural networks - learning neural networks structures - support vector machines - soft margin SVM - going beyond linearity - generalization and overfitting - regularization - validation

UNIT III

12(10L+2S)

DISTANCE-BASED MODELS Nearest neighbor models - K-means - clustering around medoids - silhouettes - hierarchical clustering - k-d trees - locality sensitive hashing - non-parametric regression - ensemble learning - bagging and random forests - boosting - meta learning

UNIT IV

12(10L+2S)

TREE AND RULE MODELS Decision trees - learning decision trees - ranking and probability estimation trees - regression trees - clustering trees - learning ordered rule lists - learning unordered rule lists - descriptive rule learning - association rule mining - first-order rule learning

UNIT V

12(10L+2S)

REINFORCEMENT LEARNING Passive reinforcement learning - direct utility estimation - adaptive dynamic programming - temporal-difference learning - active reinforcement learning - exploration - learning an actionutility function -

Generalization in reinforcement learning – policy search – applications in game playing
– applications in robot control

TOTAL PERIODS: 60

OUTCOMES:

At the end of the course the students will be able to:

- Describe the various machine learning concepts and models.
- Apply the concepts for the practical problems.
- Compare and analyse the performance of various machine learning algorithms

REFERENCES :

1. Y. S. Abu-Mostafa, M. Magdon-Ismael, and H.-T. Lin, "Learning from Data", AMLBook Publishers, 2012.
2. P. Flach, "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press, 2012.
3. K. P. Murphy, "Machine Learning: A probabilistic perspective", MIT Press, 2012.
4. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.
5. D. Barber, "Bayesian Reasoning and Machine Learning", Cambridge University Press, 2012.
6. M. Mohri, A. Rostamizadeh, and A. Talwalkar, "Foundations of Machine Learning", MIT Press, 2012.
7. T. M. Mitchell, "Machine Learning", McGraw Hill, 1997.
8. S. Russel and P. Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Prentice Hall, 2009
9. Peter Flach, "Machine Learning", Cambridge University Press, 2015.
10. Shai Shalar-Schwartz & Shai Ben-David, "Understand Machine Learning", Cambridge University, 2015.

PAPER 13 - CLOUD COMPUTING

L T P C
4 0 0 4

Objectives:

- To prepare the students to understand and learn the machine learning techniques and to apply them for the practical problems.

Unit I

12(10L+2S)

Distributed System Models and Enabling Technologies: Scalable Computing over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security and Energy Efficiency

Computer Clusters for Scalable Parallel Computing: Clustering for Massive Parallelism, Computer Clusters and MPP Architectures, Design Principles of Computer Clusters, Cluster Job and Resource Management

Unit II

12(10L+2S)

Cloud Platform Architecture over Virtualized Data Centers: Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms GAE, AWS, and Azure, Inter-cloud Resource Management, Cloud Security and Trust Management

Unit III

12(10L+2S)

Service-Oriented Architectures for Distributed Computing: Services and Service-Oriented Architecture, Message-Oriented Middle-ware, Portals and Science Gateways, Discovery, Registries, Metadata and Databases, Work-flow in Service-Oriented Architectures.

Unit IV

12(10L+2S)

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

Unit V

12(10L+2S)

Ubiquitous Clouds and the Internet of Things: Cloud Trends in Supporting Ubiquitous Computing, Performance of Distributed Systems and the Cloud, Enabling

Technologies for the Internet of Things, Innovative Applications of the Internet of Things, On-line Social and Professional Networking

TOTAL PERIODS: 60

OUTCOMES:

- Completing this course should provide you with a good understanding of **cloud computing**.
- A systematic knowledge of the fundamental technologies, architecture, and security. ... Identify problems.
- Explain, analyze, and evaluate various **cloud computing** solutions.

REFERENCES:

1. Distributed and Cloud Computing- Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra -Elsevier-2012
2. Cloud Computing - A Hands-on Approach - Arshdeep Bahga, Vijay Madisetti - University Press2014
3. Enterprise Cloud Computing - Gautam Shroff - Cambridge University Press - 2014.

PAPER 14 - BIO-INSPIRED COMPUTING

L T P C
4 0 0 4

OBJECTIVES:

- To Understand Cellular Automata and artificial evolution
- To Learn artificial neural systems and related learning algorithms
- To learn developmental and artificial immune systems
- To understand behavioral systems especially in the context of Robotics
- To understand collective systems such as ACO, PSO, and swarm robotics

UNIT I EVOLUTIONARY AND CELLULAR SYSTEMS

12 (10L+2S)

Foundations of evolutionary theory - Genotype - artificial evolution - genetic representations - initial population - fitness functions - selection and reproduction - genetic operators - evolutionary measures - evolutionary algorithms - evolutionary electronics - evolutionary algorithm case study Cellular systems - cellular automata - modeling with cellular systems - other cellular systems - computation with cellular systems - artificial life - analysis and synthesis of cellular systems

UNIT II NEURAL SYSTEMS

12 (10L+2S)

Biological nervous systems - artificial neural networks - neuron models - architecture - signal encoding - synaptic plasticity - unsupervised learning - supervised learning - reinforcement learning - evolution of neural networks - hybrid neural systems - case study

UNIT III DEVELOPMENTAL AND IMMUNE SYSTEMS

12 (10L+2S)

Rewriting systems - synthesis of developmental systems - evolutionary rewriting systems - evolutionary developmental programs Biological immune systems - lessons for artificial immune systems - algorithms and applications - shape space - negative selection algorithm - clonal selection algorithm - examples

UNIT IV BEHAVIORAL SYSTEMS

12 (10L+2S)

Behavior is cognitive science - behavior in AI - behavior based robotics - biological inspiration for robots - robots as biological models - robot learning - evolution of behavioral systems - learning in behavioral systems - co-evolution of body and control - towards self reproduction - simulation and reality .

UNIT V COLLECTIVE SYSTEMS

12 (10 L+2S)

Biological self-organization – Particle Swarm Optimization (PSO) – ant colony optimization (ACO) – swarm robotics – co-evolutionary dynamics – artificial evolution of competing systems – artificial evolution of cooperation – case study

TOTAL PERIODS: 60

OUTCOMES:

- Implement and apply evolutionary algorithms
- Explain cellular automata and artificial life
- Implement and apply neural systems
- Explain developmental and artificial immune systems
- Explain behavioral systems
- Implement and apply collective intelligence systems

REFERENCES:

1. A.E. Elben and J. E. Smith, "Introduction to Evolutionary Computing", Springer, 2010.
2. F. Neumann and C. Witt, "Bioinspired Computation in combinatorial optimization: Algorithms and their computational complexity", Springer, 2010.
3. D. Floreano and C. Mattiussi, "Bio-Inspired Artificial Intelligence", MIT Press, 2008.
4. Simon O. Haykin, "Neural Networks and Learning Machines", Third Edition, Prentice Hall, 2008.
5. M. Dorigo and T. Stutzle, "Ant Colony Optimization", A Bradford Book, 2004.
6. R. C. Ebelhart et al., "Swarm Intelligence", Morgan Kaufmann, 2001.

PAPER 15 - MULTI CORE ARCHITECTURES

L T P C
4 0 0 4

OBJECTIVES:

- To introduce the students to the recent trends in the field of Computer Architecture and identify performance related parameters
- To understand the different multiprocessor and their issues
- To expose the different types of multi-core architectures to the scholars
- To understand the design of the memory hierarchy in various architectures

UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND ILP 12 (10L+2S)

Fundamentals of Computer Design - Measuring and Reporting Performance - Instruction Level Parallelism and its Exploitation - Concepts and Challenges - Limitations of ILP - Multithreading - SMT and CMP Architectures - The Multicore era.

UNIT II MEMORY HIERARCHY DESIGN 12 (10L+2S)

Introduction-Optimizations of Cache Performance-Memory Technology and Optimizations- Protection: Virtual Memory and Virtual Machines-Design of Memory Hierarchies-Case Studies.

UNIT III MULTIPROCESSOR ISSUES 12 (10L+2S)

Symmetric and Distributed Shared Memory Architectures - Cache Coherence Issues - Performance Issues - Synchronization Issues - Models of Memory Consistency - Interconnection Networks - Buses, Crossbar and Multi-stage Interconnection Networks.

UNIT IV MULTICORE ARCHITECTURES 12 (10L+2S)

Homogeneous and Heterogeneous Multi-core Architectures - Intel Multicore Architectures - SUNCMP architecture - IBM Cell Architecture. Introduction to Warehouse-scale computers, CloudComputing - Architectures and Issues - Case Studies.

UNIT V VECTOR, SIMD AND GPU ARCHITECTURES 12 (10L+2S)

Vector Architecture - SIMD Extensions for Multimedia - Graphics Processing Units - Case Studies - GPGPU Computing - Detecting and Enhancing Loop Level Parallelism.

TOTAL: 60 PERIODS

OUTCOMES:

- Identify the limitations of ILP and the need for multicore architectures
- Discuss the issues related to multiprocessing and suggest solutions
- Point out the salient features of different multicore architectures and how they exploit parallelism
- Critically analyze the different types of inter connection networks
- Design a memory hierarchy and optimize it

REFERENCES:

1. John L. Hennessey and David A. Patterson, "Computer Architecture - A Quantitative Approach", Morgan Kaufmann / Elsevier, 5th edition, 2012.
2. Darryl Gove, "Multicore Application Programming: For Windows, Linux, and Oracle Solaris", Pearson, 2011.
3. David B. Kirk, Wen-mei W. Hwu, "Programming Massively Parallel Processors", Morgan Kauffman, 2010.
4. Wen- mei W. Hwu, "GPU Computing Gems", Morgan Kaufmann / Elsevier, 2011

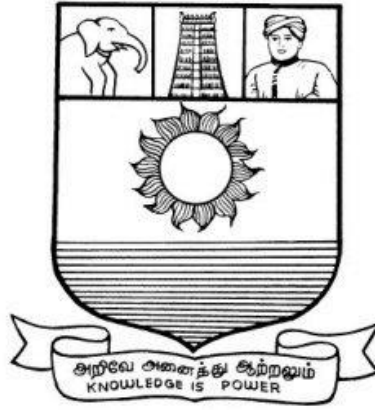
**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12**

PH.D. COURSE WORK PAPERS

(ADDITION OF ONE MORE PAPER)

Sl.No.	Additional Paper
1	Mini Project

DEPARTMENT OF CRIMINOLOGY AND CRIMINAL JUSTICE
MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI, TAMIL NADU, INDIA



Doctor of Philosophy

Choice Based Credit System (CBCS)

SYLLABUS

From the academic year 2018 - 2019 onwards

Ph. D
(Criminology and Criminal Justice)
Abstract of the Syllabus- 2018 - 2019

Sl. No.	Title of the Subjects
1.	Principles of Criminology & Criminal Justice Administration
2.	Police Administration
3.	Penology and Corrections
4.	Indian Penal Code, Criminal Procedure and Evidence
5.	Theoretical Criminology
6.	Victimology and Victim Assistance
7.	Fundamentals of Research Methods and Statistical Applications
8.	Psychology of Crime and Criminal behavior
9.	Forensic Science and Forensic Medicine
10.	Mini Project

MANONMANIAM SUNDARANAR UNIVERSITY

Syllabus

Ph. D (Criminology and Criminal Justice)

Choice Based Credit System

Paper 01: Core 01- PRINCIPLES OF CRIMINOLOGY AND CRIMINAL JUSTICE
ADMINISTRATION

(60 Hrs)

L	P	T	C
4	0	4	4

Objectives

- To understand the history and structure of core agencies of the criminal justice system
- Students will understand the nature and operation of the criminal justice system and its relation to other social structures, institutions and culture.
- To introduce students to essential legal terminology
- To understand how the criminal justice system operates

UNIT -I: Early Criminological Thought (10 hrs)

Schools of Criminology- Demonology, Classical, Neo-Classical Schools, Positive School, Cartographic School, Biological and Constitutional School. Multiple Factors, Heredity, Ecological and Economic factors.

UNIT-II Basics of Criminology (10 hrs)

Criminology: Definitions, historical perspectives, nature and scope. Criminology as a Social Science, Relations with Sciences. Criminology and Criminal Justice. Formal and Informal Social control Mechanism, Concepts: Socialization, Norms, Values, Culture, Subculture, Social Conformity, Social Disorganization, Social Pathology, Anti-social behavior.

UNIT-III Criminal Justice Processes (10 hrs)

Structure of Criminal Justice System in India. Roles of legislature, police, prosecution, judiciary and prison system in Criminal Justice. Process of Law making. Rule of Law Commissions. Cooperation and coordination among the various sub systems of criminal justice system. Role of Victims in the Criminal Justice Process.

UNIT-IV Sociological and Legal Perspectives of Crime (15 hrs)

Deviance: Normative and Re-activist Definitions of Deviance. Crime - Legal and Sociological definitions. Deviance and Crime - Differences. Process of Criminalization - sociological and legal. The origin and development of Criminal Law: Vice, Sin, Crime and Torts. Elements of Crime, Concept of Criminal Responsibility. Basic principles - Actus Reus and Mens Rea, Strict, Joint and Vicarious Liabilities. Indian Penal Code - History - Structure, Right of Private defense, General Exceptions under Indian Penal code.

UNIT-V Contemporary forms of Crime (10 hrs)

Organized crimes: Forms and Nature. Terrorism: Nature, meaning and Types of Terrorism. Communal Violence: Historical Perspective - Communal violence in Post-Independence India White, Khaki, Blue, Pink-Collar Crimes, Killing (s) in the name of honour.

RECOMMENDED READINGS

1. Ahmed Siddique, (1993), Criminology, Problems and Perspectives, III Edn., Eastern Book House, Lucknow.
2. Allen, Friday, Roebuck and Sagarin, (1981), Crime and Punishment: An introduction to Criminology. The Free press. New York.
3. Brendan Maguire & Polly F. Radosh, (1999), Introduction to Criminology, Wadsworth Publishing Company, Boston, U.S.A.
4. Chockalingam, K. (1997), 'Kuttraviyal' (Criminology) in Tamil, Parvathi Publications, Chennai.
5. Edwin H. Sutherland and Donald R. Cressey (1974), Principles of Criminology, Lippincott, Philadelphia.
6. Harry Elmer Barnes and Negley K. Teeters, (1966), New Horizons in Criminology, Prentice Hall, New Delhi.
8. John E. Conklin, J.E., (1981), Criminology, Macmillan, London.
9. Paranjpe, N.V., (2002). Criminology and Penology, Central Law Publications, Allahabad.
10. Williams, F.P. and McShane, M.D. (2004) Criminological Theory. Upper Saddle River, NJ: Prentice Hall.

Paper 02: Core 02- POLICE ADMINISTRATION

(6ohrs)

L	P	T	C
4	0	4	4

Objectives

- To identify specific periods related to the origins of Indian police and their developments
- To examine the historical development and present organization and administration of Police departments
- To examine early forms of investigative methods, its evolution and developmental processes
- To examine the origins, meaning, development, experiences and the record of community policing
- To examine the organizational development issues and future developments in police management
- To describe how specific theories of crime control affect the police (i.e., routine activities, Deterrence, environmental criminology)

UNIT-I Fundamentals of Policing (10 hrs)

History of Indian Police - Police Administration concepts: Hierarchy, Rank and File Structure, Power & Authority, Span of Control, Unity of Command - Recruitment and Training. Superintendence, control, organization, and management of police. Executive powers and duties of Police Officers. Police Act of 1861 - Police reforms - with special reference to the National Police Commission recommendations (NPC), 1979, Model police act of NPC.

UNIT -II Organization and structure of Indian Police (14 hrs)

Structure of State Police - District Police - City Police - Special Police battalions; Intelligence Branch, Crime Branch (CID) - Directorate of Vigilance and Anti-Corruption. Central Police Organizations - IB, CBI, CISF, CRPF, RPF, RAW, NIA, NSG etc. Police research and Crime Statistics Organizations- BPR & D, Organizational set-up of police stations, working system of Town & City police stations, Village police, Railway and Armed Police. International Criminal Police Organization (INTERPOL).

UNIT -III Police Investigation: Procedures and functions (12 hrs)

First Police information Report, Investigation of Scene of Crimes sketching, searching, Collection, preservation and transportation of physical clues to the experts. Charge sheet, Investigation of cognizable and non-cognizable offences, Investigation of unnatural deaths, Robbery, Dacoity, Theft House breaking Etc. Investigation of Rape cases and Traffic accidents. Mob Psychology and Crowd control.

UNIT -IV Issues and Contemporary developments in Policing (14 hrs)

Issues in Policing - Problems in Police Personnel Management, Problems related to Police hierarchy, Police Corruption, Police Subculture, Police and Human Rights. Depiction of Police in Media - Print and Visual media. Police Image, Developing healthy Police Public relationship. Recent approaches in Policing - Community and Problem oriented Policing, Team Policing, Cyber Policing. Policing in developing countries vs. policing in developed countries. Crime Analysis units in developed countries.

UNIT -V Crime Prevention (10 hrs)

Crime prevention: Anticipation/Recognition/Appraisal Initiate an Action, Remove or reduce Risk - Henry fielding methods. Primary prevention - neighborhood-level Crime and the Fear of Crime - Displacement and Diffusion - Secondary prevention - Situational Crime Prevention. Tertiary Prevention - Specific deterrence: Electronic monitoring/home confinement Reporting. Crime prevention through Environmental Design (CPTED). Role of Educational institutions in Crime Prevention - Role of NGO's in crime prevention. Role of Media in Crime Prevention. Contemporary Crime prevention methods.

RECOMMENDED READINGS

1. 1979 - 82, Report of the National Police Commission in 8 parts, Central Govt. Publications.
2. Coffey, A.R. (1975). The Prevention of Crime and Delinquency, Englewood Cliffs, NJ: Prentice Hall.
3. Diaz, S.M., (1976), New Dimensions to the Police Role and Functions in India, Published by the National Police Academy, Hyderabad.
4. Krishna Mohan Mathur, (1994), Indian Police, Role and Challenges, Gyan Publishing House, New Delhi.
5. Lab, S. (2000). Crime Prevention: Approaches, Practices and Evaluations. Anderson Publishing Company.
6. Morley, W.H., (1958), Administration of Justice in India, New Delhi, Metropolitan.
7. Nehad Ashraf, (1992), Police and Policing in India, Common Wealth Publishers, New Delhi.
8. Parmar M.S., (1992), Problems of Police Administration, Reliance Publishing House, New Delhi.
9. Paul M. Whisenand (1964). Crime Prevention, Holbrock Press Inc, Boston
10. Rosenbaum, Dennis P., Arthur J. Lurigio, and Robert C. Davis (1998). The Prevention of Crime: Social and Situational Strategies. Wadsworth Publishing, Belmont CA.

Paper 03: Core 03- PENOLOGY AND CORRECTIONS

(60 hrs)

L	P	T	C
4	0	4	4

Objectives

- To understand the multi-faceted purposes and contemporary use of the correctional services, in theory and practice.
- To understand the context of punishment including the use of the retributive system and the alternative theory and practice of punishment offered by restorative justice.

UNIT -I Nature of Punishment (12 hrs)

Penology - definition, nature and scope. Punishment-in ancient, medieval and modern times
Punishment: Significance, Concept, Aims & Types. Theories of Punishment. Sentencing - Principles, Policies and Procedures. Capital Punishment. Recent approaches to Punishment - Restorative Justice, Restitution and Victim offender Mediation.

UNIT -II Prison systems and Prison population (12 hrs)

Historical development and Administration of various prison systems- Penitentiary, Pennsylvania, Auburn systems. Evolution and development of Prison system in India. Classification of Prisoners. Prison Population - Pre-trial Detainees, Simple imprisonment, Rigorous imprisonment, AIDS Prisoners, Life Convicts, and Capital punishment.

UNIT -III Prison legislations and International Instruments (12 hrs)

History and evolution of Prison legislations - Correctional Manuals, rules etc. Prisons Act, Transfer of Prisoners Act, Juvenile Justice (Care and Protection of Children) Act, 2000. Jail Manual. Various Prison Reforms Committees and Commissions, UN Standard minimum rules for treatment of prisoners (Nelson Mandela Rules), UN Standard minimum rules for non-custodial measures (Tokyo Rules)

UNIT-IV Correctional Institutions (12 hrs)

Institutionalization: Meaning and purpose. Classification System of Prisons: Meaning and Significance. Adult Institutions: Central, District and Sub Jails. Juvenile Institutions: Observation Homes, Juvenile Justice Board, Special Homes. Women Institutions: Vigilance Home, Protective home. Open Prisons. Boarding, Lodging and medical care in prisons. Programmes - Educational, work and self-government.

UNIT -V Community based Corrections (12 hrs)

Probation: Concept and Scope, Historical development of probation. Probation in India - Probation of offenders Act. Probation procedures: Pre-sentence Investigation report, supervision, Revocation of probation etc. Parole: Meaning and Scope. Parole - provisions and rules. Halfway houses, organization and significance. After Care services in India.

RECOMMENDED READINGS

1. Ahmed Siddique, (1993). Criminology, Problems and Perspectives, III Edn. Eastern Book Company, Lucknow.
2. Bhattacharya S.K., (1986). Probation system in India, Manas Publications, New Delhi.
3. Brodie, S.R., (1976). Effectiveness of sentencing, Home office, London.
4. Chockalingam K., (1993). Issues in Probation in India, Madras University Publications, Madras.
5. Devasia, V.D & Leelamma Devasia, (1992). Criminology, Victimology and Corrections, S. B. Mangia for Ashish Publishing House, New Delhi.
6. Ghosh, S., (1992). Open Prisons and the Inmates, Mittal Publications, New Delhi.
7. Goswami, B.K. (1980). Critical Study of Criminology and Penology, Allahabad Agency, Allahabad.
8. Mulla Committee Report on Prison Reforms, 1983. Govt. of India.
9. Naresh Kumar, (1986). Constitutional Rights of Prisoners, Mittal Publishers, New Delhi.
10. Paranjpe, N.V., (2002). Criminology and Penology, Central Law Publications, Allahabad.

Paper 04: Core 04 - INDIAN PENAL CODE, CRIMINAL PROCEDURE AND EVIDENCE

(60 hrs)

L	P	T	C
4	0	4	4

Objectives

- To acquire a basic knowledge of the criminal procedure
- To understand that Fairness, efficiency and effectiveness of the criminal justice system demand that its procedures should be simple, accessible and, so far as practicable, the same for every level and type of criminal jurisdiction
- To understand the legal rules pertaining to the gathering of evidence, the court process, the admissibility of evidence at trial and post-conviction sentencing, appeals, and other remedies.

UNIT-I Typology of Offences: Indian Penal Code (15 hrs)

Offences against human body: Culpable Homicide (Sec.299), Murder (Sec.300 and 5 exceptions), Rape and other unnatural sexual offences (Sec.375-377), Hurt and Grievous Hurt (Sec.319-320), Force, Criminal Force and Assault (Sec.349-351). Offences against property: Theft (Sec.378-382), Cheating (Sec.420), Robbery and Dacoity (Sec.390-402), Criminal Misappropriation and Criminal Breach of Trust (Sec.403, 405,409), Criminal Trespass, Lurking (Sec.441-446).

UNIT -II Basics of Criminal procedure (15 hrs)

Object of Criminal Procedure - Importance of Criminal Procedure - The extent and applicability of the Code of Criminal Procedure, 1973, Territorial divisions -Main segments of the Criminal Procedure - Classification of Offences - Functionaries under the Code - Police, Prosecutors, Defence Counsel, Judges and Prison authorities.

UNIT -III Investigation process (10 hrs)

Arrest, Search and Seizure, Investigation Interrogation, Identification, Bail, Statements of police. Final Report, Charge - Preventive measures and Security Proceedings.

UNIT -IV Courts and Trials (12 hrs)

Criminal courts-District, state and Union Jurisdiction courts, and their powers. Trials - Principal features of Fair Trial- Types of Trials: Summary, Summon, and warrant trials. Judgements - Appeals, Reference, revisions, and transfer. Execution of Sentence.

UNIT - V Evidence, Enquiry & Examination (13 hrs)

Indian Evidence Act - History in India. Evidence - Meaning, principles, and concept of relevancy and admissibility. Confessions and Dying Declaration. Presumption of fact and law, Burden of proof.

Inquiry of Criminal case in courts. Submission of cognizable case in court- Witnesses and examination of witnesses. Cross examination, reexamination, and impeaching the credit of witness. Expert Evidence: Medico-legal opinion, Forensic Science expert opinion.

RECOMMENDED READINGS

1. Kelkar, R.V., (2003) Lectures on Criminal Procedure Eastern book Co., Lucknow.
2. Ratanlal and Dhirajlal (1995) Code of Criminal Procedure
3. Sarathy Veppa P. (1994) Elements of Law of Evidence, Eastern book Co., Lucknow.
4. Singh, A., (1995) Law of Evidence, Allahabad Law agency.

Paper 05: Core 05- THEORETICAL CRIMINOLOGY

(60 hrs)

L	T	P	C
4	4	0	4

Objectives

- To understand the nature of crime and criminological theory.
- To study the range of criminal justice policies, their effectiveness and their limitations.
- To understand competently and effectively communicate criminological concepts and their applications.

UNIT -I Sociological Theories of Crime I (15 hrs)

Social Strain Theories: Anomie theory, Culture conflict and Sub culture theory, Differential opportunity theory, Middle Class measuring rod. Social Ecology Theories: Concentric Zone theory, Environmental Criminology / Geography of Crime, Social disorganization theory, Cultural Transmission theory, Lower class culture theory.

UNIT -II Sociological Theories of Crime II (10 hrs)

Social Learning Theories: Theory of imitation, Differential Association Theory, Differential Identification theory.

UNIT - III: Sociological Theories of Crime III (10 hrs)

Social Control Theories: Drift and Neutralization theory, Containment theory, Social bond theory - Social Conflict Theories: Labeling Theory, Radical Criminology, New Criminology, and Marxist Criminology

UNIT -IV: Recent Theoretical Developments I (8 hrs)

Multiple factor approach. Routine activities theory, Rational Choice theory, Crime pattern theory, Shaming theory, Four wishes theory, Broken windows theory, Space transition Theory, Pyrrhic defeat theory.

UNIT -V: Recent Theoretical Developments II (8 hrs)

Feminist Criminology, Masculinity theory, Life Course theory, Integrated theories. Post - Modernist theories: News making Criminology, Peacemaking Criminology.

RECOMMENDED READINGS

1. Akers, R.L., and Sellers. C.S. (2004) *Criminological Theory: Introduction, Evaluation, and Application*. 4th Edition. Los Angeles; Roxbury Publishing.
2. Bernard, T.G., Vold, G.B., and Snipes, J.B. (2002) *Theoretical Criminology*. Fifth Edition. New York: Oxford University Press.
3. Chockalingam, K. (1997), 'Kuttraviyal' (Criminology) in Tamil, Parvathi Publications, Chennai.
4. Cullen, F.T., and Agnew, R. (2003) *Criminological Theory: Past to Present*. Second Edition. Los Angeles, CA: Roxbury Publishing Company.
5. Curran, D.J., and Renzetti, C.M. (2001) *Theories of Crime*. Second Edition. Boston: Allyn and Bacon.
6. George Vold and Thomas J. Bernard, (1986), *Theoretical Criminology*, Oxford University Press, New York
7. Harry Elmer Barnes and Negley K. Teeters, (1966), *New Horizons in Criminology*, Prentice Hall, New Delhi.
8. Paranjepe, N.V., (2002). *Criminology and Penology*, Central Law Publications, Allahabad.
10. Williams, F.P. and McShane, M.D. (2004) *Criminological Theory*. Upper Saddle River, NJ: Prentice Hall.

Paper 06: Core 06 - VICTIMOLOGY AND VICTIM ASSISTANCE

(60 hrs)

L	T	P	C
4	4	0	4

UNIT -I: Victimology Basics (12 hrs)

Victimology: Basic Concepts - Historical development of Victimology. Meaning and Definition of victim. National and International concern for victims of crime - UN Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power, 1985. Handbook of Justice for Victims, 1998. Guide for Policy Makers, 1998. USA - Patterns of Criminal Victimization - Role of victims in Criminal Occurrence, Victim - Offender relationship. Impact of Victimization- Physical and financial impact.

UNIT -II: Perspectives on Victimization (12 hrs)

Criminological perspectives: repeat victimization, routine activities, lifestyle exposure, fear of crime, victimization surveys including cost of crime. Psychological perspectives: Effects of crime on victims (including PTSD, A S D , resilience, posttraumatic growth and anger and the way victims are viewed). Legal perspectives: Rights of the Crime Victims - Victim in the criminal Justice System, Need and Significance of Victim oriented Justice System. Sociological perspectives: analysis of social reaction to crime and victimization over the Ages, the importance of feminist and critical theory and the development of the victim Movement and victim advocacy.

UNIT -III: Individual and Mass victimization (10 hrs)

Victims of traditional crime. Women victims - Dowry, battered women, Sexual Assault (Rape) Section 357 Orders to Pay Compensation in CrPC and other kinds of Sexual harassment - Child abuse. Cyber Crime Victimization of Women and Children. Trafficking in women and children. Victims of abuse of power, Genocide, Crimes against humanity, Internally Displaced persons, Victims of War - Child Soldiers, Refugees.

UNIT -IV: Criminal Justice System and Victims (10 hrs)

CJS and victim relationship: Collaborator or evidence - Victim & Police: Lodging of FIR & recording of statement - Deposition & cross-examination in courts. - Secondary Victimization by the criminal justice system and the society- Role of judiciary in Justice for victims. Creating awareness among the criminal justice professionals and the public on victim issues.

UNIT -V: Victim Assistance (16 hrs)

Alternative services for crime victims - victims support Services in the developed countries - Victim support services in India. Criminal Injuries compensation - Nirbhaya fund- CVCF - Types of assistance. Offender Restitution Programs - Victim Witness Programs - Crisis Intervention - Victim Advocacy - Introduction to Restorative Justice and Principles of Restorative Justice - Victim compensation and restitution. Compensation for victims of crime: Indian Scenario. Advantages and disadvantages of Criminal Justice - based victim support schemes- All Women Police Stations- Mahila Courts -. Role of NGOs and Professional associations, ISV, WSV, Child Line, One Stop Shop and National Organization for Victim Assistance (NOVA).

RECOMMENDED READINGS

1. Chockalingam, K. 1985, Readings in Victimology, Raviraj Publications, Chennai.
2. Fattah, E.A. 1991. Understanding Criminal Victimization, Scarborough, Ont.: Prentice Hall Canada.
3. Gottfredson, M. R. 1984. Victims Of Crime: The Dimensions Of Risk, Home Office Research And Planning Unit, Report No. 81, London: Hmso.
4. Gupta M.C., Chockalingam K., and Jayatilak Guha Roy 2001, Child Victims of Crime- Problems and Perspectives. Gyan Publishing House, New Delhi.
5. Karmen, A. 1990. Crime Victims: An Introduction to Victimology, (2nd Edition). Monterey, Ca: Brooks/Cole.
6. Mawby, R.I. And Gill, M.L. 1987. Crime Victims: Needs, Services And The Voluntary Sector, London: Tavistock.
8. Rajan, V.N., 1981, Victimology in India, Allied Publishers Pvt Ltd., New Delhi
9. Shapland, J., Willmore, J. And Duff, P. 1985. Victims In The Criminal Justice System, London: Gower.
11. Shekhar .B Toward A Victim Justice System - A New Vision of Justice for Crime Victims ISBN : 978-81-906687-3-6 University Publication, Manonmaniam Sundaranar University, Tirunelveli. Tamil Nadu, December, 2015.
12. Shekhar .B. Creating a safe space for Women & Child Victims of Crime ISBN:978-81-906687-2-96 University Publication, Manonmaniam Sundaranar University, Tirunelveli. Tamil Nadu, 2015.
13. Shekhar .B. Dimensions of Violations & Victimization, ed. Page- 395-406, ISBN No: 978-93-81402-27-6 Publication Division, Manonmaniam Sundaranar University, November 2012
13. Vijaya.S & Shekhar .B Victimization Survey among Adolescents of Three Districts in Tamil Nadu, with Somasundaram, Vijaya .S. University Publication, Manonmaniam Sundaranar University, Tirunelveli. Tamil Nadu, January, 2016

Paper 07: Core 07- FUNDAMENTALS OF RESEARCH METHODS AND STATISTICAL APPLICATIONS

(60 hrs)

L	T	P	C
4	4	0	4

Objectives

- To understand the need for empirical research; key distinctions and traditions in social research; stages in the research process.
- The application of the above to criminological enquire
- The key features, advantages and limitations of various methodology studies

UNIT -I Research: Nature and Definition (12 hrs)

Research: Nature, definition & purposes. Scientific attitudes theory formation: Inductive, Deductive-reasoning. Types of research studies: Descriptive, Analytical, Exploratory and Doctrinal. Quantitative vs Qualitative research. Criminological Research: Meaning, Objectives and scope.

UNIT -II Steps in Research (12 hrs)

Sources of Research Problems. Primary and Secondary - Independent and dependent variables. Main steps in Social Research types: Formulation of research problem, selecting of problem, study area, etc. Review of Literature. Sample collection, Data Analysis and report writing.

UNIT -III Hypothesis and Sampling (12 hrs)

Hypothesis: Definition, types and sources. Research Design: Meaning and types. Reliability and validity. Sampling: Non Probability and Probability types. Methods of data collection: Pilot study, observation, Questionnaire, Interviewing. Case study method. Unobtrusive measures - Secondary data collection - Uses of Official Statistics. Victimization surveys.

UNIT -IV Data Analysis (12 hrs)

Types of data: qualitative and quantitative. Analysis and interpretation of data, Data processing. Content analysis. Survey method, measurement and types of scales. Analysis and interpretation of data. Report writing. Ethics in Criminal Justice Research: Researcher Fraud and Plagiarism - Confidentiality in Criminal Justice Research - Avoiding Ethical problems.

UNIT -V Basic Statistics (12 hrs)

Statistics-Meaning and significance - Classification of Tabulation, Diagrammatic and graphic representation of data. Measures of central tendency-mean, median and mode. Measures of dispersion-range, mean, quartile and standard deviation. Concept of Statistical inference, test of significance. Analysis of variance. Multivariate analysis - Multiple correlation, meta-analysis, content analysis. Chi-square Test, T-Test and Regression analysis. Use of SPSS for Data Analysis.

RECOMMENDED READINGS

1. Black, Hubert M., (1972) Social Statistics, New York: McGraw-Hill Book Co.
2. Goode W. and P. Hatt (1952) Methods in Social Research, NY.
3. Hagan F.E., (1993). Research Methods in Criminal Justice and Criminology, Prentice Hall Englewood Cliffs, NJ.
4. Hays, William L., (1973) Statistics for Social Sciences, New York: Holt, Rinehart and Winston.
5. Hirchi, T., and Selivin, H.C., (1967). Delinquency Research: An appraisal of Analytical methods, New York: Free Press.
6. Kerlinger, Fred N., (1983). Foundations in Behavioral research, Delhi: Surjeet Publications, 1983.
7. Krishnaswami O.R. (1993) Methodology of Research in Social Sciences, Himalaya Publishing House, Bombay.
8. Nie, Normal H., et al. (1975) Statistical Packages for the Social Sciences, New York, McGraw Hill.
9. Wilkinson and Bhandarkar (1993). Methodology and Techniques in Social Research, Himalaya Publishing House, Bombay.

Paper 08: Core 08- PSYCHOLOGY OF CRIME AND CRIMINAL BEHAVIOUR

(60 hrs)

L	T	P	C
4	4	0	4

NOTE

(This subject has TWO parts. Part I comprises of theory portion with 50 Marks, Part II comprises of Continuous Assessment 25 Marks and a psychology practical with 25 marks)

Objectives

- To introduce the discipline of psychology as it applies to the study of crime and criminal justice.
- To explore the contribution of psychology to the explanation, investigation and reduction of crime.

Part I

UNIT - I Basics of Psychology-I (10 hrs)

The Nature and Scope of Psychology. Importance of psychology in Criminology. Learning, Types of learning, Theories of learning - Pavlov, Skinner, Thorndike, Kohler and Bandura-Motivation - meaning - social and psychological motives. Motivation: needs and drives - Theories of Motivation - Maslow, Herzberg, Atkinson, and McClelland.

UNIT - II Basics of Psychology-II (10 hrs)

Intelligence: Meaning and definition of intelligence - Measurement of intelligence - Intelligence test; Personality: Meaning of personality, Types of personality. Psychopathic Personality Theories of personality - Freud, Murray and Catell, Defense mechanisms, Frustration - Conflict - Adjustment Mechanisms Frustration - sources of frustration, Conflict - Types of conflict.

UNIT -III Psychology of Offender and Witnesses (12 hrs)

Criminal Suspects: Profiling criminal suspects, Polygraphs and lie detection, Confessions, Entrapment, Defendant characteristics: gender, socioeconomic status, moral character, general attractiveness, religion, and attitude. Eyewitnesses: Human information processing: Perception and memory - acquisition, retention, retrieval - Witness variable: alcohol and drugs, style of testimony, confidence, age - Situational variables: weapon focus, significance of crime, violence level - Crime investigation and pretrial identification: identification biases.

UNIT - IV Psychology in Criminal Justice System (14 hrs)

The Police - Psychology in Selection and Training of police officers - interactions with the mentally ill, domestic disturbances, hostage negotiation - police officer's personality - job stress. Punishment and Sentencing: The psychology of punishment - Judges and the sentencing process, death penalty, Appeals. Special defenses: Insanity, diminished capacity, post-traumatic stress disorder, battered woman syndrome, multiple personality disorder, amnesia, premenstrual syndrome. Corrections: assessments, treatment, and psychology of reformation - Correctional Institutions - Correctional Psychologist.

UNIT - V Abnormal Psychology (14 hrs)

Concept of abnormal behaviour - Types of abnormal behaviour - Abnormal behaviour and Criminality. Classification of disorders under DSM-5: Neuro-developmental disorders - Schizophrenia spectrum and other psychotic disorders - Bipolar and related disorders - Depressive disorders - Anxiety disorders - Obsessive-compulsive and related disorders - Trauma and stressor related disorders - Personality disorders and other disorders.

RECOMMENDED READINGS

1. Alexander, F., and W. Healy (1935) Roots of Crime, New York, Knopf.
2. Carson R.C. and James N. Butcher (1992) Abnormal Psychology and Modern Life, Harper Collins Publisher Inc.
3. Garrett H.E. (1961) General Psychology, Eurasia Publishing House Pvt Ltd, New Delhi
4. Murphy K.R. and Charles O. Davidshofer (2001) Psychological Testing: Principles and Applications, Prentice Hall, New Jersey.
5. Page D.J. (1970) Abnormal Psychology: A clinical Approach to Psychological Deviants, Tata McGraw Hill, New Delhi.
6. Reckless W.C. (1940) Criminal behaviour, New York, McGraw Hill.

Paper 09: Core 09- FORENSIC SCIENCE AND FORENSIC MEDICINE (60 hrs)

L	P	T	C
4	0	4	4

Objectives

- To recognize the importance to the concerned specialty in the context of the health needs of the community and the national priorities in the health section.
- To Practice the specialty concerned ethically and in step with the principles of primary health care.
- To understanding of the basic sciences relevant to the concerned specialty.
- To identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and primitive measure/strategies.
- To demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectations.

UNIT-I Forensic Science (15 hrs)

Forensic Science - definition, history, development and scope. Principles and Methods of Forensic Science. State and Central Forensic Science Laboratories. Mobile Forensic Science Laboratory. Criminalistics - Methodology and techniques. Use of rays. Counterfeit Coins and Currency notes. Scene of Crime: General crime scene procedure - notes of observation, photography, sketching. Questioned documents-writing materials, general and individual characteristics, Principles of handwriting identification of handwriting and type written scripts, Forgery cases. Ballistics.

UNIT-II Physical Evidence (10 hrs)

Classification of physical evidence - class and individual characteristics. Identification and individualization of physical evidence. Locard's Principle of exchange Varieties of trace evidence - Pollens, fibers, metal fragments, Paint, Soil, glass particles, dust and airborne particles etc., their significance. Footwear impressions: Tyre marks, Skid marks - Tool marks and their significance.

UNIT-III Personal Identification (15 hrs)

Finger Prints-history, development, patterns, ridge characteristics, primary and single digit classification, counting and importance. Developing, Lifting, Foot prints comparison and identification development, lifting and comparison of Track prints-walking picture, surface and sunken footprints. Track marks, skid marks, development lifting and comparison. The study of blood, semen etc. body fluids. Blood tests, Inheritance of blood groups.

Structure and Identification of Human Hair-structure and Animal Fiber. Identification - Data, Race, Sex, Age, Stature - Scars, Tattoo marks - Anthropometry and Dactylography - Prints, hairs and other fibers - Medico legal importance of Age.

UNIT-IV Forensic Medicine (10 hrs)

Forensic Medicine - Definition, nature and scope. Inquests. Medico Legal documents- Evidences- Dying declarations- Identification of dead and living persons. Medico-legal autopsy. Infamous conduct -Professional secrecy-Malpractice Negligence - consent - Euthanasia. Examination of decomposed and mutilated bodies. Superimposition and other methods of reconstruction. Death, types, modes and signs. Death-medico-legal importance. Medico-legal aspect of violent deaths. Post mortem changes: Immediate, Early and Late changes after death. Preservation of bodies- Presumption of death- Exhumation. Toxicology.

UNIT-V Injuries and Sex related issues (10 hrs)

Wounds and injuries. Definitions- Mechanical Injuries: abrasions, contusions, Lacerations, Incisions, Cut Wounds, Punctured wounds, Thermal Injuries, Electrical Injuries, Fire Arm and blast injuries - Asphyxial death: Hanging, Strangulation, Smothering, Gagging, Choking, Dry and wet Drowning - Battered baby syndrome - Methods of torture. Sex related issues: Potency- Sterility- virginity- Artificial insemination and test tube babies Pregnancy, Signs of recent and remote pregnancy, Superfetation, Superfecundation, Pseudocyesis, Surrogate mother, disputed paternity and maternity. Abortion, Delivery and Infanticide. Sexual offences: Natural, Unnatural and perversions.

RECOMMENDED READINGS

1. Apurba Nandy (2002) Principles of Forensic Medicine.
2. Bann Polson C.J., Knight Bernard, Essentials of Forensic medicine
3. Barry A.J. Fisher., (2000) Techniques of Crime Scene Investigation, 6th Edition, CRC Press, New York
4. Basu S.C., Handbook of Forensic Medicine and Toxicology
5. Brian H. Kaye (1995) Science and the Detective, VCH, Weinbeim, Federal Republic of Germany.
6. Camps F.E, Gradwohl's Legal medicine
7. Peter R. De Forest et.al (1983) Forensic Science: An introduction to Criminalistics, McGraw Hill Book Company, New York.
8. Peter White (Ed.) (1998) Crime Scene to Court - The essentials of Forensic Science, The Royal Society of Chemistry, UK.
9. Saferstein R., (2001) Criminalistics: An introduction to Forensic Science, Prentice Hall, Eaglewood Cliffs, New Jersey, 2001.
10. William G. Eckert., (1997) Introduction to Forensic Sciences, CRC press New York.

Paper 10: Core 10- MINI PROJECT

All the students are expected to take this paper compulsorily. The Objectives of this paper is to provide Opportunity for the students to make use of their knowledge regarding the various steps involved in conducting a research project under the supervision of a guide. The faculty at various stages of research will assist the students. The students will be encouraged to select their research problems relevant to the field of Criminology and Criminal justice. The completion of the research project by the students under the supervision of the faculty would provide with sufficient training to take up research related assignments in governmental and voluntary organizations within India and abroad.

COURSE - I

RESEARCH METHODOLOGY AND STATISTICAL TECHNIQUES

Total Credit: 04

**Subject Code:
LTPC 4 0 0 4**

Preamble

The course is designed to create academic researchers as well as professionals who are capable of conducting policy analysis, relating to National and Global economic and development issues from quantitative and inter-disciplinary perspectives. While an interdisciplinary approach is encouraged, the programme lays somewhat larger emphasis on economics to provide an integrated framework within which various development issues can be addressed.

Objectives:

1. To train the research scholars to use the techniques of statistical analysis, which are commonly applied to understand and analyze economic problems.
2. To learn robust statistical and econometrics tools and techniques for research analysis.

Module I: Research Methods

(10 L)

Social Research – Nature, Scope, Uses and Major steps – Pure, Applied and Action Research – Scientific Method: Theory and Facts – Formulation of a Research problem – Hypothesis: Types, Sources and Characteristics of a good hypothesis.

Module II: Research Design

(12 L)

Need and Types of Research Design – Exploratory, Descriptive, Diagnostic and Experimental Design – Sampling Design: Probability Sampling, Simple Random, Systematic, Stratified and Multistage or Cluster Sampling, Non Probability Sampling – Purposive, Judgment, Quota and convenience sampling – Data Collection – Primary and Secondary methods – Observation, Document, Case Study and Survey – Schedule and Questionnaire – Construction and Requisites of a Good Questionnaire – Mechanics of Thesis writing – Format of a Research Report – Footnotes and Reference.

Module III: Descriptive Statistical

(12 L)

Presentation of data – Editing, coding and tabulating data – Diagrammatic and Graphic representation of data – Processing data – Averages: Mean, Median, Mode and Weighted average – Merits and Demerits – Dispersion: Range, Standard deviation, Co-efficient of variation and Gini Ratio – Skewness, Pearson's and Bowley's coefficient of skewness.

Module IV: Statistical Methods

(14 L)

Correlation – Simple, Partial and Multiple – Pearson's coefficient of correlation and Rank correlation – Regression: Simple, Linear and non-linear regression – Multiple regression – Probit model and Logit model – Time Series Analysis – Components and Uses – Methods of estimation trend and seasonal variation – Scaling techniques – Types – Reliability and validity – doctometry – Statistical Packages in Computer – Interpretation of SPSS Package output relevant for Multivariate analysis Logit model.

Module V: Statistical Inference**(12 L)**

Steps in testing of hypothesis – Large sample Z – Test – Uses and Simple problems – ‘t’ Test: Assumptions, Properties and Applications and Simple problems – ‘F’ Test Assumptions, Properties and Applications and Simple problems, Chi-square [χ^2] Test: Assumptions, Properties and applications and non parametric tests – ‘U’ test and ‘H’ test.

References:**Basic Reading list:**

1. Elhance, D.N.(2000), Fundamentals of Statistics, Allahabad; Kitab Mahal.
2. S.P. Gupta (2001), Statistical Methods, S. Chand and Co., New Delhi.
3. Kothari, C.R (1998), Research Methodology, Wiley Eastern Ltd., New Delhi.
4. Wilkison and Bhandarkar (1991), Methodology and techniques of social Research, Himalaya Publishing House, Bombay.

Additional Reading List:

1. Eari Babbie (1975), Practice of Social Research, Wadsworth Publishers, New York.
2. Ferber and Verdoon (1962), Research Methods in Economics and Business, Macmillan, New York.
3. Goode and Halt (1987), Methods in Social Research, MoCraw Hill, London.
4. Kurein, C.T. (1973), Research Methods in Economics, Madras Sangam Publisher.
5. Moser, C.A. and Kolton, C (1980) Survey Educational Methods in Social investigation, investigation, Heinemann Educational Books, London.
6. Sonachalam, K.S. (1978), Research methodology in Social Science, Kadayam, Tamilnadu.
7. Shanmugasundaram, V. (1974), Papers on the Methodology of Research in Social Sciences, University of Madras, Chennai.
8. Sitaram Pillai (1989), Basic Statistic, Progressive Publishers, Chennai.

COURSE - II

BASIC CONCEPTS AND THEORIES IN ECONOMICS

Total Credit: 04

Subject Code:
LTPC 4 0 0 4

Preamble

The objective of this course is to make the students aware of the fundamentals of economics and also the contemporary issues of social and water Irrigation in India. This course will help the student in deciding their area of research interest.

Objectives:

1. To learn basic concepts and theories of economics will gain the importance because of sustained interest of the developing countries in uplifting their economic condition by restructuring their economies to greater diversity, efficiency and equity in consonance with their priorities.

Unit I Basic Economics (12 L)

Demand and Supply, Concept of Elasticity, Movement along the curve versus shift of the curve - Basic Utility Theory, Indifference Curves- Production Function, Average Cost, Marginal Cost, Short run, Long run cost curves- Perfect Competition and Monopoly- National Income (GDP, GNP) and multipliers, inflation, price index number.

Unit II Micro Economics (12 L)

Consumer Behaviour - Production and Costs - Markets – Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly - Theory of Distribution/ Theory of Factor Market.

Unit III Macro Economics (12 L)

National Income Accounting Methods - Classical Model, Keynesian Model, IS-LM Model, Fiscal and Monetary Policies - Solow Growth Model - Inflation, Index Numbers - Exchange Rate Systems - Balance of Payments Account - Keynesian Multipliers in an Open Economy - Structural Reforms - Indian Money Market and RBI's Monetary Policy.

Unit IV Social Issues (12 L)

Discrimination, the market, statistical discrimination, minimum wage, gender discrimination, exclusion - Income inequality and poverty, causes of income inequality and poverty (inflation) income distribution over time, the official poverty rate - Unemployment, measurement, types and cost of unemployment, interpreting the unemployment rate, social security - Governance and Corruption.

Unit V Water Irrigation and Pricing (12 L)

Irrigation development in post-independence India - Interlinking of rivers - Water shed development - Impact of irrigation development in agriculture- Ground water market - Efficiency and equity in water use - Political economy of water pricing.

References:

Unit I Suggested readings

- Mankiw G N. Principles of Macroeconomics. 6th ed. South Western, 2012.
- Robert S Pindyck & Daniel L Rubinfeld. Microeconomics. 7 th ed. Dorling Kindersley (RS), 2008.

Unit II Suggested readings

- Hal R. Varian. Microeconomic Analysis. 3rd ed. Tata Mcgraw Hill Education Private Limited, 2005.
- Anna Koutsoyiannis. Modern Microeconomics. 2nd ed. Macmillan India Limited.

Unit III Suggested readings

- Rudiger Dornbusch & Stanley Fischer. Macroeconomics 6th ed. Tata Mcgraw Hill Education Private Limited, 2005.
- William H. Branson. Macroeconomic Theory & Policy 3rd ed. East-West Press, 2005.

Unit IV Suggested readings

- Pissarides, C A, Equilibrium Unemployment Theory, MIT Press 2000.
- Menger, Carl (1976), Principles of Economics, New York University Edition
- Marshall, Alfred (1890), Principles of Economics: An Introductory Volume
- Mankiw, N Gregory (2009), Principles of Economics, 6th edition, South Western Cengage Learning, USA.

Unit V Suggested readings

- Vaidyanathan A. (2006) “India’s water resources – Contemporary issues on irrigation”, Oxford University press, New Delhi.
- Vaidyanathan A. (2013) Water resources of India, Oxford University Press.
- Ariel Dinar and Ashok Subramanian “Water Pricing Experiences – An International Perspective” World Bank, Washington, D.C.
- Helligers P.J.G.J. and Perry C.J (2004) “Water as an Economic Good in Irrigated Agriculture: Theory and Practice” The Hague, Agricultural Economics Research Institute.
- Subranmanian Asok, VijayJaganathan N. and Ruth Merinzen Dick “User Organizations for sustainable water services” World Bank technical paper no. 354, The Worl Bank, Washington D.C.
- Bhattarai, M A Narayanamoorthy and Randolf Barker (2006) “Direct and Total Benefits of irrigation in India and Its Implications to Irrigation Financing and Cost Recovery”, International Association of Agricultural Economists, Australia.

COURSE – III (Optional Papers)

1. AGRICULTURE AND RURAL DEVELOPMENT

Total Credit: 04

Subject Code:
LTPC 4 0 0 4

Preamble

The place of agriculture and rural economics in the overall economic literature is unique in the context of the Indian economy. The development programmes in India are centered around the rural area. The paper is intended to highlight the working and significance of the rural economy along with the institutional involvement in implementing the government programmes. Agriculture, allied sectors, the non-farm sector and Co-operative movement is the thrust area of the paper.

Objectives:

1. To enable the learners to know about preparation of plan and management of agricultural and rural development
2. To acquaint the learners with the different strategies adopted by the Government of India for enabling financial resources for agriculture and rural development.

Unit I Agriculture and Economic Development (12 L)

Nature and scope of agricultural and rural economics; Traditional agriculture and its modernization; Role of agriculture in economic development; Interdependence between agriculture and industry — some empirical evidence; Agricultural development, poverty and environment. Land Reforms and Land Policy

Unit II Agricultural Growth in India (12 L)

Recent trends in agricultural growth in India; Inter-regional variations in growth of output and productivity; Cropping pattern shifts; Supply of inputs — Irrigation, power, seed and fertilizers; Pricing of inputs and role of subsidies; Role of Public investment and capital formation in Indian agriculture; Agricultural and non agricultural pricing policies in India. Food security issue and Public distribution system, Recent initiative for second green revaluation, Globalization of Indian economy and problems and prospects of Indian agriculture; Impact of World Trade Organization on Indian agriculture.

Unit III Agricultural Transformation and Rural Economy (12 L)

Role of agriculture in rural economic development, rural credit markets, Micro Finance in India: Microfinance and rural development, SHGs-Bank Linkage Programmes and emerging scenario of Microfinance regulation in India, Causes and effects of rural urbanization Migration, Harris-Todaro model of rural-urban migration, Agricultural wages in India; Non-agricultural rural employment-Trends and determinants.

Unit IV Diversification of Rural Economy (12 L)

Diversification of Agriculture-Dairy Farming, Horticulture, Floriculture, Fishery, and Farm Forestry; Rural Industrialisation- Importance, Programmes, Progress and Problems of Small- Scale and Cottage Industries and Remedial Measures. Rural social infrastructure: issues and problems in Educational and Health infrastructure; Housing and Sanitation; Drinking Water Supply; Rural Transport and Communication; Rural Electrification.

Unit V Agricultural Finance

(12 L)

Need for Agricultural Finance – Non-institutional sources of Agricultural Finance: Money Lenders-Traders commission Agency – Land Lords – Institutional Sources of Agricultural Finance: Cooperative Banks, Commercial Banks, NABARD, RRBs.

Reading List:

1. Biradar, R.R.(2008): Rural Non-Agricultural Employment in India: An Analysis of Its Determinants and Impact on Poverty and Inequality, Concept Publishing Company, New Delhi
2. Chadha, G. K. and A. N. Sharma (Eds) (1997): Growth, Employment and Poverty: Change and Continuity in Rural India, D K Publishers, New Delhi.
3. Chambers, R. (1983): Rural Development: Putting the Last First, Longman, Harlow.
4. Dandekar, V.M. and N. Rath (1971): Poverty in India, GIPE, Pune.
5. Dantwala, M. L. (1973): Poverty in India: Then and Now, 1870-1970, Macmillan, Bombay.
6. Dantwala, M. L. and Others (Ed) (1986): Indian Agricultural Development since Independence: A Collection of Essays, Oxford and IBH Publishing Co.Pvt. LTd. New Delhi.
7. Gupta. K .R. (Ed) (2003): Rural Development in India, Atlantic Publishers and Distributors, New Delhi.
8. Jain, Gopal Lal (1997): Rural Development, Mangal Deep Publications, Jaipur,.
9. Singh, Katar (1986): Rural Development: Principles, Polices and Management, Sage Publications, New Delhi, (Second Edition).
10. Karalay, G. N. (2005): Integrated Approach to Rural Development: Polices, Programmes and Strategies, Concept Publishing Company, New Delhi
11. Maheshwari, S. R. (1985): Rural Development in India, Sage, Publications New Delhi.
12. Satya Sundaram, I. (1997): Rural Development, Himalaya Publishing House, Delhi.
13. Mehta, Shiv R. (1984): Rural Development Polices and Programmes, Sage Publications, New Delhi.
14. Srinivasan, T. N. and P. K. Bardhan (Eds) (1974): Poverty and Income Distribution in India, Statistical Publishing Society, Calcutta.
15. Tyagi, B. P. (1998): Agricultural Economics and Rural Development, Jai Prakash Math and Co., Meerut.
16. Visaria, P. and R. Basant Ed) (1994): Non-Agricultural Employment in India: Trends and Prospects, Sage Publications, New Delhi.

2. ECONOMICS OF INFRASTRUCTURE AND DEVELOPMENT

Total Credit: 04

Subject Code:
LTPC 4 0 0 4

Preamble

The important role infrastructure plays in a country's development need not be reiterated. In case of developing countries, lack of adequate infrastructure has been held as a major obstacle to growth. Of the various categories of infrastructure, the category of social overhead capital has gained particular prominence. The contents of the paper 'Economics of Infrastructure' exposes the student wholly to issues involved in development of infrastructure in developing countries like India.

Objectives:

1. To study the role of infrastructure plays in a country's development need not be reiterated.
2. To expose the students wholly the lack of adequate infrastructure has been held as a major obstacle to growth in developing countries like India.

I Infrastructure and Economic Development – Concepts (12 L)

Definition, Meaning, Classification of infrastructure (Social and Economic Infrastructure); Infrastructure and economic development — Infrastructure as a public good; Special characteristics of public utilities. The peak-load, Off-Load Problem, Dual Principle Controversy; Economies of scale of Joint supply; Marginal Cost Pricing vs. other methods of pricing in public utilities; Cross-subsidization — free prices, equity and efficiency. Urban and Rural Infrastructure schemes in India – PURA; Spatial aspects of development and linkages with infrastructure.

II Physical Infrastructure – I (Energy, Electricity, Gas and water Supply) (14 L)

Primacy of Energy in the Process of Economic Development. Factors Determining Demand for Energy; Effects of Energy Shortages. Energy Conservation. Renewable and Non-conventional Sources of Energy. Energy Modelling. The Search for an Optimal Energy Policy in the Indian Context- Electricity, Gas and Water Supply: Bulk Supply and Pricing of Electricity. The Relative Economics of Thermal, Hydel and Nuclear Power Plants. The Case for a National Power Grid. Financing Water Utilities. Urban and Rural Water Supply. The Exploitation of Natural Gas. Pricing Problem.

III Physical Infrastructure – II (Transport & Communication) (14 L)

Significance of Transport Infrastructure; Factors affecting Transport Network – Growth and Present status of Transport System in India; Impact of Transport Development on location of economic activities; Transport Sector Reforms in India Postal and Telegraph. Telecommunication and Information Technology; Major issues in IT – Growth and present status of IT industry in India; Implications for Regional Development

IV Social and Tourism Infrastructure (10 L)

Growth and present status of Social Infrastructure – Education, Health, Housing and Banking & Insurance; Impact of Social Infrastructure on Human and Economic Development, and development of social services in Indian plans-tourism and economic development - role of state in promoting tourism - tourism planning - infrastructural requirements for marketing tourism.

V Infrastructure Demand & Financing

(10 L)

Demand Simulation for Infrastructure; Financing Needs; Infrastructure Financing in Plan Period; Infrastructure Financing in Recent Times; Privatization of Infrastructure and PPP Models; Implications for Infrastructural Development.

References:

1. Baru, R.V. (1998), Private Health Care in India : Social Characteristics and Trends, Sage Publications, New Delhi.
2. Becker, G.S. (1974), Human Capital (2nd Edition), National Bureau of Economic Research, New York.
3. Berman, P. and M.E. Khan (1993), Paying for India's Health Care, Sage Publications, New Delhi.
4. Centre for Monitoring Indian Economy (1996), India : Energy Sector, CMIE, Mumbai.
5. Crew, M.A. and P.R. Kleindorfer (1979), Public Utility Economics, Macmillan, London.
6. Indian Council of Social Sciences Research (ICSSR) (1976), Economics of Infrastructure Vol. VI, New Delhi.
7. McMohan, W.W. (1999), Education and Development : Measuring the Social Benefits, Oxford University Press, Oxford.
8. National Council of Applied Economic Research (NCAER) (1996), India Infrastructure Report : Policy Implications for Growth and Welfare, NCAER, New Delhi.
9. Parikh, J. (Ed.) (1997), Energy Models for 2000 and Beyond, Tata McGraw-Hill, New Delhi.
10. Parikh, K.S. (Ed.) (1997), India Development Report 1997, Oxford, New Delhi.
11. Parikh, K.S. (Ed.) (1999), India Development Report — 1999-2000, Oxford, New Delhi.

3. ENVIRONMENTAL AND RESOURCE ECONOMICS

Total Credit: 04

**Subject Code:
LTPC 4 0 0 4**

Preamble

Due to the speedy growth of industries and population there is an increasing demand for the environmental resources. The free goods in the nature have now become the priced goods in the economy. The various types of pollutions have created the problems to the human beings as well as the biosphere. The quality of environmental resources is being fastly deteriorated. This paper would enable the students to know about the relationship between environment and economy, global Issues relating to environmental problems, policies and protection.

Objectives:

1. To learn the environmental degradation can very badly affect all living things coupled with human beings in particular and it should be resorted to achieve sustainable development.
2. To undertake research pertaining to economic aspects of environment and development.

Unit I Introduction to Environmental Economics (12 L)

Basic concepts of Environmental Economics, Economy-Environment interaction, Market failure, Property rights, Open access resources, Collective action, Environment and development trade-off, Environmental Kuznet's curve.

Unit II Economics of Exhaustible and Renewable Resources (14 L)

Basic concepts - Hotelling's rule, Solow-Harwick's rule, Market structure and optimal extraction policy, Uncertainty and the rate of resource extraction, Resource scarcity; Economic models of forestry and fisheries, Economics of biodiversity.

Unit III Environmental Valuation (10 L)

Market and non-market valuation; Physical linkage methods; Revealed and stated preference methods, Hicksian equivalence, Exposure to the type of models.

Unit IV Environmental Policy (10 L)

Command and control versus market mechanisms; Uncertainty and instrument choice, Regulatory compliance and enforcement, Eco-taxes and other fiscal measures.

Unit V Global Environmental Issues (14 L)

Trans-boundary pollution, economics of global warming, Climate change negotiations, Kyoto protocol, Impact of trade on environment and environment on trade, Porter's hypothesis, Pollution havens hypothesis.

Suggested Readings

1. Kolstad, C., Environmental Economics, Oxford University Press, 2000.
2. Baumol, W.J, and W.E. Oates, The Theory of Environmental Policy, Cambridge University Press, 1988.
3. Freeman, A. M., The Measurement of Environmental and Resource Values, 2nd Edition, Resources for the Future, 2003.
4. Hanley, N., J.F. Shogren, and B. White, Environmental Economics: In Theory and Practice, Macmillan India Ltd., 1997.

4. FINANCIAL ECONOMICS

Total Credit: 04

**Subject Code:
LTFC 4 0 0 4**

Preamble

The positive and significant role of finance in the process of growth and development has been very well recognized in the literature and indeed has become more important during the last two decades as the financial systems of different countries have become integrated in the process of globalization. India is no exception and has taken far reaching measures since 1991 in this direction. This paper focuses on the financial system and its relationship with the financial markets both at the national and international levels.

Objectives:

1. To develop an understanding of the basic principles of financial economics and also to improve student's analytical skills and ability to solve financial market problems.
2. To learn in-depth concepts financial system and its relationship with the financial markets both at the national and international levels.

Unit I Introduction

(10 L)

Nature and Scope of Financial Economics; Basic financial concepts, Economics of capital Budgeting; Investment Criteria, Estimation of project Cash Flows, Risk Analysis.

Unit II Financial System

(14 L)

Financial System-Meaning, constituents, functions and importance of financial system; Indian Banking System: Banking structure in India, Structure and functions of commercial banks; Functions of Central bank, Monetary policy and Central bank; Money market: Introduction, Treasury bills, Commercial paper, Certificates of deposit; Call money market, Money market mutual funds; Capital market: Primary market-shares and debentures-Types and their issuance; Secondary market- Stock exchange - Stock market indices, Methods of trading; Reforms in the Indian stock market; Role of SEBI, Debt market: Introduction; Private corporate debt market, Government securities market; Capital asset pricing model; Arbitrage pricing theory; Stock market efficiency.

Unit III Security Analysis

(14 L)

Price-value interaction model- Buy-sell decision rules, information traders and liquidity traders, Samuelson's continuous equilibrium, Passive and Aggressive trading. Risk and Return: Expected return and variances-portfolios systematic and unsystematic risk-diversification and portfolio risk Mean- Variance Criterion -systematic risk and beta-efficient frontier characteristic lines- optimum portfolio -capital asset pricing model, arbitrage pricing theory, Valuation: Bond valuation-equity valuation.

Unit IV Systems of Financial Markets

(10 L)

Spot Markets – Contingent Claims Markets – Arrow Securities – Ordinary Securities Markets – Incomplete Markets – Financial Markets and Financial Intermediaries.

Unit V Firms and Financial Markets

(12 L)

Firms and Stock Market Equilibrium – Separation of Ownership and Control – Financial Structure of the Firm – Insurance Markets – Debt Contracts – Credit Rationing.

Suggested Readings:

1. Bhole, L M, Financial Institutions and Markets: Structure, Growth and Innovations, Fourth Edition, Tata McGraw-Hill Publishing Co., New Delhi, 2004.
2. Brealey, R. and S. Myers, Principles of Corporate Finance, Fifth edition, New York, McGraw Hill, 1997.
3. Copeland, T. E. and J. F. Weston, Financial Theory and Corporate Policy, Addison Wesley, 1992.
4. Elton, E.J and M.J. Gruber, Modern Portfolio Theory & Investment Analysis, Fourth edition, John Wiley & Sons 1991.
5. Houthakker, H.S. and P.J. Williamson, Economics of Financial Markets, Oxford University Press, 1996.
6. Khan, M Y, Indian Financial System, Seventh edition, Tata McGraw-Hill Publishing Co., New Delhi, 2009.
7. Copeland T.E., J. F. Weston and K. Shastri (2005): Financial Theory and Corporate Policy, Fourth Edition, Pearson Addison-Wesley USA.
8. Cuthbertson, K, (1996): Quantitative Financial Economics: Stocks, Bonds and Foreign Exchange, John Wiley and Sons, USA
9. Eichberger J. and I.R. Harper (1997): Financial Economics, Oxford University Press, New York.
10. Tuckman, B. (1995), Fixed Income Securities – Tools for Today’s Markets, Wiley Frontiers in Finance.
11. Zvi Bodie, Alex Kane and Alan J. Marcus, Investments, 8th edition, ISBN: 0-07- 338237-X, McGraw-Hill.

5. GENDER ECONOMICS

Total Credit: 04

**Subject Code:
LTPC 4 0 0 4**

Preamble

Gender biases in societal practices and development policies have resulted in persistent gender inequalities. It is increasingly being realized that mitigating such inequalities and enhancing women’s capabilities and entitlements are crucial to the overall development of the country. This course “Economics of Gender and Development” would provide students an understanding of the nature of the economic role of women and their contribution to the national economy on the basis of a scientific and non-sexist analysis. The modules incorporated in this course provide an analysis of issues at the theoretical level and also with regard to specificity of issues prevailing in the Indian context.

Objectives:

1. To understand the nature of the economic role of women and their contribution to the national economy on the basis of women-social nexus analysis.
2. To analyze the various modules related to gender and development, especially with reference to India.

Unit I Introduction and Review

(10 L)

Families and households, Importance and concepts of women studies — Women in patriarchal and matriarchal societies and structures, patrilineal and matrilineal systems and relevance to present day society in India, Gender bias in the theories of value, distribution, and population, Women in the economic history , Race, class, and the economics of gender , The economics of gay identity D'Emilio

Unit II Demography

(10 L)

Demography of female population: Age structure, mortality rates, and sex ratio — Causes of declining sex ratios and fertility rates in LDCs and particularly India — Theories and measurement of fertility and its control; Women and their access to nutrition, health, education, and social and community resources, and their impact on female mortality and fertility, economic status, and in work participation rate.

Unit III Women in Decision Making

(12 L)

Factors affecting decision making by women; property rights, access to and control over economic resources, assets; Power of decision making at household, class, community level; Economic status of women and its effect on work-participation rate, income level, health, and education in developing countries and India; Role of kinship in allocating domestic and social resources.

Unit IV Gender and the Economics of the Labor Market

(14 L)

Labour force participation patterns, Labour force participation and family structure Factors affecting female entry in labour market; Supply and demand for female labour in developed and developing countries, particularly India; Studies of female work participation in agriculture, non-agricultural rural activities, informal sector, cottage and small-scale industries, organized industry, and services sector; Discrimination : Labour market biases and gender discrimination Compensating Differentials : Wage differentials in female activities; Determinants of wage differentials; gender, education, skill, productivity, efficiency, opportunity; Structures of wages across regions and economic sectors. Feminisation of the economic sector, Human Capital,

Unit V Social Security and Social Protection for Women

(14 L)

Social security of women: entitlements, ensuring economic independence and risk coverage, access to credit and insurance markets; Role of voluntary organizations, self-help groups in providing social security; effectiveness of collective bargaining; Review of legislation for women's entitlements, protection of property rights, social security — Schemes for safety net for women; Need for female labour unions; affirmative action for women and improvement in their economic and social status- Gender and development indices; Mainstreaming gender into development policies; Gender planning techniques; Gender sensitive governance; Paradigm shifts from women's wellbeing to women's empowerment; Democratic decentralization (panchayats) and women's empowerment in India, Gender Budgeting.

Suggested Books and Readings

Books:

- Blau, Francine, Marianne Ferber and Anne Winkler 1998. *The Economics of Men, Women and Work* (Englewood Cliffs, NJ: Prentice Hall, Third Edition). (BFW)
- Boserup E. (1970), *Women's Role in Economic Development*, George Allen and Unwin, London.
- Desai, N. and M.K. Raj. (Eds.) (1979), *Women and Society in India*, Research Centre for Women Studies, SNDT University, Bombay.
- Government of India (1974), *Towards Equality — Report of the Committee on the Status of Women in India*, Department of Social Welfare, Ministry of Education and Social Welfare, New Delhi.
- Hoffman, Saul D. and Susan L. Averett 2004. *Women and the Economy: Family, Work and Pay* (Addison-Wesley-Longman). (HA)
- Krishnaraj, M., R.M. Sudarshan and A. Shariff (1999), *Gender, Population and Development*, Oxford University Press, New Delhi.
- Jacobsen, Joyce P.. 1998. *The Economics of Gender*, 2nd edition, New York: Blackwell.
- Jacobsen, Joyce. 1998. *The Economics of Gender* (Cambridge: Blackwell, 2nd Edition). (On reserve at Odegaard).
- Stack, Carol B. 1974. *All Our Kin: Strategies For Survival in a Black Community*. New York, NY: Harper & Row.
- Seth, M. (2000), *Women and Development : The Indian Experience*, Sage Publications, New Delhi. Economics 179
- Srinivasan K. and A. Shroff (1998), *India : Towards Population and Development Goals*, Oxford University Press, New Delhi.
- Venkateswaran, S. (1995), *Environment, Development and the Gender Gap*, Sage Publications, New Delhi.
- Wazir, R. (2000), *The Gender Gap in Basic Education : NGOs as Change Agents*, Sage Publications, New Delhi.

Readings:

- D'Emilio, John. 1993. "Capitalism and Gay Identity," reprinted in *The Lesbian and Gay Studies Reader*, Henry Abelove, et. al., eds., New York: Routledge.
- Ehrenreich, Barbara and Deirdre English. 1973. "Women and the Rise of the American Medical Profession," reprinted in Wendy McElroy, ed., *Freedom, Feminism, and the State*, 2nd edition, New York: Holmes and Meier, 1991.
- Hochschild, Arlie Russel. 1989. *The Second Shift*, New York: Avon, chapter 4.
- McKenzie, Richard and Gordon Tullock. 1975. *The New World of Economics*, Homewood, IL: Richard Irwin, chapter 9.
- Rhoads, Steven E.. 1993. *Incomparable Worth: Pay Equity Meets the Market*, Cambridge: Cambridge University Press, chapter 2.

- Robinson, John P. and Melissa A. Milkie. 1998. "Back to Basics: Trends in and Role Determinants of Women's Attitudes Toward Housework," *Journal of Marriage and the Family* 60, February: 205-18.
- Segalen, Martine. 1996. "The Industrial Revolution: From Proletariat to Bourgeoisie," in Andre Barguiere, et. al., eds, Sarah Hamburg Tenison, trans., *A History of the Family* vol. 2, Cambridge, MA: MIT Press.
- Walker, Deborah. 1995. "Feminism and Economics: Legislation or Markets?" in Rita J. Simon, ed., *Neither Victim nor Enemy*, Lanham, MD: Women's Freedom Network and University Press of America.

Videos:

- 1900 House (selected episodes). Shown on the campus network

6. HEALTH ECONOMICS

Total Credit: 04

Subject Code:

LTTC 4 0 0 4

Preamble

Health status of the population forms a major variable in measuring the Human Development Index. Health infrastructure provisions both public and private sector assumes significance in the overall health policy of a country. The present paper analyses the national health scene, correlation of health output and input indicators with level of economic development. Resource allocation in the health sector both public and private sector, evaluation of benefits and costs of health services, financing of health services and role of government and institutions also is examined.

Objectives:

1. To enable the learners to understand of the interplay between demographic processes and economic development.
2. To acquaint the learners to gain a sound command over the basic tenets of demography as well as key demographic issues and illustrations in India's context.

Unit I Introduction to Health Economics

(12 L)

Defining Health Economics. Importance of Health Economics – Essential Features. Basic concepts of health economics: Health, Health Care, Birth rate, Fertility rate, Death rate, IMR, CMR, MMR, Morbidity rate (Acute and Chronic), Disability Adjusted Life Year (DALY), Quality Adjusted Life Year (QUALY), Sex Ratio.

Unit II Demand for Health and Health Care

(12 L)

Welfare economics of medical care, production of health, demand for health and health care, equity, efficiency and the need, link between development and health, investing in health for economic development.

Unit III Health Production Function

(12 L)

Nature of production function, different types of production function and their applications, national and international perspective, distributional inequities in opportunity and commercialization of medical and para-medical education, cost escalation in the health care system, easy access and availability to appropriate technology, need for regulation and control

Unit IV Health Care Incentives, Costing and Financing

(12 L)

Goals of health care provision and financing, competitive health insurance and risk adjustment, Demand and supply of health insurance, asymmetric information and agency, costing of health care market insurance, self-insurance and protection, employment based insurance, health insurance in India, , public-private partnership and the role of state

Unit V Measuring Health Status and Health Care in India

(12 L)

Measurement of health state utilities, QALYs and its alternatives- different approaches of valuing health, multi-attribute utility instruments and their development - Various health indicators and its recent trend, health care expenditures, target of health care and achievements, different options for financing healthcare, taxation, user fees, health insurance, role of urban and rural local bodies, role of WHO, economic impact of HIV/AIDS in India and gender issues.

Suggested Readings

1. CII-Mckinsey Report, Healthcare in India: The Road Ahead, 2004.
2. Culyer, A. J. and J.P. Newhouse (eds.), Handbook of Health Economics, Volume 1 A & 1 B, NorthHolland, 2000.
3. Folland, S., A.C. Goodman and M. Stano, Economics of Health and Health Care, Fifth edition, Pearson Prentice Hall, 2006.
4. Pradhan, B.K. and R Sundar, Gender Impact of HIV and AIDS in India, United Nations Development Programme, 2006.
5. Pradhan, B.K. and R Sundar, Socio-economic impact of HIV AIDS in India, United Nations Development Programme, 2006.
6. Reports of WHO.
7. Zweifel, P., Health Economics, Oxford University Press, 1997.

7. INTERNATIONAL ECONOMICS AND POLICY

Total Credit: 04

**Subject Code:
LTPC 4 0 0 4**

Preamble

International Economics and Economic Policy focuses on contributions that are relevant to economic policy, emphasizing both theoretical and empirical papers. In particular, the course focuses on comparative economic policy; international political economy, including international organizations and policy cooperation; monetary and real/technological dynamics in open economies; globalization and regional integration; trade; migration; international investment; internet commerce; and regulation.

Objectives:

1. To enable the students to understand to analyze various issues pertaining to India's International Trade and Policies for economic development.
2. To learn the student about the International monetary systems and its reforms.

Unit I Theory of International Trade

(12 L)

Mercantilist theory, Classical and Neo-classical (Adam Smith, Ricardo, J.S.Mill,H-O Model, Haberler), Theory of Opportunity Cost, New construction of Ricardian Theory, New Trade Theories (Vernon, Posner, Cannon) Technological dynamics, Factor intensity Reversal, Leontief Paradox, Stolper Samuelson theorem, Theory of Change in Factor Endowment, Factor Equalization Theorem, Specific Factor Model, Immiserizing Growth, Theory of Custom Union, Gains From Trade, Inter and Intra Industry Trade Model, Free trade better than no trade, Restricted trade better than no trade and free trade

Unit II External Trade Policy

(12 L)

Exim policy, ECGC, Export Promotion Councils, DGFT, Incoterm, Tariff and Non-Tariff Barriers, Terms of trade, Protection, New Economic Policy

Unit III Theory of International Finance

(12 L)

Prices in the open economy: purchasing power parity, Financial markets in the open economy, Open economy macroeconomics, exchange rate determination: Flexible prices: the monetary Model, Fixed prices: the Mundell-Fleming model, Coordination of Fiscal and Monetary policy under fixed and flexible exchange rate, Asset Market Model, Exchange rate dynamics, Expectations, Balance of Payment and adjustment Mechanisms, Foreign Trade Multiplier and repercussion effect.

Unit IV International Monetary System

(12 L)

International Monetary system, Euro currency, Euro dollar, Dollarization, SDR, China and reserve currency issues. Optimum currency areas and monetary union, Recent Financial crisis Regional Trade Agreement, Economic Integration in North America, The European Union: Many Markets into One, ASEAN, Trade and Policy Reform in Latin America, Emerging Economies, BRICS and the world economy,

Unit V International Financial Architecture

(12 L)

IMF, World Bank, WTO, GATT, UNCTAD, Reforming the international institutional architecture

Suggested Reading:

- Pugel, T.A. (2008), International Economics, 13th Edition, Tata Mcgraw hill publishing Co, New Delhi.
- Bhagwati, J. N., A. Panagariya and T.N.Srinivasan(1998), Lectures on International Trade, OUP,NewDelhi, Second Edition.
- Krugman, P.A. and M Obstfeld (2003), International Economics: Theory and Policy,Sixth Ed.
- Salvatore Dominick (2010), International economics, 8th edition, Wiley Publication, New Delhi, ISBN: 978-81- 265-1413-7
- Laurence Copeland (May, 2008), Exchange Rates and International Finance 5th Edition Paperback, ISBN13: 9780273710271
- Leontief, W. W. (1953). "Domestic Production and Foreign Trade: The American Capital Position Re-examined". Proceedings American Philosophical Society 97: 332–349.
- Leamer, E.E. (1980). "The Leontief Paradox Reconsidered". Journal of Political Economy 88: 495– 503.
- Y. Shiozawa (2007) A New Construction of Ricardian Trade Theory: A Many-country, Manycommodity with Intermediate Goods and Choice of Techniques, Evolutionary and Institutional Economics Review, 3(2): 141-187.
- Jones, Ronald W. 1961 Comparative Advantage and the theory of Tariffs; A Multi-Country, Multi-commodity Model, Review of Economic Studies, 28(3): 161-175.
- R. Dornbusch; S. Fischer; P. A. Samuelson 1977 Comparative Advantage, Trade, and Payments in a Ricardian Model with a Continuum of Goods, The American Economic Review, 67(5): 823-839.
- Shiozawa, Y. 2007 A New Construction of Ricardian Trade Theory—A Many-country, Manycommodity Case with Intermediate Goods and Choice of Production Techniques—, Evolutionary and Institutional Economics Review 3(2): 141-187.

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- Chipman, J. (1965) “A Survey of the Theory of International Trade, Part I: The Classical Theory,” *Econometrica* 33: 477–519.
- Balassa, B. (1963) “An Empirical Demonstration of Classical Comparative Cost Theory,” *Review of Economics and Statistics* 45: 231–8.
- Haberler, Gottfried (1936) *The Theory of International Trade*, New York: Macmillan, ch. 12.
- Heller, H. Robert (1968) *International Trade, Theory and Empirical Evidence*, Englewood Cliffs, NJ: Prentice Hall, ch. 4.
- Rybczynski, T. M. (1955) “Factor Endowments and Relative Commodity Prices,” *Economica* 22: 336–41; reprinted in R. Caves and H. Johnson (eds) (1968) *Readings in International Economics*, Homewood, IL: Irwin.
- Samuelson, P.A. (1949) “International Factor-Price Equalization Once Again,” *Economic Journal* 59: 181–97.
- Stolper, W. and Samuelson, P.A. (1941) “Protection and Real Wages,” *Review of Economic Studies* 9: 58–73.
- Vernon, R. (1966) “International Investment and International Trade in the Product Cycle,” *Quarterly Journal of Economics* 80:190–207.
- Balassa, B. (1975) “Trade Creation and Diversion in the European Common Market,” *European Economic Integration*. Amsterdam: North-Holland.
- Brown, A., Deardorff, A., and Stern, R. (1992) “North American Integration,” *Economic Journal* 102: 1507–1518.
- Frankel, J.(1997) *Regional Trading Blocs in the World Economic System*, Washington, DC: Institute for International Economics.
- Hufbauer, G. and Schott, J. (1993) *NAFTA: An Assessment*, Washington, DC: Institute for International Economics.
- Staiger, Robert (1995) “International Rules and Institutions for Trade Policy,” in G. Grossman and K. Rogoff
- Jackson, John (1997) *The World Trading System, Law and Policy of International Economic Relations*, 2nd edn, Cambridge, MA: MIT Press.
- Amiti, M. and Freund, C. (2007) “An Anatomy of China’s Export Growth,” Paper prepared for Global Implications of China’s Trade, Investment and Growth Conference, IMF Research Department.
- Balassa, B. (1971) *The Structure of Protection in Developing Countries*, Baltimore: Johns Hopkins University Press.
- Havrylyshyn, O. (1990) “Trade Policy and Productivity Gains in Developing Countries,” *World Bank Research Observer*, 1–24.

8. PUBLIC ECONOMICS AND POLICY

Total Credit: 04

**Subject Code:
LTPC 4 0 0 4**

Preamble

Role and functions of the Government in an economy have been changing with the passage of time. The term 'Public Finance' has traditionally been applied to the package of those policies and operations which involve the use of tax and expenditure measures. This course covers the rationale for government provision of goods in a market economy and the effects of taxes on economic efficiency. We will also contrast the traditional public finance view of the role of government with the public choice school of thought. The primary emphasis is on expenditures and taxes at the federal level. As a part of the broader fiscal restructuring plan of the central and state governments in India, reforms have been initiated with particular emphasis on radical reforms in indirect taxes both in terms of tax policy reforms like base broadening, elimination of tax concessions and reduction in the number of tax rates and rationalization of tax structures, as well as tax administrative reforms like modernization of tax administration and extensive use of IT.

Objectives:

1. To enable the students to understand about the fiscal institutions, tax structure and its distribution, public policy and other several issues related to public economics.
2. To help the students to understand the nature, structure and functioning of the public economics, especially with reference to India.

Unit I Introduction

(12 L)

Public Finance – Definition and Scope; Public and Private finance. The Role of the Government in a changing perspective, Fiscal Functions of the Government, Co-ordination among these functions.

Unit II Welfare Foundations of Public Economics

(12 L)

Distinction between Private and Public Goods, Pareto Optimality, Theory of Second best, Market Failure, Optimal provision of Public Goods, Free Rider Problem. The Pure Theory of Public Goods by Samuelson.

Unit III Public Expenditure

(12 L)

Growth and Structural changes in public expenditure, Wagner's Law, Peacock and Wiseman's hypothesis, Public Choice in Determining the Level of Public expenditure, Public expenditure on health, education and subsidies in India, Criteria for Expenditure Evaluation - Valuation of Benefit and Cost, Choice of Discount rate.

Unit IV Principles of Taxation

(12 L)

Principle of Fiscal Neutrality, Excess Burden, Principle of Equity, Benefit Principle, Bowen and Lindhal Models, Ability to pay Principle.(7) Tax policy and administration Reform in indirect tax structure of India: MODVAT, CENVAT, Value Added Tax (VAT), Issue of taxation of services in India, Goods and Service Tax (GST), Problem of Tax Evasion and Parallel Economy.

Unit V Issues on Federal Finance in India

(12 L)

Devolution Criteria, Division of fiscal powers between the centre and states and local bodies, problems of inter-jurisdictional spillovers and issues of tax harmonisation, Report of latest Finance Commission.

Suggested Readings:

- Richard A. Musgrave (1989), Public Finance in Theory and Practice McGraw Hill Book Company, New York.
- M. Govinda Rao and Tapas Sen (1998) : Financial Federalism in India, McMillan, Delhi.
- Arun Kumar (1998) : Black Economy in India, Penguin Books, New Delhi.
- Buchaman J.M. (1970), The Public Finances, Richard D.Irwin, Homewood.
- Hemlata Rao (2006) Fiscal Federalism –Issues and Policies, New Country Publications, New Delhi.
- Atkinson A.B. and J.E. Sigitz (1980). Lectures on Public Economics, Tata MacGraw Hill, New Delhi.
- Comes R. and T.Sandler (1986) The theory of Externalities, Public Goods and Club Goods, Cambridge University Press, Cambridge.
- Alan, A. Tait, (1972): The Value Added Tax, McGraw- Hill Publications.
- National Institute of Public Finance and Policy, (1989): The Operation of MODVAT, NIPFP, New Delhi.

9. REGIONAL ECONOMIC ANALYSIS

Total Credit: 04

**Subject Code:
LTFC 4 0 0 4**

Preamble

It is being increasingly recognized that market forces do not result automatically in regionally balanced development of economics. For effective and meaningful intervention to pull up economically and socially the less developed regions, it is necessary to understand the dynamics of regional development. This paper attempts to teach to the students the dynamics of regional development right from the meaning and concepts related to regional development to a broad overview of the techniques of regional analysis.

Objectives:

1. To enable the students to understand the basic concepts of regional importance of economic development
2. To enable the students to cope up regional coastal resources and management for sustainable economic development.

Unit I Basics of Regional Economics

(12 L)

Need for study of Regional Economics, Definition of a region, Different types of regions, Differences between region and a nation; Regional income, Problems of estimation, Indicators of regional development, Social, Economic and Political factors in regional growth.

Unit II Regional Allocation of resources

(12 L)

Balanced regional development; Cumulative Causation Models, Regional linkage-spread and backwash effects; Regional Convergence and divergence theories, Regional Polarisation, regional Economic Multiplier. The basis of interregional trade, Regional trade and factor price equalization, Regional trade and factor migration, issues and challenges in regional trade

Unit III Transport costs and location

(12 L)

Location and regional growth, Transportation and regional growth, the role of cities in regional development, Thunen's, Weber's theory of location; Locational and weight triangles; Locational interdependence. Locational – Views of Christaller, Losch, Perroux, Florance, Hoover, Polander and Isaxd – Dynamic theory of regions. Hotelling Principle

Unit IV Regional Development in India

(12 L)

Socio-Economic Regional imbalance in India; Regional planning; Rural urban inequality; Role of Planning commission and finance commission in regional development, Trends in Regional Disparities in Income & Consumption, Sectoral Income and Employment Pattern across regions, Spatial Concentration of Industries in Liberalised Regime, Trends in regional agro production and productivity, Regional Distribution of Infrastructure, Trends in regional disparities in Infrastructure. Key issues in regional development of Rajasthan.

Unit V Coastal Resource and Environment

(12 L)

Issues in Coastal Zone Management in India – Impact of Globalisation in Coastal Zone - Impact of Megacities in Coastal Zone – Coastal Disasters - Coastal Erosion - Coastal Disaster Planning and Management - Tourism Issues - Coastal Zone Regulations in India – CRZ Classification - Coastal Resource Management in Tamil Nadu – Issues – Gulf of Mannar and Bio diversity and Its Conservation - Coral Reef Management Issues in Gulf of Mannar – and Role of Government, NGOs and Communities

Selected Readings:

- Adelman, I. and C.T. Morris (1973) – Economic Growth and Social Equity in Developing Countries, Stanford, USA
- Ahluwalia, M. (1976) – “Inequality, Poverty, and Development”, Journal of Development Economics, Vol. 6
- Anand, S. and R. Kanbur (1993) – “The Kuznets Process and the Inequality-Development Relationship”, Journal of Development Economics, Vol. 40

- Anand, S. and R. Kanbur (1993a) – “Inequality and Development: A Critique”, *Journal of Development Economics*, Vol. 41
- Hoover, Edgar M., *An Introduction to Regional Economics*. New York. Alfred A. Knopf, 2nd edition.
- Isard, Welter, (1976), *Methods of Regional Analysis*, The M.I.T. Press Massachusetts and London, England, Chaps, 4,6,7,9 & 11.
- Kuznets, S. (1955) – “Economic Growth and Economic Inequality, *American Economic Review*, Vol. 45, Kuznets, S. (1963) – “Quantitative Aspects of Economic Growth of Nations: VIII, Distribution of Income by Size”, *Economic Development and Cultural Change*, Vol. 12.
- Mathur, Ashok (2000), *National and Regional Growth Performance in the Indian Economy, in Reform and Employment*, New Delhi, IAMR and Concept Publishers.
- Needleman, L., (ed.), (1968), *Regional Economics*, Penguin Books Ltd., Part-II, Cha. 4.
- Parloff, Harvey et. al., *Regions, Resources and Economic Growth*. University of Nebraska Press, Lincoln USA. Part II, pp.55-104.
- Richardson, Harry W., (1976): *Regional Economics*, Weidenfold and Nicoloson, London, Chaps. 1 to 5,7,9 & 13.
- Shand, Ric and S. Bhide (2000), “Sources of Economic Growth: Regional Dimensions of Reforms,” *Economic and Political Weekly*, Vol. 35, No. 42, October 14.
- Smith, David, (1971), *Industrial Location: An Economic Geography Analysis*, Hohn Wiley, New York.
- Donald Robadue, Jr. (Ed.) *Eight years in Ecuador The Road to Integrated Coastal Management –Coastal Resources Centre University of Rhode Island, USA, 1995.*
- Richard B. Pollnac and Brian R. Crawford, *Discovering Factors that Influence the Success of Community –Based Marine Protected Areas in the Visayas, Philippines,*
- *Coastal Resources Center, University of Rhode Island, USA,2000.*
- Gordon W. Thayer et al., *Science – Based Restoration Monitoring of Coastal Habitats, USA Department of Commerce NOAA, USA,2003.*
- Richard K. Wallace and Kristen M. Fletcher, *Understanding Fisheries Management, Auburn University and the University of Mississippi, USA, 1996.*
- Stephen Olsen, Donald D. Robadue, Jr., Luis Arriaga , *Atacames Special Area Management Plan ,Atacames-Sua-Muisne, CRC,URI, USA,1993.*

10. INDUSTRIAL DEVELOPMENT

Total Credit: 04

Subject Code:

LTPC 4 0 0 4

Preamble

It is being increasingly recognized that market forces do not result automatically in regionally balanced development of economics. For effective and meaningful intervention to pull up economically and socially the less developed regions, it is necessary to understand the dynamics of regional development. This paper attempts to teach to the students the dynamics of regional development right from the meaning and concepts related to regional development to a broad overview of the techniques of regional analysis.

Objectives:

1. To enable the learners to understand in the contemporary world with globalization and liberalization more and more attention is being given to industry.
2. To acquire knowledge among the students on the basic issues such as productivity, efficiency, capacity utilization and debates involved in the industrial development of India.

Unit I Theory of the Firm

(10 L)

Undifferentiated Products - Cournot, Stackelberg, Dominant firm model, Bertrand-Heterogeneous products - Chamberlin's small and large number case-Kinked demand curve theory - Bain's limit pricing - Sales and growth maximization hypothesis - Managerial theories of the firm - Game theoretical models.

Unit II Investment Decisions

(10 L)

Conventional and modern methods - Risk and uncertainty - Sensitivity analysis - Financial statements and ratio analysis - Inflation accounting - Project appraisal methods – Industrial finance- Sources of finance - Capital structure - Incentive, signaling and control arguments - Separation of ownership and control.

Unit III Vertically Related Markets and Competition Policy

(12 L)

Successive and mutually related market power - Monopoly, variable proportions and price discrimination - Monopsony and backward integration - Uncertainty - Diversification, rationing and cost economics and asset specificity - Internal hierarchies Hierarchies as information systems - Incentive structures and internal labour markets - Supervision in hierarchies - Competition policy: Need and requirements - Mergers and acquisitions - Coordination with other policies.

Unit IV Product market Differentiation and Imperfect Information

(14 L)

Lancastrian and Hotelling approaches – representative consumer approach and Chamberlin's model of diversity of tastes - The address approach -Competition in address-Free entry-Pure profit and non-uniqueness in free entry equilibriumproduct diversity and multi address firms - Bargains and rip-offs - Theory of sales - Quality and reputations-Product varietyImperfect discrimination and price dispersions -Advertising - Dorfman Steiner condition - Lemons and information asymmetries.

Unit V Technical Change, Market Structure and Indian Industry

(14 L)

The Economics of patents - Adoption and diffusion of innovations - Innovations and rivalry : Kamien and Schwartz - Measures of concentration - Concentration ratio - Hirschman - Herfindahl index - Entropy measure - Structure conduct performance paradigm - Contestable markets - Fixed costs, Sunk costs and contestability - Stackelberg - Spence – Dixit model- Industrial growth in India: Trends and prospects – Public enterprises; efficiency, productivity and performance constrains- Small scale industries : definition, role, policy issues and performance - Capacity utilization - Industrial sickness and Exit policy - Concept of competitiveness - Nominal protection-coefficients (NPC) and effective rate of protection (ERP) – Total-factor productivity - Technology transfer - Pricing policies-Administered pricing and LRMC based tariffs – Industrial location policy in India; regional imbalance - Globalization and competition - Privatization.

Selected Readings:

- Ahluwalia, I. J. (1985), Industrial Growth in India – Stagnation since Mid-sixties, Oxford University Press, New Delhi.
- Ahluwalia, I. J. (1991), Productivity and Growth in Indian Manufacturing, Oxford University Press, New Delhi.
- Desai, A. V. (1994), —Factors Underlying the Slow Growth of Indian Industry, in Indian Growth and Stagnation - The Debate in India Ex. Deepak Nayyar, Oxford University Press.
- Ferguson, Paul R. and Glenys J. Ferguson, (1994), Industrial Economics - Issues and Perspectives, Macmillan, London.
- Shepher, William G. (1985), The Economics of industrial Organisation, Prentice - Hall, Inc, Englewood Cliffs, N. J.
- Staley, E & Morse R. (1965), Modern Small Industry for Developing Countries, McGraw Hill Book Company.
- Vepa R. K. (1988), Modern Small Industry in India, Sage Publications.
- Srivastava, M.P. (1987), Problems of Accountability of Public Enterprises in India, Uppal Publishing House, New Delhi.
- Mohanty, Binode (1991), Ed. Economic Development Perspectives, Vol. 3, public Enterprises and Performance, Common Wealth Publishers, New Delhi.
- Jyotsna and Narayan B. (1990), —Performance Appraisal of PEs in India: A Conceptual Approach, in Public Enterprises in India - Principles and Performance, Ed. Srivastava V.K.L., Chug Publications, Allahabad

**Department of Education
Manonmaniam Sundaranar University**

**Ph. D Course Work - Syllabus
(2018-19)**

Ph. D Course Work - Syllabus

(2018-19)

Course Structure and Syllabus

The credit based theory papers are given below.

<i>Course Work No.</i>	<i>Subject Title</i>	<i>Contact Hrs./ Week</i>	<i>Credits</i>
1.	Perspectives In Higher Education	5	4
2.	Teacher Education across the World	5	4
3.	Cognitive Psychology	5	4
4.	Educational Studies	5	4
5.	Education at Elementary Level	5	4
6.	Education at Secondary and Higher Secondary Levels	5	4
7.	Educational Sociology	5	4
8.	Educational Statistics	5	4
9.	ICT in Education	4	4
10.	Curriculum Studies	6	4
11.	Teacher Education - I	7	4
12.	Education for Differently Abled	7	4
13.	Educational Policy, Planning & Financing	5	4
14.	Teacher Education - II	5	4
15.	Educational Evaluation	5	4
16.	Behaviour Modification	4	4
17.	Psychotherapy	4	4
18.	Psychology of Addiction	4	4

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Note:

- Among the above 15 papers, any one of the first three papers (Perspectives in Higher Education, Teacher Education across the world and Cognitive Psychology) in the above list has to be chosen as a compulsory paper by the proposed scholars who have not completed M.Phil.
- Candidates with PG qualification should earn 16 credits as per UGC Regulations in the following option: (4 Course works of 4 credits each (Or) 3 Course work of 4 credits

each and 1 mini project of 4 credits). Candidates with M.Phil, qualification should earn 8 credits as per UGC regulations in the following options (2 Course works of 4 credits each (Or) 1 Course work of 4 credits and 1 mini project of 4 credits). The above course work should be recommended by the Doctoral Committee.

- Mini Project carried out by a Ph.D scholar as part of his/her course work, shall have the following components:
 - Objective and methodology of the problem
 - Literature survey
 - Preliminary results of the research work
- Format of the mini project shall be same as like that of a thesis
- Total number of pages shall be between 50 and 80 pages
- The Doctoral Committee shall value of the mini project and submit the marks to the Controller of Examinations and the same marks would be incorporated in the mark sheet along with the marks of the other course work examinations.

1. PERSPECTIVES IN HIGHER EDUCATION

L	T	P	C
3	2	0	4

Preamble: Higher education is very important for the growth and development of any country. It is a living organ and requires continuous changes to ensure the quality of education. National Knowledge Commission and University Grants Commission have recommended many academic reforms to address the challenges of today's networked globalized world. People are coming together with the help of new technologies which is resulting towards new aspirations, expectations, collaborations and associations. The National bodies provide an important step to revamp the processes, systems and methodologies of Higher Educational Institutions (HEIs). The teacher centric mode is changed to learner centric mode. Class room teaching and learning about the managerial aspects of higher education is made effective, relevant and interesting. Concepts and theories of higher education is explained with examples, experimentation and related applications.

Objectives:

To enable the scholar

- to comprehend the objectives demands, and problems of higher education;
- to acquire knowledge about the managerial aspects of higher education;
- to understand the importance of linking community and industry with higher education;
- to comprehend the role of ICT in higher education and
- to acquire knowledge about the role of funding agencies at higher education level

Unit I: Trends in Higher Education

Objectives of Higher Education – Demand for Higher Education – Problems of Higher Education – Policy of admission in Higher Education – Growth of colleges and Universities in recent years – National Policy on Education (1986 &1992) – PoA – National Knowledge Commission (NKC) **(L7, T3 = 10 Hrs)**

Unit II: Management of Higher Education

Management of Higher Education – Education in Concurrent list – Types of universities – Decentralization – Democratization of Higher Education – Autonomy to colleges. Innovations in Higher Education – Utilization of modern techniques – Open book exam – self financing colleges – Open university – Distance education – Institutions with linked industries interaction and public sector units **(L7, T5 = 12 Hrs)**

Unit III: Community and Higher Education

Need & Significance of Linking Higher Education with community – Involvement in community development – Participation in Adult Literacy Programme – Consultancy services Extension Activities – College complex – Need & significance of Environmental education – Utilizing community resources – Accountability to community (L7, T5 = 12 Hrs)

Unit IV: Research in Higher Education

Research in Higher Education – Needed Research in Higher Education – Teachers and Research - Research organizations in India –Funding Agencies – UGC, CSIR, DST, ICSSR, DPT - Maintenance of Standards in Higher Education–Role of ICT in research (L7, T5 = 12 Hrs)

Unit V: Quality in Higher Education

Application of ICT in Higher Education - Relationship between Technology and Quality in Higher Education - NAAC, NCTE, TANSICHE and International Accreditation Bodies– Present scenario in the implication of modern technologies in Higher Education (L8, T6 = 14 Hrs)

(Total = 60 Hrs)

References

- Arya, P. P (2006). *Higher education and global challenges systems and opportunities*. New Delhi: Deep & Deep Publications.
- Bourai, H. H. A & Uniyal B. P. (2005). *Challenges in administration of higher education*. New Delhi: Abhijeet Publications.
- Dahiya, S. (1996). *Higher education in India: Some reflections*. New Delhi: Kanishka Publishers.
- Dhar, B. (2008). *Higher education system*. New Delhi: APH Publishing Corporation.
- Jagannath, Patnaik. (2005). *Higher education in information age*. New Delhi: Authors Press.
- Patil, V.T. (2010). *Higher education in India the international engagement*. New Delhi: Authors Press.
- Rao, U. K. (2004). *Higher education*. New Delhi: APH Publishing Corporation.
- Sahoo, R. K. & Senapati, T. (2008). *Resource mobilisation for higher education*. New Delhi: Regal Publications.
- Sharma, R.S. (2005). *Higher education scope and development*. New Delhi: Commonwealth Publishers.
- Sharma, S. R. (2005). *History and development of higher education in free India*. Jaipur: ABD Publishers.



2. TEACHER EDUCATION ACROSS THE WORLD

L	T	P	C
4	0	0	4

Preamble: The aim of this study is to explore the policies and procedures designed to equip prospective teachers with the knowledge, attitudes, behaviors and skills they require to perform their tasks effectively in the classrooms. The acquisition or improvement of teacher competences requires training, through which it will be improved educational planning and assessment. In some parts of the world (USA, Netherlands, Canada etc.) specific standards of professional practice have been developed for, or by, teacher educators. Modern society demands high quality teaching and learning from teachers. Teachers have to possess a great deal of knowledge and skills with regard to both teaching and assessment practices in order to meet those demands and standards of quality education.

Objectives:

After completing the course, the scholar will be able to –

- understand the features of the teacher educational system;
- gain knowledge about the system of education and teacher preparation in various countries;
- critically examine the growth and development of teacher education in nations;
- develop an awareness of the problems in teacher education across the world; and
- tie the performance of teachers to numerous, larger societal goals and problems.

Unit I: Concept of Teacher Education

Meaning of training and education - Difference between training and education - Need for teacher training - Objectives of teacher education – NCTE and Teacher education - Recommendations of NCTE - Research based objectives of NCTE - Difficulties of teacher education curriculum in India - New Regulations of NCTE (L9)

Unit II: Teacher Education in Developed Countries (UK & USA)

Teacher Education in UK: Stages of education - Models of initial teacher education - Curriculum and courses of study. Teacher education in USA: Teaching quality and equity attacks - The potential power of teacher education - Curriculum and courses of study - The challenges for teacher education in USA (L11)

Unit III: Teacher Education in Developing Countries (China & Korea)

Teacher Education in China: The era of professional teacher education - Teacher education for ethnic minorities. Teacher education in Korea: Current status of teachers in Korea - Main Teacher Policies in Korea - Analysis of features and implications (L10)

Unit IV: Teacher Education in Underdeveloped Countries (Nigeria & Ethiopia)

Teacher education in contemporary Nigeria: Trends, Challenges and prospects - Teacher education and national development - Exploring alternatives for teacher education provision. Teacher education in Ethiopia: Present state of teacher education - Challenges in teacher education in Ethiopia (L10)

Unit V: Major Issues and Problems of Teacher Education

Issues, Problems in Teacher Education - Maintaining standards in teacher education -Service conditions of Teacher Educators - Quality management of teacher education -Privatization, Globalization in teacher education - Autonomy in teacher education – MHRD, UGC, NCERT, NCTE, NACC, ICSSR, NUEPA, CASE, DEC and Teacher Education (L8)

(Total = 48 Hours)

References

Darling, H.,& Lieberman (2012). *Teacher education around the world*. UK: Routledge Publications.

Jain, Kavitha (2003). *World teachers training today*. New Delhi: Mohit Publications.

Prasad, Janardan (2007). *Principles and practices of teacher education*. New Delhi: Kanishka Publishers.

Rao, V.K. (2009). *Teacher education*. New Delhi: APH Publishing Corporation.

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www.kice.re.kr

www.mest.go.kr

www.np.chinese embassy



3. COGNITIVE PSYCHOLOGY

L	T	P	C
3	2	0	4

Preamble: Cognitive psychology is an interdisciplinary field that attempts to provide a framework to the various facets of the enquiry into the nature of the human mind and brain. The field lies at the intersection of several other disciplines, including philosophy (knowledge representation, logic), psychology (basic human cognition, perception and performance), computer science (computational theory, artificial intelligence and robotics), linguistics (theories of language structure) and cognitive neuroscience (brain mechanisms for intelligent behaviour). Typical research areas of cognitive psychology include perception, attention, learning & memory, goal directed movement in complex environments and consciousness, language comprehension and production and language acquisition. Cognitive psychology also studies behavioural deficits due to brain trauma, congenital or other reasons.

Objectives:

After completing the course, the scholar will be able to -

- understand the nature of cognition as a discipline/an area of study;
- learn the basic concepts of brain and cognitive processes through scientific methods;
- acquire strong empirical and theoretical background in areas of cognitive psychology;
- understand various mental processes: Attention and consciousness, memory processes, reasoning and decision making;
- develop ability to conduct original research in chosen area; and
- inculcate analytical and technical skills to conduct and critically examine research.

Unit I - Cognitive Psychology and Brain

Influences on the study of Cognition - Research methods in cognitive psychology - Paradigms of cognitive psychology. Brain: structure of the brain, Localization of function, Lateralization of function, Brain imaging technique **(L8, T3 = 11 Hrs)**

Unit II - Basic Processes

Perception: Gestalt approaches to perception, Bottom- up processes, Top-down processes, direct perception, and Disruption of perceptions. Attention: Selective attention, Neuroscientific studies of attention, Automaticity and effects of practice, Divided attention. Forming and using new memory traces, Metaphors of memory, Sensory memory, Short-term memory, Working memory, Executive functioning, Neurological studies of memory processes. Memories: Traditional view of long-term memory, Levels-of-processing view, Reconstructive nature of memory, Amnesia **(L8, T2 = 10 Hrs)**

Unit III - Representation and Organization of Knowledge

Memory for general knowledge: Semantic/ Episodic distinction, Semantic memory modal, Schemata, Implicit versus Explicit memory. Concepts and Categorization: Theoretical descriptions of the nature of concepts, forming new concepts and classifying new instances, Visual imagery and Spatial cognition: Mnemonics and memory codes, Empirical investigations of imagery, Nature of mental imagery, Neuro-psychological findings, Spatial cognition

(L8, T4 = 12 Hrs)

Unit IV - Manipulation of Information

Language: Structure of language, Language comprehension and production, Language and cognition. Thinking and problem solving: Classic problems and general methods of solution, Blocks to problem solving, Problem space hypothesis, Expert systems, Finding creative solutions, Critical thinking. Reasoning: Types, Patterns of reasoning performance. Approaches to the study of reasoning, Neuro psychological evidence on reasoning. Making decisions: Phases of decision making, Basic concepts of probability, Cognitive illusions in decision making, Utility models of decision making, improving decision making

(L11, T4 = 15 Hrs)

Unit V - Individual and Situational Differences in Cognition

Cognitive development through Adolescence, Piagetian theory, Non-Piagetian approaches to cognitive development, some Post-Piagetian answers to the question “What develops?”, Individual, aging and gender differences in cognition: Individual differences in cognition, effects of aging on cognition, gender differences in cognition. Cognition in cross-cultural perspective: Effects of schooling and literacy, situated cognition in everyday settings

(L9, T3 = 12 Hrs)

(Total = 60 Hours)

References

- Eysenck M. W., & Keane M. T. (2005). *Cognitive psychology: A student's handbook* (5th Ed.). New York: Psychology Press.
- Galotti, K. M. (2011). *Cognitive development*. UK: SAGE Publications.
- Hunt, R. R., & Ellis, H. C. (2004). *Fundamentals of cognitive psychology* (7th Ed.). New Delhi: Tata McGraw-Hill.
- Menon, S. (2006). *Consciousness, experience and ways of knowing*. Bangalore: National Institute of Advanced Studies.
- Raja, B. W. D., Yuvaraj, T. & Baboo, S. (2014). *Cognitive Science in India*. Chennai: TR Publications.
- Riegler, B. R., & Riegler, G. R. (2008). *Cognitive psychology: Applying the science of the mind* (2nd Ed.). New Delhi: Dorling Kindersley.
- Upton, D. & Upton, P. (2011). *Test yourself cognitive psychology*. UK: Learning Matters.



4. EDUCATIONAL STUDIES

L	T	P	C
3	2	0	4

Preamble: Education is the process of facilitating learning or the acquisition of knowledge, skills, values, beliefs, and habits. Education frequently takes place under the guidance of educators, but learners may also learn by themselves. In addition to the formal/informal setting of Education and the experience of an individual has a formative effect on the way he/she thinks, feels, or acts. This course brings together the various perspectives of education including its interdisciplinary nature, socio-cultural contexts, and place of education in Constitution and also reflects its various support systems. The learner will understand education as a key discipline for learning. The vital features of education in Indian scenario are focused in this course.

Objectives:

After completing the course, the scholar will be able to -

- understand the nature of education as a discipline/an area of study;
- understand the basic concepts/issues of education with reference to kind of concerns the NCF (2005) and NCFTE (2009) have raised;
- examine critically the theories and basic concepts of education drawn from various disciplines cognate to education;
- examine critically the concerns arises from vision of school education;
- reflect on the multiple contexts in which the school education institutions are working; and
- discuss the emerging dimensions of school education.

Unit I - Education as a Discipline

Discipline - Meaning, Concepts, principles, theories, assumptions and contexts related to education discipline: schooling - curriculum - syllabus - text books - assessment - teaching-learning process - School education: Contemporary challenges - Aims of Indian Education (L7, T3 = 10 Hrs)

Unit II - Education as Interdisciplinary Knowledge

Interdisciplinary nature of education - relationships with various disciplines/subjects (philosophy, psychology, sociology, management, economics, anthropology) - Contribution of science and technology to education - Challenges to education - Axiological issues in education (role of peace and other values) (L7, T6 = 13 Hrs)

Unit III - Socio-cultural Context of Education

Social purpose of education - Cultural purpose of education - Socialization and acculturation of learners - Contemporary Indian society (with reference to multilingual, multicultural, gender, equity, poverty, diversity, human rights and rights of the child) - Teaching in the context of diversities - Appraisal of the role of school, parents, peer group and the community - Equality in educational opportunity
(L8, T5 = 13 Hrs)

Unit IV- Constitutional Provisions and Education

Constitutional Provisions and Education that reflect national ideals: Democracy and values of equality, justice, freedom, secularism, respect for human dignity and rights - Aims and purposes of Education drawn from Constitutional Provisions - Fundamental Rights and Duties of Citizens - Role of Central and state governments in the development of education
(L7, T5 = 12 Hrs)

Unit V- Support Systems of Education

Support systems: Principles and guidelines - Teacher education and NCF (2005), Right to Education Act, (2009) - Department of Public instruction, Ministry and other government agencies, Academic Institutes: Role, involvements, issues related to control and autonomy -Participation of stakeholders in school education: NGOs, civil society groups, teacher organisations, parents, family, PTA and local community
(L7, T5 = 12 Hrs)

(Total= 60 Hours)

References

- Banrs, J.A. (1996). *Cultural diversity and education: Foundations curriculum and teaching* (4thed.). Boston: Allynand, Becon.
- Beyer, L.E. (Ed.) (1996). *Creating democratic classrooms: The struggle to integrate theory and practice*. New York: Teachers College Press.
- Bruubacher, John S. (1969). *Modern philosophies of education*. New Delhi: Tata McGraw-Hill Publishing Company.
- Butchvarov, P. (1970) *The concept of knowledge*. Evanston, Illinois: North Western University Press.
- Debra Heyes, Martin Hills, Pam Chistie & Bob Lingard. (2007). *Teachers and schooling: Making a difference*. Australia: Allen and Unwin,
- Delors, Jacques et al. (1996). *Learning: The treasure within report of the international commission on education for 21st century*. UNESCO.

Freire, Paulo (1970). *Pedagogy of the oppressed*. New York: Continuum.

Matheson, David (2004). *An introduction to the study of education* (2nded.). David Fulton Publish.

Naik, J.P. (1975). *Equality, quality and quantity: The elusive triangle of Indian education*. Bombay: Allied Publications.

Slattery, Patrick & Dana Rapp. (2002). *Ethics and the foundations of education-Teaching convictions in a postmodern world*. Allyn & Bacon.

Wall, Edmund (2001). *Educational theory: philosophical and political perspectives*. Prometheus Books.

Winch, C. (1996). *Key Concepts in the philosophy of education*. Routledge.



5. EDUCATION AT ELEMENTARY LEVEL

L	T	P	C
3	1	1	4

Preamble: This course presents the overview of the elementary education at the national and global levels. It is aimed at describing the historical progression of elementary education to help the teachers understand the nature and development of elementary education in a holistic way. This has been designed based on the needs of the society and varied life experiences to facilitate fair understanding of elementary education in the contemporary Indian society.

Objectives:

After completing the course, the scholar will be able to -

- understand the context of elementary education;
- recognize the concept, objectives, rationale, challenges and extent of success of universal elementary education (UEE);
- expand an understanding of underlying principles of curriculum development and evaluation at elementary stage;
- develop research insight for curriculum development in elementary education.
- build up an understanding of underlying principles of curriculum development and evaluation at elementary stage;
- widen research insight for curriculum development in elementary education;
- understand the development of elementary teacher education in post-independent India; and
- develop understanding of status of elementary teachers, the problems and issues related to professional growth.

Unit I -Context of Elementary Education

Developmental characteristics and norms-physical, cognitive process and abilities; language development; socio-emotional development during early and late childhood - Influence of home, school and community related factors on child's development - learner/learning centered approach, activity centered approach, freedom and discipline; reflection on present practices

(L7, T2, P1 = 10 Hrs)

Unit II -Development of Elementary Education

Nature of Elementary Education after independence - Educational thought of Mahatma Gandhi and Tagore to elementary education - Constitutional provision for education and Directive Principles related to elementary education - Provision in RTE Act and related issues - Elementary education in NPE (1986), PoA (1992), NCF (2005).

(L6, T2, P2 =10 Hrs)

Unit III - UEE and Challenges

Concept, objectives, meaning and justification of UEE - Current status of UEE (access enrolment, and retention) with reference to the equity principles: differential across habitation, gender, caste and other socially disadvantaged groups - Access and enrolment of different types of learners-issues and challenges - Enrolment and dropout: meaning and assessment and related issues and dropout - Achievement levels of different types of learners-status and issues - Inclusive education

(L8, T2, P4 = 14 Hrs)

UNIT IV- Programmes in Elementary Education

Panchayatraj and community involvement in educational planning and management related issues - Participation of NGOs in achieving goals of UEE - ECCE programme, women empowerment as support services - District primary education programme: goals and strategies-SarvaShikshaAbhiyan:goals and specific programme interventions namely access, enrolment, retention/participation and achievement - Monitoring, research and evaluation of schemes viz., mid-day meals, VEC and incentive schemes and achievement levels

(L8, T3, P3 = 14 Hrs)

UNIT V- Curriculum and Evaluation in Elementary Education

Elementary School Curriculum: Principles - Curriculum, Objectives, Planning, Organisation and Evaluation of for Work Experience, Art Education, Health & Physical Education, Language(s), Mathematics, Environmental Studies/ Social Sciences and Natural Sciences in Elementary Education

(L7, T3, P2 = 12 Hrs)

(Total = 60 Hours)

References

- Celin, Richards. (1984). *The study of primary education and resource book. Vol. I.*
- Erickson, H.L. (2002). *Concept-based curriculum and instruction.* California: Crown Press.
- GOI. (1986). *National policy on education.* New Delhi: MHRD.
- GOI. (1987). *Programme of action.* New Delhi: MHRD.

- Hayes, Denis. (2008). *Primary teaching today: An introduction*. UK: Routledge Publications.
- Hurlock, E. (1995). *Child development*. USA: McGraw Hill Book Company.
- Kurrian, J. (1993). *Elementary education in India*. New Delhi: Concept Publication.
- MHRD (2001). *Convention on the Right to the child*. New Delhi: MHRD.
- NCERT (2005). *National Curriculum Framework*. New Delhi: NCERT.
- NCERT (2005). *Position paper on teacher education for curricular renewal*. New Delhi: NCERT.
- Rao, V.K. (2007). *Universalisation of elementary education*. New Delhi: Indian Publishers.
- UNESCO (2006). *Teachers and educational quality: Monitoring global needs for 2015*. Montreal: UNESCO Publication.



6. EDUCATION AT SECONDARY AND HIGHER SECONDARY LEVELS

L	T	P	C
3	1	1	4

Preamble: Secondary and higher secondary education is increasingly becoming an area of focus in developing countries, which have thus far concentrated on achieving universal elementary education. This policy note on secondary education in India discusses issues and aspects critical for the development of this subsector. Secondary education, in terms of policy, is a concurrent item in that it is within the purview of both State and Central governments. State level implications and strategies for developing this sub-sector are critical. The Central government involvement in secondary education thus far has been through discrete programs, such as computer and vocational education.

Objectives:

After completing the course, the scholar will be able to -

- understand the nature-scope and systems of secondary and senior secondary education;
- examine the status of development of secondary and senior secondary education in India after independence;
- understand the problem and challenges related to secondary and senior secondary education;
- understand the interventions to solve the problems and issues related to alternative schooling at secondary and higher secondary levels;
- identify critical issues related to universalization of secondary education; and
- know about the innovations at secondary and higher secondary levels of education.

Unit I - Secondary Education

General Aims and Objectives of Secondary Education, Education during Post Independence Period. Secondary Education Commission 1952-53, Education Commission 1964-66, New Education Policy 1986 with Programme of Action, 1992.

(L7, T2, P2 = 11 Hrs)

Unit II - Secondary and Higher Secondary School Curriculum

Principles of school curriculum development at secondary and higher secondary level and text book development in secondary and higher secondary education - Approaches to career guidance, Vocationalisation of education and careerdevelopment - Ginzberg's theory about guidance, Holland's theory of vocational choice.

(L8, T2, P3 = 13 Hrs)

Unit III - Problems and Challenges of Secondary Education

Problems and challenges related to universalisation of secondary education - Alternative schooling at secondary stage - Problems / challenges / to access enrolment, dropout, achievement- equality of educational opportunities - Problems of education for girls, disadvantaged and differently abled children - Classroom problems: discipline, underachievement, lack of motivation, slow learners, delinquency and maladjustment - Issues of quality in secondary and higher secondary education. (L7, T4, P2 = 13 Hrs)

Unit IV - Research and Innovation in Secondary and Higher Secondary Education

Purpose - scope - trends of research in secondary and higher secondary education, innovative practices at secondary and higher secondary levels- micro teaching, simulated social skill training, team teaching, brain storming, independent study, group discussions and role playing. (L7, T2, P3 = 12 Hrs)

Unit V - Monitoring for Quality Improvement in Schools

Monitoring - meaning, objectives and significance - Monitoring mechanism at different levels of schooling -Alumni association - Evaluation in Schools at State and Central boards. (L7, T2, P2 = 11 Hrs)

(Total = 60 Hours)

References

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7. EDUCATIONAL SOCIOLOGY

L	T	P	C
3	2	0	4

Preamble: This paper aims to probe the nature of Sociology and Education and to establish and develop students' educational-sociological competences. This paper introduces the sociological bases of Education. The educational thoughts of sociological exponents are also able to understand in a detailed means. This also gives a clear understanding of the educational structure and educational opportunities available for the different strata in the society.

Objectives:

After completing the course, the scholar will be able to -

- understand the sociological perspective in education;
- understand the structure and function of the educational system in the social system of today;
- understand the trends of social development and its impact on education;
- understand the quality perspective in Education; and
- realize the perspective changes in the society.

Unit I - Education and Sociology

Meaning, aims and functions of education; Sociology – Relationship with education; Educational sociology- nature; Sociology of education; Individual and social aims in education; Education and Society as mutually supporting systems (L7, T4 = 11 Hrs)

Unit II - Sociological Bases of Education

Socialization and Education – Education and Culture – Cultural lag- Education and Education and Values – Agencies of Education – Education for Modernization – Education for National Integration and International understanding-Education and Democracy (L7, T5 = 12 Hrs)

Unit III - Educational Thoughts of Sociologists

Auguste Comte (1798-1857) – Herbert Spencer (1820-1903) – Charles Horton Cooley (1864-1929) – Pitirim A. Sorokin (1889-1968) – Talcot Parsons (1902-1979) (L8, T5 = 13 Hrs)

Unit IV - Social Structure and Education

Education and adjustment; Social stratification; Social mobility; Social equity: value education - Education and Social Change: Process, patterns, factors responsible for social change, relationship between education and social change (L7, T5 = 12 Hrs)

Unit V - Equality of Educational Opportunities

Meaning - Constraints: Caste, Community, Religion, Social status, etc.; Women's Education; Education for socially, economically backward people - Scheduled caste, Scheduled Tribes, Rural population - Human Rights Education (L7, T5 = 12 Hrs)

(Total = 60 Hours)

References

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- Havighurst, Robert et al., (1995). *Society and education*. Boston: Allyn and Bacon.
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8. EDUCATIONAL STATISTICS

L	T	P	C
3	2	0	4

Preamble: This paper capacitates acquire knowledge about the Educational Statistics and the fundamental concepts and procedures of descriptive and inferential statistics. The need of statistics to analyse the data which the scholars collect for their research work for inquiry in the social and behavioral sciences during the current programme and to utilize the same in their future research ventures is made clear through this course.

Objectives:

After completing the course, the scholar will be able to -

- understand the meaning and need of statistics in educational researches;
- know the difference between descriptive and inferential statistics;
- distinguish parametric and non-parametric statistics; and
- select and apply appropriate statistical techniques.

Unit I - Descriptive Statistics

Statistics - meaning and scope - Scales: types and applications. Data: tabulation and graphic representation - types and uses. Measures of Central Tendency and Dispersion - Elementary ideas of probability - Normal probability curve - properties and applications (L7, T7 = 14 Hrs)

Unit II - Correlational Techniques

Scatter Diagram - meaning and uses, Product moment and Rank Correlations, Biserial, Point biserial, tetrachoric and phi-coefficient correlations, Partial and multiple correlations, and applications (L9, T5 = 14 Hrs)

Unit III - Prediction

Linear Regression Equations, Prediction of Variables, Multiple regression (L6 = 6 Hrs)

Unit IV - Parametric Tests

Sampling Distribution - Standard error - Estimation of population parameters - testing of hypotheses - degrees of freedom - levels of significance - errors in making inference - t-tests - ANOVA - and applications (L7, T5 = 12 Hrs)

Unit V - Non-parametric Tests

Sign test - Median test - Chi-square Test - Kolmogorov-Smirnov test - Two sample Mann-Whitney test, Kruskal-Wallis's test and applications (L7, T7 = 14 Hrs)

(Total = 60 Hours)

References

- Aron, A., Aron, E., & Coups, E. (2012). *Statistics for psychology*. Noida: Pearson.
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- Best, John W., & Kahn, James V. (2012). *Research in education* (10thed.). New Delhi: Prentice Hall of India.
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9. ICT IN EDUCATION

L	T	P	C
4	0	0	4

Preamble: ICT in Education aims at preparing the scholars to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socioeconomic development of the nation and global competitiveness. To catalyse, support and sustain ICT and ICT enabled activities and processes in order to improve access, quality and efficiency in the school educational system and ICT literate community which can deploy, utilise and contribute to nation building. To create an environment of collaboration, cooperation and sharing, conducive to the creation of a demand for optimal utilisation of and optimum returns on the potentials of ICT in education.

Objectives:

After completing the course, the scholar will be able to -

- appreciate the role of ICT in teaching learning;
- use ICT devices and its applications in teaching learning contexts;
- understand the fundamentals of computers and operating systems;
- understand the operations and use of computers and common accessories;
- understand the features, working and use of the Internet and the Web;
- appreciate the use of word, date and media processing for teaching learning;
- appreciate the use of multimedia and web content for teaching learning; and
- appreciate the use of MS word, MS Excel, MS Power Point, HTML - for teaching and learning.

Unit I -Computer Fundamentals: Hardware & Software

Introduction to computer - Functional overview of a personal computer: its parts and functions - Standard computer accessories -operating system: files and folders - the concept of window and multi-tasking **(L9)**

Unit II -MS-Office

MS Word: Creating a file, saving, editing a text, finding and replacing a text, formatting a text, creating a table, inserting, deleting a row and column

*MS-Excel:*Creating a Excel work sheet file, entering data in the sheet, manipulating data in the row and column, inserting a chart, Functions

MS-PowerPoint: Creating a Power Point file, inserting a new slide, slide show -view show- creating a link between the slides and files *Developing a module (Using MS Word, MS-Excel, and MS-PowerPoint)* **(L11)**

Unit III - Role of ICT in Teaching and Learning

ICT: Meaning and importance – theories of teaching and learning. Uses of resources in Video conferencing

e-learning: Definitions, scope, trends, Synchronous and Asynchronous mode - Pedagogical designs & e-learning - Assessments, feedback and e-moderation - Role of Computers in Evaluation – EDUSAT - Mobile learning

On line learning management system: Digital learning objects, Online learning course development models, Management and implementation of e-learning (L10)

Unit IV- WWW & Web Based Learning

Internet and the WWW: Information, services and functions of the internet and web; connecting to and using the web - Using search engines and Web utilities: Keywords and search strategies - e-mail, chat, news groups and forums, web blogs

Multimedia: Concept and meaning, text, graphics, animation, audio & video
Multimedia applications: Computer based training - Electronic books and references - Information kiosks - web2 and web3 Tools - cloud computing (L10)

Unit V - Hyper Text Markup Language

Script writing html-part of the HTML script – defining header and body sections-formatting statements – listing statements – creating menus -Creating link between files inserting pictures and images (L8)

(Total = 48 Hours)

References

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10. CURRICULUM STUDIES

L	T	P	C
3	1	1	4

Preamble: Curriculum Studies is a concentration within curriculum and instruction concerned with understanding curricula as an active force of human educational experience. One of the vital roles of teachers is to facilitate and refine the knowledge of students by using the curriculum as a tool. This course imparts necessary preparation of the learners to know the basic concepts and process of curriculum. It also helps to get acquaintance on various approaches and models of curriculum development.

Objectives:

After completing the course, the scholar will be able to -

- acquire knowledge and get insight into curriculum perspectives;
- understand the concept of curriculum and characteristics of a good curriculum;
- gain experience in constructive and critical analysis of text book;
- get insight into the guiding principles and recommendations of NCF 2005 and NCFTE 2009;
- develop the capability to play the role of curriculum designer, reviewer, implementer and assessor; and
- gain total curricular experiences

Unit I - Curriculum Perspectives

Curriculum: Concept, definitions, need and importance, Principles, aims and objectives - Philosophical and ideological basis of curriculum - Characteristics of a good curriculum - Components of curriculum: Objectives, content, transaction mode and evaluation - Preservation of culture - Curriculum for the differently-abled students - Curriculum vs Syllabus - Source book vs Textbook (L5, T5, P5 = 15 Hrs)

Unit II - Language Curriculum

Inclusion of First language / ESL in school curriculum: Need - Specific objectives of teaching First language / ESL - Developing LSRW skills - Learning outcomes at elementary level - Teacher as Implementer and Assessor - Textbook Review: Meaning, Need, Uses - Qualities of a good text book - Content analysis: Meaning, Need and significance. (L5, T5, P5 = 15 Hrs)

Unit III - Approaches to Curriculum Development

Subject-centred: Core curriculum, Learner-centred, Community-centred - Curriculum frameworks of school education and Teacher education - Humanistic Curriculum and Social Reconstructionist Curriculum: characteristics, purpose, role of the teacher, psychological basis (L5, T5, P5 = 15 Hrs)

Unit IV - Models of Curriculum Development

Tylers model (1949) - Hilda Taba model (1962) - Nicholls and Nicholls model (1972) - Willes and Bondi model (1989) - Need assessment model - Futuristic model - Vocational/Training model (L4, T4, P4 = 12 Hrs)

Unit V - Curriculum Implementation and Renewal

Teachers role in generating dynamic curriculum - Selection and development of learning resources (textbooks, teaching - learning materials and resources outside the institution - local environment, community, media, etc. - Process of Curriculum evaluation and revision - Need for continual evaluation - Feedback from learners, teachers, community and Administrators - Observable incongruencies and correspondence between expectations and actual achievements (L5, T5, P5 = 15 Hrs)

(Total = 72 Hours)

References

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Prasad, Janardan&Kaushik, Vijay Kumari. (2013).*Advanced curriculum construction*.
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Roland, C. Faunce& Nelson, L. Bossing. (1967). *Developing the core curriculum (2nded.)*.
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11. TEACHER EDUCATION - I

L	T	P	C
2	2	2	4

Preamble: Teachers are the builders of a nation. This course work enables to acquire necessary skills for planning and organizing classroom management. The scholar will be able to gain insight and reflect values and status of teaching as a profession, understand the roles and responsibilities of teachers and teacher educators. They will be able to examine critically the issues, problems and concerns of teacher education.

Objectives:

After completing the course, the scholar will be able to-

- study the changing concepts of teacher education during various periods of educational development in the country;
- develop an awareness of the problems in teacher education;
- acquaint with the responsibilities pertaining to the organization of a teacher education institution; and
- develop necessary skills for planning and organization of functions for effective school management

Unit I - Teacher Education: Objectives and Growth

Teacher Education: Definition, scope, objectives, functions. Development of teacher education in India - Types of Teacher Education Institutions: Primary, Secondary and Tertiary levels
(L2, T7, P7 = 16 Hrs)

Unit II -Academic and Administrative Functions of Teacher Education Institutions

Selection of Students: Conduct of tests viz. attitude, aptitude and achievement and interviews- Evaluation of Teacher Education Curriculum - Curriculum development in Teacher Education - Advanced methods of teaching adopted in Teacher Education - ICT in the curriculum
(L2, T7, P7 = 16 Hrs)

Unit III - Organization of Practice Teaching and Assessment

Different methods of practice teaching: model lessons, criticism lessons - Role of co-operating schools, Trends in teacher preparation: Interaction analysis & micro-teaching training and periodical assessment of cognitive and affective variables of teacher trainees. Tools for assessment of teacher trainees and need for maintaining cumulative records
(L3, T8, P8 = 19 Hrs)

Unit IV - Pre-Service and In-service Teacher Education Programmes

National Council for Teacher Education: Roles and responsibilities in Teacher Education - Planning of Secondary and Elementary Teacher Education Institutions with reference to infrastructural facilities and human resources - Criteria for evaluating teacher education institutions - In-service Teacher Education: Objectives, organization, methods and follow up actions (L3, T7, P7 = 17 Hrs)

Unit V - Research in Teacher Education

Research Programmes: Action Research, Experimental Projects and Major & Minor Research Projects. Funding Agencies for Researches in Teacher Education: NCTE, NCERT, UGC, DTERT, etc. Survey of Educational Researches conducted in India and Abroad. Role played by University Departments in researches related to Teacher Education (L2, T7, P7 = 16 Hrs)

(Total = 84 Hours)

References

- Anderson, L.W. (1995). *International encyclopaedia of teaching and teacher education* (2nded.). Oxford: Elsevier Science.
- Arora, G.L. (2002). *Teachers and their teaching: need for new perspectives*. New Delhi: Ravi Books.
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12. EDUCATION FOR DIFFERENTLY ABLED

L	T	P	C
2	2	2	4

Preamble: This paper enables to acquire knowledge about the differently abled children and the label under which they are categorized. The problems of these children are made clear and the need and significance of educating these children are realized through this paper. Moreover the paper is also systematically designed how to identify and detect the children with specific disabilities and how to sort educational provisions to meet the unique needs of the children with disabilities.

Objectives:

After completing the course, the scholar will be able to -

- identify the types and categories of differently abled children;
- develop a favourable attitude towards differently abled children;
- develop an understanding of problems in educating these children; and
- appreciate the need, scope and significance of special educational treatments.

Unit I - Differently Abled Children

Meaning and definition of exceptional children - Types of Exceptional Children: Intellectually Exceptional, Physically Exceptional, Emotionally Exceptional - Need and significance of education of exceptional - Importance of early detection - Inclusive and integrated education - Role of teachers working in inclusive settings

(L2, T7, P7 = 16 Hrs)

Unit II - Education of the Intellectually Exceptional

Meaning, nature and characteristics of gifted, creative, backward, mentally retarded, autism, and cerebral palsy - Identification, needs, problems and educational provisions of Intellectually Exceptional Children

(L2, T7, P7 = 16 Hrs)

Unit III - Education of the Physically and Emotionally Exceptional

Meaning of Physical disability - Causes, Educational provisions for Visually impaired, hearing impaired children and children with learning disabilities - dyslexia, dyscalculia, dysgraphia. Meaning of emotionally exceptional - Causes, provision and treatment

(L3, T7, P8 = 18 Hrs)

Unit IV - Recent trends and issues in the Education of Differently Abled Children

Need based and skill oriented education - Role of Educational Technology - Computer assisted instruction, Tutorial, self-study and distance learning - Assistive technology in special education - Use of hardware and software devices

(L2, T7, P7 = 16 Hrs)

Unit V -Policies and Legislations

International and national legislations for education of children with special needs - National policy on education with reference to Education of the exceptional learners - Government schemes and provisions for children with special needs - Services and programmes for the disabled - Research in Special Education **(L3, T8, P7 = 18 Hrs)**

(Total = 84 Hours)

References

- Alice,Rajkumar, M., Rita,Sundari,D.,& Digumarti,Bhaskara,Rao, (2004).*Special education*.New Delhi: Discovery Publishing House.
- Bharat, Singh. (2008).*Modern teaching of exceptional children*.New Delhi: Anmol Publications.
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- Dash, M. (2007).*Education of exceptional children*.New Delhi: Atlantic Publishers and Distributors.
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- Samuel, Kirk, James, J. Gallagher et al., (2009). *Educating exceptional children*. USA: Wadsworth.



13. EDUCATIONAL POLICY, PLANNING AND FINANCING

L	T	P	C
1	3	3	4

Preamble: Planned development of skills must be strengthened by a “policy”, which is both comprehensive as well as national in character. Educational Planning in India is one of the vital areas of concern in all the Five year Plans in India. With the onset of globalization and modernization in recent times, education at all levels is very necessary if India is to surpass other nations. Its purpose is to guide the skill development strategies and coordinated action by all stake holders. It is also important to refresh the knowledge of educational policies in the economic, employment and social development arenas.

Objectives:

After completing the course, the scholar will be able to -

- enrich the knowledge of learners in educational policies
- understand the principles and theories in governance and planning of educational organizations
- sensitize the learners the importance of leadership in the accomplishment of educational goals and objectives
- acquire the importance of supervision, financing and budgeting to ensure managerial effectiveness
- refresh the knowledge in the field of economic development

Unit I - Educational Policy before Independence

Policies of Education in India - Macaulay’s Minute on Education (1835), Woods Despatch (1854), Indian University Commission (1902), Calcutta University Commission (1917-19), Hartog Committee (1928-29), Zakir Hussain Committee (1938), Sargent Report (1944) **(L2, T7, P7 = 16 Hrs)**

Unit II- Educational Policy after Independence

University Education Commission (1948-49), Secondary Education Commission (1952 - 53), Education Commission (1964-66), National Policy of Education (1968), Committee on Governance of Universities and Colleges (1969-73) - Development of Higher Education in India: A policy framework (1978), National Commission on Teachers I (1983-85), National Commission on Teachers II (1983-85), National Policy on Education (1986), Programme of Action (1992), Women Education Commission, National Knowledge Commission. RUSA in Higher Education **(L3, T8, P8 = 19 Hrs)**

Unit III - Educational Planning

Educational Planning – Meaning, need and importance, areas of planning, salient features, principles of educational planning - approaches to educational planning, techniques of planning, execution and evaluation of planning - First exercise Educational plan (1938 - 44) - Education in Five Year Plans, limitations and suggestions for effective planning, role of government in education

(L2, T7, P7 = 16 Hrs)

Unit IV - Financing in Education

Definition, meaning and principles of educational finance - Educational finance at Macro and Micro levels – Budgeting: Steps in budget preparation, fund allocations and expenditure, fund raising, accounting and auditing - Financial accountability Systems - Educational Loans and Taxes

(L2, T7, P7 = 16 Hrs)

Unit V - Economic Development in Education

Development of country's economy, Social Relevance, Human resource development - Financial resource: Procurement, utilization and maintenance of resources, allocation of resources – Economic and social bases for allocation of resources in education - Cost benefit analysis and cost management

(L3, T7, P7 = 17 Hrs)

(Total = 84 Hours)

References

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14. TEACHER EDUCATION -II

L	T	P	C
1	3	3	4

Preamble: By the end of the course, the scholar will be able to gain insight and reflect on the concept of teaching and the status of teaching as a profession, understand the roles and responsibilities of teachers and teacher educators. They will be able to examine critically the growth and development of teacher education in the country along with the various techniques for the evaluation of in-service teacher education programmes reflecting the issues, concerns and problems of pre-service and teacher in-service education of the teachers.

Objectives:

After completing the course, the scholar will be able to -

- gain insight and reflect on the concept of teaching and the status of teaching as a profession;
- understand the roles and responsibilities of teachers and teacher educators;
- prepare teachers for reflective teaching, critically examine the role and contribution of various regulating bodies and support institutions for improving quality of teacher's education;
- critically examine the growth and development of teacher education in various countries;
- adopt various methods and techniques for transaction of curriculum ;
- use various techniques for the evaluation of in-service teacher education programmes; and
- reflect on issues, concerns and problems of teacher in-service education of the teachers.

Unit I - Teachers and Teaching Profession

Teachers changing roles and responsibilities - Concept of Professionalism; Teaching as a profession - Service conditions of school teachers - Professional ethics of teachers - Social status of teachers; Teacher appraisal and accountability - Who is a Teacher educator? - Roles and responsibilities of teacher educators - Preparation of teacher educators - Continuing education of teacher educators: provisions for the continuing education of teacher educators and institutional mechanism (L2, T7, P7 = 16 Hrs)

Unit II - Nature, Objectives, Structure and Models of Pre-Service Teacher Education

Recommendations of various commissions and committees concerning teacher education system - Impact of NPE, 1986 and its POA on teacher education system - The Centrally Sponsored Scheme for the Reconstructing and Strengthening of Teacher

Education: Components of pre-service teacher education: foundational component, specialization areas, practicum internship, co-curricular activities, working with the community and work experience. Teacher education curriculum at different stages - Models of Pre-service teacher education at secondary level: regular and distance mode - Model of pre-service teacher education at elementary levels - Issues, concerns and problems of pre-service teacher education (L2, T7, P7 = 16 Hrs)

Unit III - Curriculum transaction in Pre-service Teacher Education

Methods and Techniques: Lecture-cum-Discussion, Demonstration, Group Discussion, Brain storming, Team Teaching, Use of ICT, Case analysis, reading and review of original texts, projects and assignments - taxonomy formulating of instructional objectives, unit planning, lesson planning, and teacher's diary - School Experience Programme (SEP)/Internship- Planning and organization of SEP - Monitoring and supervision - Internship: concept; planning and organization - Critical reflection as the central aim of teacher education (L3, T7, P7 = 17 Hrs)

Unit IV- Continuing Professional Development of the In-Service Teachers

Modes of Teaching: face to face, distance mode, eclectic mode. Assessment of training needs, formulation of training curriculum, preparation of course materials - appraisal of course materials - Issues, concerns and problems of Teachers' In-service education - Split Model followed in-service training of teacher under SSA - Professional development -Concept and significance - Strategies of professional development: workshops, seminars, symposium, panel discussion, conferences, self-study and study groups book clubs, extension lectures, research colloquium, refresher courses, orientation programmes -Teacher learning resource centre : functions - State Provisions for professional development of the teachers (L3, T8, P8 = 19 Hrs)

Unit V - Innovations and Quality in Teacher Education

Innovations in teacher education - Integrated teacher education, comprehensive teacher education - Teacher Effectiveness - ICT in Teacher education - Professional competence of Teacher Educators - Assessment and Accreditation of teacher education institutions (L2, T7, P7 = 16 Hrs)

(Total = 84 Hours)

References

- Mohammad,Miyan. (2004). *Professionalization of teacher education*. New Delhi:Mittal Publications.
- NCTE. (1998). *Policy perspective in teacher education-critique and documentation*. New Delhi: NCTE.

- Ramanath, Kishan, N. (2007). *Global trends in teacher education*. New Delhi. APH Publishing Corporation.
- Reimers, Eleonora, Villegas. (2003). *Teacher professional development: An international review of the literature*. Paris: UNESCO: IIEP.
- Sarita&Tomar, Monika. (2005). *Teacher education, making education effective*. Delhi: ISHA Books.
- Sharma, B.M. (2005). *Teacher training and educational research*. New Delhi: Commonwealth Publications.
- Siddiqui, M.A. (1993). *In-service education of teachers*. New Delhi: NCERT.
- Singh, Yogesh Kumar. (2005). *Teacher education*. New Delhi: APH Publishing Corporation.
- Srivastave, Prakash, G.N. (2004). *Perspectives in teacher education*. New Delhi: Concept Publishing Company.
- The National Assessment and Accreditation Council, (2004). *Innovations in teacher education international practices of quality assurance*. Bangalore: NAAC.



15. EDUCATIONAL EVALUATION

L	T	P	C
1	3	3	4

Preamble: Evaluation is an indispensable component of the educational process, which helps teachers and learners to improve teaching and learning. It is continuous process not a periodic exercise. It helps in forming the values of judgment, educational status, or achievements of students. It is desirable that teachers must acquire knowledge and understanding about the various aspects of evaluation and its application in classrooms. It provides students with the need, importance, concepts and characteristics of educational evaluation.

Objectives:

After completing the course, the scholar will be able to -

- understand the difference between measurement and evaluation;
- develop skills in conducting internal assessment exams and external assessment exams;
- apply the characteristics of an effective tool of evaluation to design a standard question paper;
- utilize the recommendations of various commissions in the evaluation of academic and non-academic development of learners;
- understand the specific uses of the different procedures of evaluation; and
- apply the various types of activities for the effective use of CCE techniques in evaluating the primary level learners.

Unit I - Status of Evaluation

Educational evaluation in teaching learning process - Difference among measurement, evaluation, assessment, testing, appraisal and examination - Tests and examinations - Examination reforms - Norm-referenced testing & Criterion-referenced testing - Formative and Summative Tests - Indicators of formative assessment - Cognitive and Non-cognitive assessment of learning outcomes - Internal examination verses External examinations (L3, T7, P7 = 17 Hrs)

Unit II - Procedure of Evaluation

Bloom's taxonomy - Revised taxonomy of objectives 2001 - Oral test and Written test - Different forms of test items - Framing test items and question papers- Diagnostic,

Prognostic and Achievement test - Preparation of a Blue print - Preparing a good question paper - Characteristics of a good test (L2, T7, P7 = 16 Hrs)

Unit III - System Assessment and Evaluation

Secondary Education Management Information System (SEMIS) - Evaluation of school experience/internship programmes. Assessment of teaching proficiency: criterion, tools and techniques. Organisation and regulation of internal assessment in PSTE: Preparation of guidelines and scheme of internal assessment. Portfolio assessment - Structure of MIS School mapping at secondary level - Course mapping at senior secondary level (L2, T8, P7 = 17 Hrs)

Unit IV - Evaluation - Tools and Techniques

Testing and Non-testing tools of evaluation-essay type, short answer and objective types of achievement test, observation, interview, rating scale, check list, attitude scale, interest inventories, socio-metric techniques, anecdotal records, question bank, grading (L2, T7, P8 = 17 Hrs)

Unit V - Current Trends in Evaluation

Computers in students' evaluation - Electronic delivery of objective tests - Alternative assessment - Rubrics - Assessment as an aspect of learning - Continuous and Comprehensive Evaluation - Progress report and Cumulative record - Open book examination (L3, T7, P7 = 17 Hrs)

(Total = 84 Hours)

References

- Aggarwal, J.C. (2005). *Essentials of examination system*. New Delhi: Vikas Publishing House.
- Drummond, M.J. (1993). *Assessing children's learning*. London: David Fulton.
- Ebel, Robert L. & Fribie, David. A. (1991). *Essentials of educational achievement*. New Delhi: Prentice-Hall of Hall.
- Frey, B. (2014). *Modern classroom assessment*. California: Sage Publication.
- Freeman, Richard & Lewis, Roger. (1998). *Planning and implementing assessment*. London: Kogan Page.
- GOI. (1991). *Minimum levels of learning at primary stage*. New Delhi: MHRD.
- Gronlund, N.E. (1990). *Measurement and evaluation in teaching (6thed.)*. New York: The MacMillan.

- Lindgren, B, W. (1975). *Basic ideas of statistics*. New York: Macmillan Publishing Co. Inc.
- NCERT (1985). *Contemporary issues in public examination*. New Delhi: NCERT.
- NCERT (1985). *Handbook of continuous and comprehensive evaluation*. New Delhi: NCERT.
- Shah, Beena (Ed.). (1988). *Revamping the examination system*. New Delhi: Northern Book Cent.
- Singh, Pritam. (2003). *Dynamics of a question*. New Delhi: Doaba House.



16. BEHAVIOUR MODIFICATION

L	T	P	C
4	1	0	4

UNIT I: FUNDAMENTALS OF BEHAVIOUR MODIFICATION

Basic concepts of Behaviour Modification, Definition and goal; Learning, Biological & Cognitive Foundations; meaning of Behavioral Assessment, Behavior Analysis and Formulation: desirable and undesirable behaviour – overt and covert - Deficit & Excess – normal & deviant – Conceptual issues: antecedents, consequences, stimulus control, generalization and discrimination;

(12L)

UNIT II: CLASSICAL CONDITIONING TECHNIQUES

Relaxation Techniques - Systematic Desensitization – Covert & Overt Conditioning - Flooding – Shaping

(12L)

UNIT III: OPERANT CONDITIONING TECHNIQUES

Aversion Therapy – Thought Stopping - Time out - Token Economy, Shaping, Chaining, Premack’s Principle, Prompting and Fading - Biofeedback.

(13L)

UNIT IV: SOCIAL & COGNITIVE LEARNING TECHNIQUES

Organizational & Clinical Behaviour Modification Models: Role Play & Behavioural Rehearsal – Psychodrama - Modelling - Meichenbaum’s Self- Instruction Training- Assertion Training

(13L)

UNIT V: APPLICATIONS & ETHICAL ISSUES

Application of Behavioural Modification techniques in Industrial / Organisational setting – Institutional setting – Social setting.

(10L)

(Total 60L)

TEXT BOOKS:

1. Miltenberger, R. (2007). Behaviour modification: Principles and procedures. 4th ed. Cengage Learning.
2. Jena, SPK. (2008). Behaviour Therapy: Techniques, Research and Applications. Sage Publications, New Delhi.
3. Fisher, W. W., Piazza, C. C., & Roane, H. S. (2011). Handbook of applied behaviour analysis. The Guilford Press, London.

REFERENCES

1. Sundel&Sundel (1990). Behavior change in the Human Services, 4th edition, Thousand Oaks: Sage Publications.

17. PSYCHOTHERAPY

L	T	P	C
4	1	0	4

UNIT I: INTRODUCTION

Definition – Goals of Psychotherapy – Professional issues – Personal characteristics of therapists – common and unique features of Psychotherapies – Psychotherapy in India
(10L)

UNIT II: PSYCHOANALYSIS

Psycho-Dynamic therapies – Indications and evaluations – Neo-Freudian approaches – Group therapy - Current status and evaluation
(12L)

UNIT III: HUMANISTIC – EXISTENTIALISTIC THERAPIES

Person-centred therapy – Gestalt therapy – Transactional analysis – Reality therapy – Existential therapy – Logotherapy– Current status and evaluation
(12L)

UNIT IV: COGNITIVE BEHAVIOUR THERAPIES

Behaviour therapy – Rational Emotive behaviour therapy – Cognitive therapy – Current status and evaluation
(11L)

UNIT V: POSTMODERN THERAPIES

Solution-focused therapy – Brief therapy – Narrative therapy - Eclecticism– Current status and evaluation
(10L)
(Total 45L)

TEXT BOOKS

1. Corey, G. (2009). Theory and Practice of Counselling & Psychotherapy. 8th ed. Thomson Brooks/Cole.
2. Nelson-Jones, R. (2014). Theory and Practice of Counselling & Psychotherapy. 6th ed. Sage, New Delhi.
3. Kottler, J. A., & Montgomery, M. J. (2011). Theories of Counselling and Therapy: an experimental approach. 2nd ed. Sage, New Delhi.

REFERENCES

1. Nelson-Jones, R. (2005). Practical Counselling and Helping Skills, 5th Edition, Sage, New Delhi.
2. Nelson-Jones, R. (2005). Theory and Practice of Counselling, 5th Edition, Sage, New Delhi.

18. PSYCHOLOGY OF ADDICTION

L T P C

4 1 0 4

UNIT 1: NATURE AND SCOPE OF ADDICTION

Definition, nature and characteristics; scope of addiction in the field of health care; Non legal and illicit drugs of abuse; DSM criteria for substance dependence and abuse; Demographic & Epidemiological Considerations

(8L)

UNIT 2: THEORETICAL PERSPECTIVES

Biological, Psychological, Cognitive, Socio-cultural and Integrative Perspectives

(8L)

UNIT 3: STIMULANTS & DEPRESSEDENTS

Stimulant – related disorders – Tobacco – Caffeine
Depressant – related disorders – Alcohol - Sedatives

(10L)

UNIT 4: OTHER DRUGS OF ABUSE

Opioids – Cannabis - Hallucinogens

(10L)

UNIT 5: SUBSTANCE DEPENDENCE AND ITS MANAGEMENT

Prediction & prevention; Assisting change; Preventing relapse, anonymous and support groups – Pathological gambling: Law and regulations – Internet Addiction: causes, signs and symptoms.

(9L)

(Total 45L)

TEXT BOOKS:

1. Barlow, D. H., & Durand, V. M. (2016). *Abnormal Psychology*. 6th ed. Cengage, India.
2. Woolfe, R. Dryden, W. (1996). *Handbook of Counseling Psychology*, London, Sage Publishers.
3. Carson & Butcher (1998). *Abnormal Psychology and Modern Life*, Pearson Publishers.
4. Taylor, S.E. (2006). *Health psychology*, 6th Ed. Tata Mc.Graw Hill Edition, New Delhi.
5. Corner, R.J. (1995). *Abnormal Psychology*, 2nd Ed. NY: W.H. Freeman & Co.

REFERENCES:

1. Velleman, R. (2001). *Counseling for Alcohol Problems*, 2nd Ed. London, Sage.
2. World Health Organisation. ICD-10. *Classification of Mental and Behavioral Disorders*.
3. Woolman, B.B. (1965). *Handbook of Clinical Psychology*, London, Pergaman Press.

Ph.D. EDUCATION

(with effect from the academic year 2021-2022 onwards)

Sl. No.	Title of Course Work Paper	Credit
1.	Educational Studies	4
2.	Educational Statistics	4
3.	Curriculum Studies	4
4.	Educational Policy, Planning & Financing	4
5.	Educational Evaluation	4
6.	Mini Project	4
7.	Applications of Educational Psychology	4
8.	Prospects of Elementary Education	4
9.	Prospects of Secondary Education	4
10.	Organisation and Administration of Teacher Education	4
11.	Perspectives, Issues and Research in Teacher Education (e-PG Pathshala)	4
12.	Andragogy of Education	4
13.	Antiquity, Politics and Economics of Education	4
14.	Technology Blended Education	4
15.	Inclusive Education	4
16.	Environmental Education	4
17.*	Research and Publication Ethics	2

* Refer: Ph.D Common syllabus for all.

EDUCATIONAL STUDIES

L	T	P	C
3	2	0	4

Preamble:

Education is the process of facilitating learning or the acquisition of knowledge, skills, values, beliefs, and habits. Education frequently takes place under the guidance of educators, but learners may also learn by themselves. In addition to the formal/informal setting of education, the experience of an individual has a formative effect on the way he/she thinks, feels, or acts. This course brings together the various perspectives of education including its interdisciplinary nature, socio-cultural contexts, and place of education in constitution and also reflects its various support systems. The learner will understand education as a key discipline for learning. The vital features of education in Indian scenario are focused in this course.

Expected Outcomes:

After completing the course, the student will be able to -

- understand the nature of education as a discipline/an area of study;
- compare and contrast the strength and limitation of western school of thoughts and Indian school of philosophy;
- understand the basic concepts/issues of education with reference to the NCF (2005) and the NCFTE (2009);
- examine critically the theories and basic concepts of education drawn from various disciplines cognate to education; and
- reflect on the multiple contexts in which the schools are working.

Unit I - Indian Perspectives

Contribution of Indian Schools of Philosophy: Sankhya Yoga, Vedanta, Buddhism and Jainism (with special reference to Vidya, Nyaya, Darshan) - Islamic Education

Unit II - Western Perspectives

Idealism – Realism – Naturalism – Pragmatism – Marxism – Existentialism - Their contribution to Education with special reference to information, knowledge and wisdom

Unit III - Education as a Discipline / an Interdisciplinary Knowledge

Concepts, principles, theories, assumptions and contexts related to education -

Discipline: schooling – Curriculum – Syllabus – Text books – School education: Contemporary challenges – Aims of Indian education – Interdisciplinary nature of education – Relationship of Education with philosophy, psychology, sociology, management, economics, anthropology – Challenges to education – Axiological issues in education – Role of peace and other values

Unit IV - Socio-cultural and Political Contexts of Education

Social purpose of education – Cultural purpose of education – Teaching in the context of diversities – Appraisal of the role of school, parents, peer group and the community – Multiple schools contexts: rural/urban, tribal, schools affiliated to different boards – Role of personnel in school management – Learner-friendly school environment – School as site of curricular engagement, struggle and social change – Teacher's autonomy – academic freedom

Unit V- Support Systems of Education

Support systems: Principles and guidelines – Department of Public instruction, Ministry and other government agencies, Academic Institutes: Role, involvements, issues related to control and autonomy – Participation of stakeholders in school education: NGOs, civil society groups, teacher organisations, parents, family, PTA and local community

References:

1. Aggarwal, J.C & Gupta, S. (2006). *Great philosophers and thinkers on education*. New Delhi: Shipra Publications.
2. Banrs, J.A. (1996). *Cultural diversity and education: Foundations curriculum and teaching* (4th ed.). Boston: Alynand, Becon.
3. Beyer, L.E. (Ed.) (1996). *Creating democratic classrooms: The struggle to integrate theory and Practice*. New York: Teachers College Press.
4. Butchvarov, P. (1970). *The concept of knowledge*. Evanston, Illinois: North Western University Press.
5. Delors, Jacques et al. (1996). *Learning: The treasure within report of the international commission on education for 21st century*. UNESCO.
6. Heyes, D., Hills, M., Chistie, P & Lingard, B. (2007). *Teachers and schooling: Making a difference*. Australia: Allen and Unwin,
7. *International encyclopedia of education - Vol.10*. (2nd ed.) (1994). Perganon Press.
8. Matheson, David (2004). *An Introduction to the study of education* (2nd ed.). UK: David Fulton Publish.

9. Mohanty, J.E. (1982). *Indian education in the emerging society*, New Delhi: Sterling Publications.
10. Slattery, P & Rapp, D. (2002). *Ethics and the foundations of education-Teaching Convictions in a postmodern world*. Boston: Allyn & Bacon.
11. Wall, Edmund (2001). *Educational theory: Philosophical and political Perspectives*. Amherst NY: Prometheus Books.
12. Winch, C. (1996). *Key Concepts in the philosophy of education*. Oxfordshire U K: Routledge.

EDUCATIONAL STATISTICS

L	T	P	C
3	2	0	4

Preamble:

This paper capacitates to acquire knowledge about the fundamental concepts and procedures of descriptive and inferential statistics. The need of statistics to analyse the data which the students collect for their research work for inquiry in the social and behavioral sciences during the current programme and to utilize the same in their future research ventures is made clear through this course.

Expected Outcomes:

After completing the course, the student will be able to -

- understand the meaning and need of statistics in educational researches;
- know the difference between descriptive and inferential statistics;
- distinguish parametric and non-parametric statistics; and
- select and apply appropriate statistical techniques.

Unit I - Introduction to Statistics

Statistics - Meaning and scope, Types of measurement scale - Data: Sources, acquisition and classification of data - Quantitative and qualitative data - Graphical representation: Bar-chart, Histogram, Pie-chart, Table-chart and Line-chart - Mapping of data

Unit II - Descriptive Statistics

Quantitative data analysis - Descriptive data analysis: Measures of central tendency and Dispersion, variability, fiduciary limits - Elementary ideas of probability, Normal probability curve - Qualitative data analysis - Data reduction and classification, Analytical induction and constant comparison, Concept of triangulation - Data interpretation - Data and governance

Unit III - Correlation and Prediction

Scatter Diagram - meaning and uses, Product moment and Rank Correlations, Biserial, Point biserial, tetrachoric and phi-coefficient correlations, Partial and multiple correlations, and applications - Linear regression equations, Prediction of variables, Multiple regression

Unit IV - Parametric Tests

Sampling distribution - Standard error - Estimation of population parameters - Testing of Hypothesis - Type I and Type II errors - Degrees of freedom - Levels of significance - Power of a statistical test - Effect size - Errors in making inference - Parametric techniques - Conditions to be satisfied for using parametric techniques - t-tests, z test, ANOVA

Unit V - Non-parametric Tests

Sign test - Median test - Chi-square Test - Kolmogorov-Smirnov test - Two sample Mann-Whitney test - Kruskal-Wallis's test

References:

1. Argyrous, George. (2011). *Statistics for research*. New Delhi: Sage.
2. Aron, Arthur., Aron, Elaine N., & Coups, Elliot. (2012). *Statistics for psychology*. Noida: Pearson.
3. Best, John W., & Kahn, James V. (2012). *Research in education (10th ed.)*. New Delhi: Prentice Hall of India.
4. Garrett, Henry. (1961). *Statistics in psychology and education*. New Delhi: Paragon International Publishers.
5. Guiford, J.F. (1950). *Fundamental statistics in psychology and education*. NY: McGraw Hill.
6. Gupta, C. (1981). *Fundamentals of statistics*. Bombay: Himalaya Publishing House.
7. Mangal, S.K. (2002). *Statistics in psychology and education (2nd ed.)*. New Delhi: Prentice-Hall of India.
8. Pillai, R.S.N., Bagavathi. (2013). *Statistics: Theory and practice*. New Delhi: S. Chand & Company.
9. Sharma, R.N. (2003). *Statistical techniques in educational research*. New Delhi: Surjeet Publications.
10. Sidhu, Kulbir Singh. (2010). *Statistics in education and psychology*. New Delhi: Sterling Publishers.

CURRICULUM STUDIES

L T P C
2 2 2 4

Preamble:

Curriculum Studies is a concentration within curriculum and instruction concerned with understanding curricula as an active force of human educational experience. One of the vital roles of teachers is to facilitate and refine the knowledge of students by using the curriculum as a tool. This course imparts necessary preparation of the learners to know the basic concepts and process of curriculum. It also helps to get acquaintance on various approaches and models of curriculum development.

Expected Outcomes:

After completing the course, the student will be able to -

- acquire knowledge and get insight into curriculum perspectives;
- understand the concept of curriculum and characteristics of a good curriculum;
- gain experience in constructive and critical analysis of text book;
- get insight into the guiding principles and recommendations of NCF 2005 and NCFTE 2009;
- develop the capability to play the role of curriculum designer, reviewer, implementer and assessor; and
- evaluate the total curricular experiences.

Unit I - Perspectives of Curriculum

Concept and Principles of Curriculum - Characteristics of a good curriculum- Strategies of Curriculum Development - Stages in the Process of Curriculum development - Foundations of Curriculum Planning - Philosophical Bases: national, democratic, sociological basis, Psychological Bases: Learners' needs and interests, Bench marking and Role of National level Statutory Bodies - UGC, NCTE and University in Curriculum Development

Unit II- Approaches to Curriculum Development

Instructional System - Instructional Media - Instructional Techniques and Material in enhancing curriculum Transaction - Approaches to Evaluation of Curriculum - Approaches to Curriculum and Instruction: academic and competency based approaches - Subject centred: core curriculum, learner centred, community centred

Unit III - Models of Curriculum

Models of Curriculum Design: Traditional and Contemporary Models - Academic / Discipline Based Model - Competency Based Model - Social Functions / Activities Model, Individual Needs & Interests Model, Outcome Based Integrative Model , Intervention Model, C I P P Model (Context, Input, Process, Product Model) - Models of Curriculum Evaluation: Tyler's Model, Stakes' Model, Scriven's Model, Kirkpatrick's Model

Unit IV - Curriculum Reforms and Development

Curriculum change: meaning and types - Factors affecting curriculum change - Approaches to curriculum reforms - Role of students, teachers and educational administrators in curriculum reforms and improvement - Scope of curriculum research - Types of Research in Curriculum Studies

Unit V - Textbook Review and Content Analysis

Textbook Review: Meaning, Need, Uses - Qualities of a good text book - Content analysis: Meaning, Need and significance - conceptual accuracy, learners' perception of content - Curriculum vs Syllabus - Source book vs Textbook

References:

1. Aggarwal, Deepak. (2007). *Curriculum development: Concept, methods and techniques*. New Delhi: Book Encla.
2. Boyle, Bill & Marie, Charles (2016). *Curriculum development: A guide to educators*. Thousand Oaks, CA: SAGE Publications.
3. Kridel, Craig (Ed.). (2010). *Encyclopedia of curriculum*. New Delhi: Sage Publications.
4. Madhulika, Sharma. (2013). *Education management, curriculum development and teaching techniques*. New Delhi: Kanishka Publishers.
5. McKernan, James. (2007). *Curriculum and imagination: Process, theory, pedagogy and action research*. UK: Routledge.
6. NCERT (2009). *National Curriculum Framework - 2005*. New Delhi: NCERT.
7. O'hara, M. (2004). *Meeting the standard for initial teacher training and induction*. London: Continuum.
8. Prasad, Janardan & Kaushik, Vijay Kumari. (2013). *Advanced curriculum construction*. New Delhi: Kanishka Publishers.
9. Roland, C. Faunce & Nelson, L. Bossing. (1967). *Developing the core curriculum (2nd ed.)*. New Delhi: Prentice Hall of India.
10. Taba, H. (1962). *Curriculum development: Theory and practice*. NY: Harcourt Brace.
11. Wheeler, D. (1967). *Curriculum process*. London: University of London press.

EDUCATIONAL POLICY, PLANNING AND FINANCING

L T P C
4 0 0 4

Preamble:

Planned development of skills must be strengthened by a “policy”, which is both comprehensive as well as national in character. Educational Planning in India is one of the vital areas of concern in all the Five year Plans in India. With the onset of globalization and modernization in recent times, education at all levels is very necessary if India is to surpass other nations. Its purpose is to guide the skill development strategies and coordinated action by all stake holders. It is also important to refresh the knowledge of educational policies in the economic, employment and social development arenas.

Expected Outcomes:

After completing the course, the student will be able to –

- acquire knowledge on the various educational policies recommended to promote education in the Country during pre and post independent period;
- understand the principles and theories in governance and planning of educational organizations;
- sensitize the learners the importance of leadership in the accomplishment of educational goals and objectives;
- gets insight on educational planning, its areas and various recommendations put forth by the Five year plans of the country;
- acquire the importance of supervision, financing and budgeting to ensure managerial effectiveness; and
- refresh the knowledge in the field of economic development.

Unit I - Educational Policy before Independence

Policies of Education – Macaulay’s Minute on Education (1835), Woods Despatch (1854), Indian University Commission (1902), Calcutta University Commission (1917- 1919), Hartog Committee (1928-29), Zakir Hussain Committee (1938), Sargent Report (1944)

Unit II - Educational Policy after Independence

University Education Commission (1948 -49), Secondary Education Commission (1952 - 53), Education Commission (1964 - 66), National Policy of Education (1968), Committee

on governance of Universities and Colleges (1969 -73), Development of Higher Education in India: A policy framework (1978), National Commission on Teachers I (1983 - 85), National Commission on Teachers II (1983 -85), National Policy on Education (1986), Programme of Action (1986), Women Education Commission, National Knowledge Commission (2005)

Unit III - Educational Planning

Introduction to Educational Planning - Meaning, need and importance, areas of planning, salient features, principles of educational planning, techniques of planning, execution and evaluation of planning. First exercise of Educational Plan (1938 - 44), Education in Five Year Plans

Unit IV - Financing in Education

Definition, meaning and principles of educational finance, Educational finance at Macro and Micro levels. Budgeting - Steps in budget preparation, fund allocations and expenditure, fund raising, accounting and auditing, Financial accountability Systems, Educational Loans and Taxes

Unit V - Economic Development in Education

Development of country's economy, Social Relevance, Human resource development. Financial resource: Procurement, utilization and maintenance of resources, Allocation of resources - economic and social bases for allocation of resources in educations. Cost benefit analysis and cost management

References:

1. Becker, G. W. (1964). *Human capital*. Princeton: Princeton University Press.
2. Bell & Bell. (2006). *Education, policy and social class*. Routledge.
3. Blaug, Mark. (1970). *Economics of education*. London: Penguin.
4. Bowman, M. J. Ctral, (Eds). (1968). *Readings in the economic of education*. Paris: UNESCO.
5. Cohn, E. (1972). *Economics of education*. Lexington Mass - D.C. Health Company.
6. Harbison, F. H. & Myres, C. A. (1964). *Education, man power and economic growth*. Maidenhead: McGraw-Hall.
7. Jandhya, B. G. Tilak. (1985). *Economics of inequality in education*. New Delhi: Sage Publications.
8. Mukhopadadyay, Mamar & Tyagi, R. S. (2005). *Governance of school education in India*. New Delhi: NIEPA.

9. Pandit, H. S. (Ed). (1969). *Measurement of cost productivity and efficiency of education*. New Delhi: NCERT.
10. Perlman, Richard. (1973). *The economics of education: Conceptual problems and policy issues*. NY: McGraw Hill Book Company.
11. Reddy, Shiva, B. (2000). *Education and rural development in India*. Paris: UNESCO: International Institute of Educational Planning.
12. Sacharopoulos, George, P., & Woodhall, M. (1985). *Education for development*. NY: Columbia University Press.

EDUCATIONAL EVALUATION

L	T	P	C
1	3	3	4

Preamble:

Evaluation is an indispensable component of the educational process, which helps teachers and learners to improve teaching and learning. When it is a continuous process rather than periodic process, its purpose will be realized effectively. It helps in forming the values of judgment, educational status, and achievements in students. It is desirable that future teachers must acquire knowledge and understanding about the various aspects of evaluation in classrooms. It provides students with the need, importance, concepts and characteristics of educational evaluation.

Expected Outcomes:

After completing the course, the student will be able to -

- understand the difference between measurement and evaluation;
- gets insight on evaluation procedure based on Blooms taxonomy of educational objectives;
- know the need for evaluating the internship, ICT resources, like programmes ;
- apply the various assessment techniques in day-to-day practice of teaching; and
- have alignment with the recent trends of evaluation.

Unit I - Status of Evaluation

Educational evaluation in teaching learning process - Elements and types of evaluation - Difference among measurement, evaluation, assessment, testing, appraisal and examination - Tests and examinations - Examination reforms - Norm-referenced testing & Criterion-referenced testing - Formative and Summative Tests - Indicators of formative assessment - Cognitive and Non-cognitive assessment of learning outcomes - Internal examination versus External examinations.

Unit II - Procedure of Evaluation

Bloom's taxonomy - Revised taxonomy of objectives 2001 - Oral test and Written test - Different forms of test items - Framing test items and question papers - Selection type or fixed response type questions - Essay type and objective type items compared - Diagnostic, Prognostic and Achievement test - Preparation of a Blue print - Preparing a good question paper - Characteristics of a good test

Unit III - Assessment in Pedagogy of Education

Assessment: Meaning, nature, perspectives, types – Relationship between objectives and outcomes of assessment - Feedback Devices: Meaning, types, criteria, guidance as a feedback devices - Assessment of portfolios - Reflective journal - Field engagement using rubrics - Competency Based Evaluation - Assessment of teacher prepared ICT Resources – Evaluation of internship programmes. Assessment of teaching proficiency: criterion, tools and techniques.

Unit IV - Assessment Techniques

Assessment in Andragogy of Education - Interaction Analysis: Flanders' Interaction analysis, Galloway's system of interaction analysis (Recording of Classroom Events, Construction and Interpretation of Interaction Matrix), Criteria for teacher evaluation (Product, Process and Presage criteria, Evaluation in Choice Based Credit System in Higher education - Anecdotal records, question bank, grading

Unit V - Current Trends in Evaluation

Computer based testing - Electronic delivery of objective tests – Alternative assessment – Rubrics for Self and Peer evaluation (Meaning, steps of construction) - Assessment as an aspect of learning - Continuous and Comprehensive Evaluation – Progress report and Cumulative record - Open book examination - Innovations in evaluation systems

References:

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9. NCERT (1985). *Handbook of continuous and comprehensive evaluation*. New Delhi: NCERT.
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MINI PROJECT

APPLICATIONS OF EDUCATIONAL PSYCHOLOGY

L	T	P	C
4	1	1	4

Preamble:

Educational psychology is the branch of psychology that deals with the scientific study of human learning. The study of learning processes, from both cognitive and behavioral perspectives. It allows researchers to understand individual differences in intelligence, cognitive development, motivation, self-regulation, and self-concept, as well as their role in learning. It is necessary for a teacher to understand the human behaviour because they deal with the humans (students) most of the time. This course highlights the essential perspectives of educational psychology. The main focus of this course is on enabling the learner to develop an understanding about intelligence, models of teaching, learning and personality. The concepts on introduction to psychology as a scientific study are also revealed through this course.

Expected Outcomes:

After completing the course, the student will be able to -

- understand the different psychological explanations of learning;
- understand the process of knowledge acquisition and knowledge construction;
- develop skills to transact curriculum employing different models of teaching;
- understand the aspects of individual differences and implications for teaching learning; and
- align learning styles and teaching strategies.

Unit I - General Perspectives of Psychology

Educational Psychology: Meaning, Definition and Principles - Schools of psychology: structuralism, functionalism, behaviourism, constructivism, Gestalt, cognitive psychology - Growth and Development: Concept and Principles - Cognitive processes and stages of cognitive development - Characteristics of adolescent and adult learners (Academic, Social, Emotional and Cognitive) - Personality: Meaning, Definitions - Theories of personality: Freud, Carl Rogers, Gordon Allport, Max Wertheimer, Kurt Koffka- Individual differences

Unit II- Intelligence

Approaches to Intelligence from Unitary to Multiple - Concepts of Social intelligence, multiple intelligence, emotional intelligence, Theories of Intelligence by Sternberg, Gardner, Testing and Assessment of Intelligence - Concepts of Problem Solving - Critical thinking - Metacognition and Creativity

Unit III - Learning

Principles of learning - Theories of learning: Behaviouristic, Cognitive and Social theories of learning - Factors affecting social learning, social competence, Concept of social cognition, understanding social relationship and socialization goals - Assessment of Cognitive (Anderson and Krathwohl), Affective (Krathwohl) and psychomotor domains (R.H. Dave) of learning

Unit IV - Pedagogy & Andragogy of Teaching

Pedagogy, Pedagogical Analysis - Concept and Stages, Critical Pedagogy-Meaning, Need and its implications in Teacher Education - Organizing Teaching: Memory Level (Herbartian Model), Understanding Level (Morrison teaching Model), Reflective Level (Bigge and Hunt teaching Model) - Concept of Andragogy in Education: Meaning, Principles, Competencies of Self-directed Learning - Theory of Andragogy (Malcolm Knowles) - The Dynamic Model of Learner Autonomy - Models of Teaching: Suchman's Inquiry Training Model - Ausubel's Advance Organiser model -Bruner's Concept Attainment Model - Jurisprudential Inquiry Model - Piaget's Cognitive Model

UNIT V Guidance and Counselling

Guidance and Counselling: Meaning, nature, principles, difference and need - Types of Guidance: Educational, vocational, personal, health and social & Directive, Non-directive and Eclectic - Approaches to counselling - Cognitive - Behavioural (Albert Ellis - REBT) & Humanistic, Person-centred Counselling (Carl Rogers) - Theories of Counselling: Behaviouristic, Rational, Emotive and Reality-Stress management-Mental health and Mental hygiene

References:

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PROSPECTS OF ELEMENTARY EDUCATION

L T P C

3 1 1 4

Preamble:

This course presents the overview of the elementary education at the national and global levels. It is aimed at describing the historical progression of elementary education to help the teachers understand the nature and development of elementary education in a holistic way. This has been designed based on the needs of the society and varied life experiences to facilitate fair understanding of elementary education in the contemporary Indian society.

Expected Outcomes:

After completing the course, the student will be able to -

- acquire knowledge about the context of elementary education;
- understand the concept, objectives, challenges and extent of success of UEE;
- comprehend the underlying principles of curriculum development and evaluation at elementary stage;
- acquaint research insight for curriculum development in elementary education; and
- analyse the status of elementary teachers, the problems and issues related to professional growth.

Unit I - Context of Elementary Education

Developmental characteristics and norms-physical, cognitive process and abilities; language development; socio-emotional development during early and late childhood - Learner/learning centered approach, activity centered approach, freedom and discipline; reflection on present practices

Unit II - Provisions in Elementary Education

Nature of Elementary Education after independence - Educational thought of Gandhi and Tagore to elementary education - Constitutional provision for education and Directive Principles related to elementary education - Provision in RTE Act and related issues - Elementary education in NPE (1986), POA (1992), NCF (2005)

Unit III - Issues and Challenges of Upper Elementary Education

Concept, objectives, meaning and justification of UEE - Current status of UEE (access enrolment, and retention) with reference to the equity principles: differential across habitation, gender, caste and other socially disadvantaged groups - Access and enrolment of different types of learners - issues and challenges - Enrolment and dropout: meaning and assessment and related issues and dropout - Achievement levels of different types of learners - status and issues

Unit IV- Programmes in Elementary Education

Panchayatraj and community involvement in educational planning and management related issues - Participation of NGOs in achieving goals of UEE - ECCE programme - District primary education programme: goals and strategies - SSA: goals and specific programme interventions namely access, enrolment, retention/participation and achievement - Monitoring, research and evaluation of schemes viz., mid-day meals, VEC and incentive schemes and achievement levels

Unit V- Curriculum in Elementary Education

Elementary School Curriculum: Principles - Curriculum , Objectives, Planning, Organisation and Evaluation of for Work Experience, Art Education, Health & Physical Education, Language(s), Mathematics, Environmental Studies/ Social sciences and Natural Sciences in Elementary Education

References:

1. Celin, R. (1984). *The study of primary education and resource book. Vol. I.*
2. Erickson, H.L. (2002). *Concept-based curriculum and instruction.* California: Crown Press.
3. GOI. (1986). *National policy on education.* New Delhi: MHRD.
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PROSPECTS OF SECONDARY EDUCATION

L T P C

3 1 1 4

Preamble:

Secondary and higher secondary education is increasingly becoming an area of focus in developing countries, which have thus far concentrated on achieving universal elementary education. This policy note on secondary education in India discusses issues and aspects critical for the development of this subsector. Secondary education, in terms of policy, is a concurrent item in that it is within the purview of both State and Central governments. State level implications and strategies for developing this sub-sector are critical.

Expected Outcomes:

After completing the course, the student will be able to -

- understand the nature-scope and systems of secondary and senior secondary education;
- examine the status of development of secondary and senior secondary education in India after independence;
- explore the problem and challenges related to secondary and senior secondary education;
- understand the interventions to solve the problems and issues related to alternative schooling at secondary and higher secondary levels;
- identify critical issues related to universalization of secondary education; and
- know about the innovations at secondary and higher secondary levels of education.

Unit I - Secondary Education

General Aims and Objectives of Secondary Education, Education during Post Independence Period. Constitutional provisions for education, Secondary Education Commission 1952-53, Education Commission 1964-66, New Education Policy 1986 with Programme of Action, 1992

Unit II - Secondary and Higher Secondary School Curriculum

Principles of school curriculum development at secondary and higher secondary level and text book development in secondary and higher secondary education - Approaches to career guidance, Vocationalisation of education and career development - Ginzberg's theory about guidance, Holland's theory of vocational choice

Unit III - Problems and Challenges of Secondary Education

Problems and challenges related to universalisation of secondary education - Alternative schooling at secondary stage - Problems / challenges / to access enrolment, dropout, achievement- equality of educational opportunities - Problems of education for girls, disadvantaged and differently abled children - Classroom problems: discipline, underachievement, lack of motivation, slow learners, delinquency and maladjustment - Issues of quality in secondary and higher secondary education

Unit IV - Research Trends in Secondary and Higher Secondary Education

Purpose - scope - trends of research in secondary and higher secondary education, innovative practices at secondary and higher secondary levels - simulated social skill training, independent study and role playing

Unit V - Monitoring for Quality Improvement in Schools

Monitoring - meaning, objectives and significance - Monitoring mechanism at different levels of schooling - Alumni association - Secondary Education Management Information System (SEMIS) - Structure of MIS School mapping at secondary level - Course mapping at senior secondary level

References:

1. Ahuja, A, Jangira, N.K. (2002). *Effective teacher training: cooperative learning based approach*. New Delhi: National Publishing House.
2. Bhatnagar, R. P. *Technology of teaching*. Meerut: International Publishing House.
3. Burkes, H.M. & Steffir, B. (1979). *Theories of counseling* (3rd Ed.). NY: McGraw Hill.
4. Jangira, N.K. & Mani, M.N. (1990). *Integrated education for visually handicapped*. Gurgaon: Old Subjimandi Academic Press.
5. Jha, M. (2002). *Inclusive education for all: schools without walls*. Chennai: Heinemann Educational Publishers.
6. Mohammad, Miyan. (2004). *Professionalisation of teacher education*. New Delhi: Mittal Publications.
7. Sharma, P. L. (1990). *Teachers' handbook on IED - Helping children with special needs*. NCERT Publication.

8. Sharma, P. L. (2003). *Planning inclusive education in small schools*. Mysore: RIE.
9. Sudesh, Mudhopadyay & Anil Kumar, K. (2001). *Quality profiles of secondary schools*. New Delhi: NIEPA.
10. Yadav, M. S. & Lakshmi, T. K. S. (2003). *Conceptual inputs for secondary teacher education: the instructional role*. New Delhi: NCTE.

ORGANISATION AND ADMINISTRATION OF TEACHER EDUCATION

L	T	P	C
1	3	3	4

Preamble:

Teachers are the builders of a nation. This paper enables the students to acquire necessary skills for planning and organizing classroom management. The student will be able to gain insight and reflect values and status of teaching as a profession, understand the roles and responsibilities of teachers and teacher educators. They will be able to examine critically the issues, problems and concerns of teacher education.

Expected Outcomes:

After completing the course, the student will be able to –

- recognize the concept of teacher education, its objectives, scope and functions;
- acquire knowledge about the various types of teacher education institutions across the country;
- develop an awareness of the problems in teacher development;
- acquaint with the responsibilities pertaining to the organization of pre-service and in-service teacher education;
- develop competency necessary for effective professionalism; and
- recognize the various research programmes and the prominent areas of research in teacher education.

Unit I - Pre-service Teacher Education

Teaching: Concept, objectives, characteristics and basic requirements – Teacher centred vs Learner centred methods - Teacher Education: Meaning, nature, scope - Types of Teacher Education Programmes - Structure of Teacher Education - Curriculum and its vision in curriculum documents of NCERT and NCTE at Elementary, Secondary and Higher Secondary levels - Organization and components of Pre-service Teacher Education - Transactional approaches (for foundation courses): Expository, Collaborative and Experiential learning

Unit II – Models of Teacher Education

Knowledge base of Teacher Education: Schulman, Deng and Luke & Habermas - Reflective Teaching: Meaning and Strategies - Models of Teacher Education: Behaviouristic, Competency-based and Inquiry Oriented

Unit III – In-service Teacher Education

In-service Teacher Education: Concept, need, purpose, scope, organization and modes - Agencies and Institutions of In-service Teacher Education: District, State and National Levels (SSA, RMSA, SCERT, NCERT, NCTE and UGC) - Planning in-service teacher education programme: Purpose, duration, resources and budget

Unit IV – Professionalism

Concept of Profession and Professionalism - Teaching as a Profession - Professional Ethics of Teachers - Professional, Technical and Skill Based education - Personal and Contextual factors affecting Teacher Development - ICT Integration - Quality Enhancement for Professionalization of Teacher Education - Teaching Support System: Traditional, Modern and ICT based.

Unit V – Research in Teacher Education

Research Programmes: Action Research, Experimental Projects and Major & Minor Research Projects. Funding Agencies for Researches in Teacher Education: NCTE, NCERT, UGC, DTER, etc. Survey of Educational Researches conducted in India and Abroad. Role played by University Departments in Researches related to Teacher Education

References:

1. Anderson, L.W. (1995). *International encyclopaedia of teaching and teacher education* (2nd ed.). Oxford: Elsevier Science.
2. Arora, G.L. (2002). *Teachers and their teaching: need for new perspectives*. New Delhi: Ravi Books.
3. Joyce, B., & Weal, M. (2003). *Modals of teaching* (7th ed.). Boston: Allyn & Bacon.
4. Lampert, M. (2001). *Teaching problems and the problems of teaching*. New Haven: Yale University Press.
5. Linda, Darling, Hammond & John, Bransford. (2005). *Preparing teachers for a changing world*. San Francisco: Jossey-Bass.
6. National Curriculum Frame Work Review. (2005). *National focus groups – position paper on teacher education*. New Delhi: NCERT.

7. Ram, S. (1999). *Current issues in teacher education*. New Delhi: Sarup & Sons Publications.
8. Ramanath, Kishan, N. (2007). *Global trends in teacher education*. New Delhi: APH Publishing Corporation.
9. Rao, V.K. and Reddy, R.S. (1992). *Instructional objectives and teacher education*. New Delhi: Commonwealth Publishers.
10. Srivastava, R.C. & Bose, K. (1973). *Theory and practice of teacher education in India*. Allahabad: Chug Publications.

PERSPECTIVES, ISSUES AND RESEARCH IN TEACHER EDUCATION

(e-PG Pathshala)

L T P C

3 1 1 4

Preamble:

By the end of the course, the student will be able to gain insight and reflect on the concept of teaching and the status of teaching as a profession, understand the roles and responsibilities of teachers and teacher educators. They will be able to examine critically the growth and development of teacher education in the country along with the various techniques for the evaluation of in-service teacher education programmes reflecting the issues, concerns and problems of in-service teacher education and thereby provide solutions for the problems. They will equip themselves to be effective nation builders with self-confidence, inquisitiveness, faithfulness, dutiful, humble, and good role models to the students in future.

Objectives

After completing this course the students will be able to:

- understand the concept and significance of teacher education programme, e-teacher education and e-learning;
- know the functions of pre-service and in-service teacher education programme and also the strength and achievement of prevailing education system in India;
- acquires knowledge on historical development of teacher education in India during various periods;
- gets insight on teaching methods followed in India;
- highlight the various issues faced by teachers and teacher education in India and recognize the ways to overcome the issues;
- provide information regarding human resource planning and also recognises the pioneer competencies of India; and
- understand the present teaching scenario in schools and also does a reality check on teachers and teacher education today.

Unit I – Scope of Teacher Education Programmes in India

Introduction – Pre service Teacher Education Programme: Objectives, Functions, Curriculum – In service Teacher Education : Nature, Objectives, Scope and Context – Modes of Teacher Education – Face to face, Open and Distance Education, e- teacher education: Concepts and features, Technology : a vehicle for development of classroom

instruction, issues in implementing e- learning in teacher education, advantages and disadvantages - Stage specific teacher education - Teacher Education for all levels

Unit II - Scenario of Teacher Education in Ancient, Medieval, Modern and Contemporary India

Teacher Education in Vedic, Buddhist, Medieval, pre-independent India and post-independent periods - Development of understanding about HRD - Identity Crisis of Education - NCFTE (2009-PREFACE) - Achievement of NCFTE (2009) and NCF (2005) - Challenges and Reality - Quality concerns of Teacher Education - Total Teacher Education courses recognized and intake approved

Unit III - Innovations, Issues and Concerns of Teacher Education

Innovative practices - Need of innovative practices in teacher education - Innovations in Secondary Teacher Education programme - Deployment of innovation - Issues faced by teacher education in India: Institutional inertia and brand inequity - Quality of teacher education institutions -Mushrooming of teacher education institutions

Unit IV - Research of Teacher Education & School Education Symbiosis

Identity of Education in India - Journey of NCFTE (2009) & NCF (2005) -Research and innovation - Need for taxonomy of educational skills - Renewal of the courses in education - Problems of research - Researching pioneer competencies in India: Meaning of pioneer, pioneer competencies, Attributes of Nobel Laureates of India - Problems addressed by the pioneers and developing pioneer culture

Unit V - Teachers Today: A Reality Check

Science education for Wholistic development of Teachers: Developing humane and Professional teachers, Wholistic Education and Approach, Illustration on Tea Preparation, properties of materials and ingredients, chemical composition of various ingredients used in preparation of Tea, Health benefits of black pepper, Nutritional profile for basil, Health benefit of black paper - Teacher in the Digital Age, Issues and Concerns - Integration of ICT aided Constructivist learning approach: Issues and Concerns - Good teacher - NCFTE (2009) and NCF (2005) - Challenges and reality - Human resource planning - Scenario of school teaching - Students' perception of teacher
- Teacher today

ANDRAGOGY OF EDUCATION

L T P C
2 2 2 4

Preamble:

This paper in adult education is designed to enhance the practice of adult education (Andragogy) through the provision of formal study in the theoretical foundations, methods, techniques and problem solving for the professional adult educator working in a variety of settings. The goal is to equip students with appropriate knowledge and skills for the performance of roles as teacher, facilitator, program planner, administrator and advocate. It is designed to acquire new skills or to build on their current knowledge base regarding adult learning and to develop skills and knowledge in organizing, conducting, evaluating or administering programs for adult learners.

Expected Outcomes:

After completing the course, the student will be able to -

- know the historical significance of adult education;
- learn about prominent theories of adult education;
- engage students in learning about how adults learn;
- design, deliver and evaluate adult educational programs; and
- explore the recent trends in adult education.

Unit I - Concepts and Terminologies

Andragogy and pedagogy - Illiteracy and its types - Literacy and its types - Understanding Diversity in Adult Education - Historical perspective of Andragogy: From Past to Present - Adult Learning: From Theory to Practice - Andragogical Process Model for Learning - Center model versus the each-one, teach-one model Commissions, Farmers' functional literacy, Gram Shikshan Mohim in Maharashtra, National Adult Education Program, Mass Program for Functional Literacy, - Needs Assessment Strategy
- Use of new information technologies: multimedia packages, computer aided learning, websites on adult education, data base creation for adult education - Participatory communication methods

Unit II - Foundations of Adult Education

Philosophical Foundations - Liberal, Behavioristic, Progressive, Humanistic and Radical approaches - Ideas of Rabindranath Tagore and Mahatma Gandhi - Conscientization approach: Ideas of Paulo Friere - Socialist Pedagogy - Psychological Foundations: Psychology of adults - Difference between the adult and the child as learners -

Characteristics of adult male and female learners and differences in their learning needs
- Learning needs of adults in urban, rural and tribal settings - Learning needs of adults of different socio-economic strata - Motivational aspects of adult learning - Values in adult education: Challenges and issues of contemporary society

Unit III - Curriculum Methods, Techniques and Teaching Materials

Developing curricula - types of curriculum - Different teaching methods - Teaching and learning materials for adults - Teaching aids - conventional, non-conventional, modern - Socialization and popular education as learning tools/strategies - Techniques of Material Preparation for Adults - Identification of needs and interests of adult learners - Preparation of books for neo-literates - Processes and contents; field testing of materials - Publication and marketing of materials: Role of National Book Trust, SRC, NGOs, etc. - Development of materials - print and non-print other than books

Unit IV - Training and Field Organisation

Training: Functionaries in adult, continuing education and field outreach programs conducted by government agencies, NGOs and universities and their training needs - Identification of objectives, content, training method, implementation strategies and evaluation techniques - The participatory approach as a training technique - Management and organisation of a training program - Field Organisation: Strategies for entry into communities - Rapport building, survey, planning for macro- and micro-situations - Setting targets, organization, resource mobilization, budget and its management, conduct of field work and its monitoring - Evaluation - continuous, internal, external - Tools for evaluation - Remedial actions

Unit V - Current Trends in Adult Education

National Literacy Mission (NLM): Structure, role and function, operational network and supporting agencies and bodies - SRC, DIET, NIAE, Directorate of Adult Education - Total Literacy Campaigns (TLC) - Post- Literacy Campaigns (PLC) - Off shoots of TLC and PLC - Field skills, teaching methods for adults, training methods for training of functionaries - Monitoring and evaluation of TLC, PLC and other programs of the NLM - Role of NGOs, Universities and other Government agencies in support of the NLM - UNESCO's efforts : Education for All Declarations, Hamburg Declaration - Mumbai Statement, World Declaration on Higher Education - Cape Town Statement - Policies, projects and conferences - Current Trends in Asian, African and European countries

References:

1. Baumgartner, Lisa, Caffarella, Rosemary S. & Merriam, Sharan. (2007). *Learning in adulthood: A comprehensive guide*. (3rd ed.). San Francisco: John Wiley & Sons.
2. Galbraith, Michael, W. (2004). *Adult Learning Methods: A Guide for Effective Instruction*.(3rd ed.). Melbourne, FL: Krieger Publishing Company.
3. Knowles, M. S. (1984). *Andragogy in action: Applying modern principles of adult learning*. San Francisco: Jossey-Bass Publishers.
4. Knowles, Malcolm F., Holton III, Elwood S. & Swanson, Richard A. (2015). *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). NY: Routledge Publications.
5. Malcolm S. Knowles. (1970). *The modern practice of adult education*. NY: Association Press.
6. McDonald, Betty (2012). *Assessment in adult learning: Andragogy, assessment, empowerment, lifelong learning, motivation, reflection, self regulation, technology*. Germany: Lambert Academic Publishing.
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8. Merriam, Sharan B. (2008). *Third update on adult learning theory: New directions for adult and continuing education*. NJ: John Wiley Publishers.
9. Mody, B. (1991). *Designing Messages for Development Communication*. New Delhi: Sage Publications.
10. Mohankumar, V. (2015). *Adult and lifelong learning: Selected articles*. New Delhi: Indian Adult Education Association.
11. Tappin R. M. (2014). *Adult development and Andragogy theories: Application to adult learning environments*.
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ANTIQUITY, POLITICS AND ECONOMICS OF EDUCATION

L	T	P	C
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Preamble:

This course is designed to provide historical background of education which is a foundation for a professional teacher. Appreciation of the strengths and weaknesses of previous endeavors prepares the students to contribute for evolving education systems. Careful consideration of the relationship of education with politics and economics enhances national development and political socialization. The course also empowers the students as *educational* leaders or administrators, with profound knowledge over the theories for careful *financial management* within the system. The knowledge base of history of education along with its progress till date, politics and economic perspectives based on theories craft an adept teacher community.

Expected Outcomes:

After completing the course, the student will be able to -

- gain an overview of education in ancient India and post independent era;
- understand the important contributions of Committees and Commissions for teacher education;
- apprehend the economic and political perspective of education; and
- realise the linkage among educational policy, political socialization and national development.

Unit I -History of Education in Pre-independent India

Education in Ancient India : Introduction - Types of Institution : Gurukul, Parishads, Sangam , Ashramas, Vidyapeeta, Agraharas and Viharas - Famous Educational Institutions : Takshasila, Nalanda University, Vallabhi, Vikramasila, Odantapuri and Ujjain - British Raj Higher Education : Charter Act, Macaulay's Educational Policy, Woods Despatch, Hunter Commission, Indian Universities Act, Sadler University Commission, Wardha Scheme of Basic Education, Sargeant Plan of Education

Unit II - Committees and Commissions' Contribution to Teacher Education Post-independent India

Secondary Education Commission (1953), Kothari Education Commission (1964-66), National Policy of Education (1986,1992), National Commission on Teachers (1999), National Curriculum Framework 2005, National Knowledge Commission (2007), Yashpal Committee Report (2009), National Curriculum Framework for Teacher Education (2009), Justice Verma Committee Report (2012), New Education Policy (2016)

Unit III - Policies and Education

Relationship between Policies and Education, Linkage between Educational Policy and National Development, Determinants of Educational Policy and Process of Policy formulation: Analysis of the existing situation, generation of policy options, evaluation of policy options, making the policy decision, planning of policy implementation, policy impact assessment and subsequent policy cycles

Unit IV - Economics of Education

Concept of Economics of Education: Cost Benefit Analysis Vs Cost Effective Analysis in Education, Economic returns to Higher Education Signaling Theory Vs Human Capital Theory, Concept of Educational Finance; Educational finance at Micro and Macro Levels, Concept of Budgeting

Unit V - Politics and Education

Relationship Between Politics and Education, Perspectives of Politics of Education Liberal, Conservative and Critical, Approaches to understanding Politics (Behaviouralism, Theory of Systems Analysis and Theory of Rational Choice), Education for Political Development and Political Socialization

References:

1. Agarwal, J.C. (2009). *Modern Indian education: History, development and problems*. New Delhi: Shipra Publications
2. Eric, H. A., et. al. (2016). *Handbook of the Economics of Education*. Publications. North Holland: Elsevier.
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TECHNOLOGY BLENDED EDUCATION

L T P C

4 0 0 4

Preamble:

Technology blended Education aims at preparing the students to participate creatively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and global competitiveness. To catalyse, support and sustain teaching learning process effectively, the emerging trends in technology is integrated in the teaching learning activities. Digital initiatives build upon the synergies in higher education by adopting a holistic approach to create a conducive environment of collaboration, cooperation and sharing the creation of a demand for optimal utilisation of the resources in education.

Expected Outcomes:

After completing the course, the student will be able to -

- appreciate the role of technology in teaching learning;
- grow in the usage of multimedia and web content for teaching learning;
- use word processing, databases, spreadsheets, and graphics to illustrate presentations;
- demonstrate competency in using audio-visual equipment, methods, and technologies in teaching learning contexts;
- learn the emerging trends in technology and to integrate it in teaching process; and
- explore the various digital initiatives in higher education.

Unit I - Concept of Educational Technology

Educational Technology as a Discipline: Information Technology, Communication Technology & Information and Communication Technology (ICT) and Instructional Technology - Applications of Educational Technology in formal, non-formal (ODL), informal and inclusive education systems - Implications of Behaviourist, Cognitive and Constructivist Theories to Instructional Design: Skinner, Piaget, Ausubel, Bruner, Vygotsky - Relationship between Learning Theories and Instructional Strategies for large and small groups & formal and non-formal groups - Use of ICT in Evaluation - Administration and Research: e-portfolios, ICT for research - Online repositories - Online libraries, Online and Offline assessment tools: Online survey tools or test generators

Unit II - Instructional Design

Systems Approach to Instructional Design, Models of Development of Instructional Design: ADDIE, ASSURE, Dick and Carey Model Mason's - Gagne's Nine Events of

Instruction and Five E's of Constructivism - Nine Elements of Constructivist Instructional Design - Application of Computers in Education: CAI, CAL, CBT, CML - Process of preparing ODLM

Unit III - Emerging Trends in e-Learning

Concept of e learning, Approaches to e-learning: Offline, Online, Synchronous, Asynchronous, Blended learning, Mobile learning - Social learning: concept, use of web 2.0 and web 3.0 tools for learning - Social networking sites, blogs, chats, video conferencing, discussion forum - Open Education Resources - Concept of e-Inclusion - Application of Assistive technology in e-learning - Quality of e-learning - Measuring quality of system: Information, System, Service, User Satisfaction and Net Benefits - D&M IS Success Model, 2003 - Ethical issues for e-learner and e-teacher

Unit IV - Web Based Learning & Hypertext Markup Language

Internet and the WWW: Information, services and functions of the internet and web - Keywords and search strategies; e-mail, chat, news groups and forums, web blogs - cloud computing. Script writing html-part of the HTML script - defining header and body sections-formatting statements - listing statements - creating menus - Creating link between files, inserting pictures and images

Unit V - Digital Initiatives in Higher Education

SWAYAM - MOOCs - SWAYAM PRABHA - e-shodhsindhu - NDL - NPTEL - NMEICT - e-Governance - NAD - Virtual Labs - e-Yantra - e-Acharya - e-Kalpa - FOSSEE - e-Vidwan - Spoken Tutorial - Central Cloud Infrastructure - IIC - SAP - UAY - IMPRINT - GIAN

References:

1. Anandan, K. & Dharma Raja, B. William. (2010). *Educational technology*. New Delhi: APH Publishing Corporation.
2. Flynn, Meredith & Rutkosky, Nita. (2000). *Advanced Microsoft office*. New Delhi: BPB Publications.
3. Gray, T., & Silver-Pacuilla, H. (2011). *Breakthrough teaching and learning: How educational and assistive technologies are driving innovation*. NY: Springer
4. Greaves, Thomas W., Hayes, Jeanne, Wilson, Leslie, Gielniak, Michael & Peterson, Eric L. (2012). *Revolutionizing education through technology*. Washington, DC: International Society for Technology in Education.
5. Hergest, Douglas. (1992). *Excel 4 for windows - instant reference*. Singapore: Tech Publications.

6. Hillman, David. (1998). *Multimedia technology and applications*. NY: Delmar Publishers.
7. Jonathan Anderson & Tom Van Weert (2002). *Information and communication technology in education: A curriculum for schools and programme of teacher development*. UNESCO.
8. Jones, B. (1990). *Technology and future of work*. UK: Oxford University Press.
9. Underdahl, Brain & Underdahl, Keith. (2000). *Internet with web page web site design*, New Delhi: IDG Books India.
10. Williams, P. John (Ed.) (2012). *Technology education for teachers*. The Netherlands: Sense Publishers.

INCLUSIVE EDUCATION

L T P C
1 3 3 4

Preamble:

Inclusive education systems remove the barriers, eliminates all forms of discrimination and respect diverse needs, abilities and characteristics of every individual in the learning environment. Ensuring equal opportunity to have education is a human right. The identification and adaptation of the school curriculum in pace with the learners needs along with the partnership of parents , peers and professionals facilitates the realization of no one left behind policy in education. The teacher's sound knowledge and positive attitude for inclusion can serve the purpose effectively. This course facilitates the prospective teachers to include the excluded and marginalized groups and providing them with quality education and implement inclusive policies and programmes.

Expected Outcomes:

After completing the course, the student will be able to -

- gather a solid understanding of the evolution of the philosophy of inclusive education;
- gain knowledge about International and national legislations for education of diverse learners;
- identify the diverse learners and apply appropriate educational evaluation techniques;
- develop adaptive curriculum suitable for diverse learners;
- develop the skill to plan and manage inclusive classroom;
- analyze the issues of inclusive education in India; and
- stay alive with the research trends of inclusive education.

Unit I - Introduction to Inclusive Education

Inclusive Education: Concept, Principles, Scope and Target Groups (Diverse learners; Including Marginalized group and Learners with Disabilities), Evolution of the Philosophy of Inclusive Education: Special, Integrated and Inclusive Education

Unit II - Diverse Learners

Concept of Impairment, Disability and Handicap - Classification of Disabilities based on ICF Model, Readiness of School - Models of Inclusion, Prevalence, Types, Characteristics and Educational Needs of Diverse learners' Intellectual, Physical and Multiple

Disabilities - Causes and prevention of disabilities - Identification of Diverse Learners for Inclusion - Educational Evaluation Methods, Techniques and Tools

Unit III - Inclusive Classrooms

Planning and Management of Inclusive Classrooms: Infrastructure, Human Resource and Instructional Practices - Curriculum and Curricular Adaptations for Diverse Learners - ILP - Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan, Remedial Teaching) - Parent-Professional Partnership: Role of Parents, Peers, Professionals, Teachers and School

Unit IV - Barriers and Facilitators

Barriers and Facilitators in Inclusive Education: Attitude, Social and Educational and Current Status - Ethical Issues of inclusive education in India - Research Trends of Inclusive Education in India

Unit V - Legal Provisions

Policies and Legislations (National Policy of Education (1986) - Programme of Action of Action (1992) - Persons with Disabilities Act (1995) - National Policy of Disabilities (2006) - National Curriculum Framework (2005), Concession and Facilities to Diverse Learners (Academic and Financial) - Rehabilitation Council of India Act (1992) - Inclusive Education under Sarva Shiksha Abhiyan (SSA) - Features of UNCRPD (United Nations Convention on the Rights of Persons with Disabilities) and its Implication

References:

1. Alice, Rajkumar, M., Rita, Sundari, D., & Digumarti, Bhaskara, Rao, (2004). *Special education*. New Delhi: Discovery Publishing House.
2. Bharat, Singh. (2008). *Modern teaching of exceptional children*. New Delhi: Anmol Publications.
3. Chintamani, Kar. (2008). *Exceptional children their psychology and education*. New Delhi: Sterling Publishers.
4. Dash, M. (2007). *Education of exceptional children*. New Delhi: Atlantic Publishers and Distributors.
5. Dharma Raja, B. William., & Kumar, Praveen S. (2011). *Special education: Focus on mathematics learning disability*. New Delhi: APH Publishing Corporation.
6. Kavitha, Jain. (2006). *Special education*. New Delhi: Mohit Publications.
7. Meenakumari. (2009). *Education for the children with special needs*. New Delhi: Centrum Press.

8. Philip, E. Vernon, Georgina, Adamson & Dorothy, F. Vernon. (1977). *The psychology and education of gifted children*. London: Methuen of Co.Ltd.
9. Prem, Prakash. (2008). *Education of exceptional children challenges and strategies*. New Delhi: Kanishkha Publishers.
10. Saini, B. L. (2002). *Education of exceptional children*. Ludhiana: Tandon Publications.
11. Samuel, Kirk, James, J. Gallagher et al. (2009). *Educating exceptional children*. U.S.A.: Wadsworth.
12. Ysseldyke, James; Algozzine, Bob & Thurlow, Martha. (2010). *Critical issues in special education*. New Delhi: Kanishkha Publications.

ENVIRONMENTAL EDUCATION

L T P C
4 0 0 4

Preamble:

Our environment has been indiscriminately exploited through loss of biodiversity, soil, weather and water pollution, population explosion, climate change, global warming, deforestation and scarcity of natural resources are the some of the consequences of our reckless deeds. The real development of any nation is progressing without damaging the environment. The Government is enacting several laws and implementing various policies and amendments to safeguard the nature. The objectives of environment education cannot be achieved without the involvement of the students at the grass root level. To make the citizens environment conscious, the supreme court of India has given direction to make all enrich environment orientation.

Expected Outcomes:

After completing the course, the student will be able to -

- understand facts and concepts concerning various aspects of the environment
- acquire the knowledge of various Environmental Issues;
- understand the relationship between Human Population and Environment;
- develop the positive attitude towards Environmental Education;
- understand environmental problems and their causes and remedies;
- develop a sense of responsibility and favorable attitude towards conservation of environment, biodiversity and sustainable development;
- understand the environmental Management; and
- imbibe values like love and respect for nature and its laws.

Unit I - Environment and Environmental Issues

Meaning, importance and scope of Environmental Education - Eco-system and its components. Environmental issues: Climate change - Global warming - Green House effect - Acid Rain - Ozone layer depletion and its effects - Urbanization - Deforestation - Soil erosion - Natural disasters. Pollution - various types. Role of individuals, community and government in planning, decision-making, legislation and social action for prevention of pollution

Unit II - Impact of Population on Environment

History of Human population growth - Human Population growth in India - Impact of population growth on eco-system, human settlements, land distribution. Population

Education: Need and Objectives – concept of sustainable development. Environment and Health Problem. Environmental stress – Effect of stressors on health and behaviour

Unit III - Biodiversity and its Conservation

Definition, Types, and Significance. Hot spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India – Conservation of biodiversity (In-situ and Ex-situ conservation) - National parks and Sanctuaries

Unit IV - Environmental Management and Organization

Definition and Need – Managing the natural resources – Renewable and non-renewable resources – Social forest – Water Management – Rainwater harvesting, Role of NGOs – Environmental protection acts. Disaster management- Environmental Conferences: Stockholm conference (1972), Rio Summit (1992), Kyoto Protocol (1997), Johannesburg conference (2002), Role of NCERT, CCE, DST in protecting environment

Unit V - Strategies for Environmental Conservation

Activities – Field trips, workshop, exhibitions, video shows, nature clubs, nature walk and celebration of environment day. Practical measures – saving energy, hygiene and sanitation programmes, eco-friendly behaviour, organic farming, 'Clean and green campus' programme

References:

1. Agarwal, K.C. (2001). *Environmental Biology*. Bikaner: Nidi Public Ltd.
2. Begon, W.D. & Mortimer, M. (1981). *Population ecology*. UK: Blackwell Oxford.
3. Borkin, D.B. & Keller, E.A. (1982). *Environmental studies*. Ohio: E.E. Merrill Company.
4. Clud, P.E. (1996). *Resources and man*. San Francisco: W.H. Freedom and Company,
5. Krihnamacharyulu & Reddy, G.S. (2005). *Environmental education*. Hyderabad:Neelkammal Publication.
6. Jadhav, H & Bhosale, V.M. (1995). *Environmental Protection and Laws*. Delhi: Himalaya Pub. House,
7. Kumar, Vijandra. (2000). *Modern methods of teaching environmental education*. Sarup and Sons.
8. Saxena, A.B. (1986). *Environmental education*. Agra: National Psychological Corporation.
9. Sharma, P.D. (1990). *Ecology and environment*. Meerut: Rastogi Publisher.

10. Sharma, R.A. (2002). *Environmental education*. Meerut: Surya Publication.
11. Singh, S. & Dubey, A. (1989). *Environmental management*, Allahabad: Allahabad University.
12. Veliappan, A., et al. (2007). *Environmental education*. Tirunelveli: A.V. Parvathi Publication.

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RESEARCH METHODOLOGY

Objectives:

- To introduce the scholars to the basic concepts of research.
- To train the scholars in the art of thesis writing and the methods of analyzing and organizing the material and the mechanics of thesis.
- To learn to use relevant critical concepts in order to effectively analyze and evaluate examples of rhetorical discourse

Unit I: FUNDAMENTALS OF RESEARCH

Selecting a Topic - Using the Library - Compiling a Working Bibliography - Taking Notes - Plagiarism

Unit II: STYLE AND ORGANISATION

Outlining - Language and Style – Paraphrasing - Writing Drafts

Unit III: MECHANICS OF WRITING

Spelling – Punctuation - Typing, Margin and Spacing

Unit IV: FORMAT

Principles of MLA Styles - Details of MLA Styles

Unit V: DOCUMENTATION

Parenthetical Documentation - Preparing List of Works Cited - Sample Entries

References:

MLA Handbook 8th Edition. The Modern Language Association of America. 2016.
Gilbaldi, Joseph. *The MLA Style Manual and Guide to Scholarly Publishing*. Modern Language Association of America. 1998.

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RHETORICS & STYLISTICS

Objectives:

- To familiarize the scholars with the Paradigms involved in Knowledge Production.
- To make the researchers self aware and Purposive Researchers.
- To develop Collaborative capabilities of Knowledge Acquisition.

Unit – I

Rhetorics – Definition and Scope – History of Rhetorics – Classical Rhetorics – Aristotelian Rhetorics – Cognitive Rhetorics - Political Rhetorics – Modern Rhetorics – Literary Rhetorics.
Hermeneutics – Epistemology

Unit – II

Stylistics – Literary features – Figures of Speech – Literary stylistics – Interpretive stylistics – Evaluative stylistics – Discourse stylistics
Genre studies – Types – Social Background

Unit – III

Expository writing - Descriptive writing – Repository writing – Narrative – Persuasive - Argumentative – Point of view

Unit – IV

Discourse analysis – Discourse as Social institution - Narratology

Unit – V

Thesis writing – Objective – Hypothesis – Antithesis - Synthesis

References:

- Barry, Peter. 2002. *Beginning Theory: an Introduction to Literary and Cultural Theory*. New York: Manchester United Press.
- Booth, Wayne C. 1983. *The Rhetoric of Fiction*. University of Chicago Press.
- Brooks, Cleanth and Robert Penn Warren. 1970. *Modern Rhetoric*. Harcourt, Brace & World.
- Crystal, David. 1994. *The Cambridge Encyclopedia of the English Language*. London: CUP.
- Fish, Stanley. *Rhetoricity of Knowledge Rhetoric*.
- Foucault, Mitchell. 1982. *The Archaeology of Knowledge*. Vintage.
- Frow, John. 2009. *Genre*. Routledge Publication.
- Madden, Frank. 2002. *Exploring Poetry*. London: Longman.
- Paltridge, B. 2006. *Discourse Analysis: An Introduction*. London: Continuum Discourse.
- Verdonk, Peter. 2002. *Stylistics*. Oxford: OUP.
- MLA Handbook 8th Edition*. The Modern Language Association of America. 2016. New York.

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INDIAN AESTHETICS AND POETICS

Objectives:

- To familiarize the scholars with the aesthetics of Indian texts.
- To make the scholars be aware of the literary techniques of Indian poetics.
- To impart Indian consciousness and encourage research based on Indian aesthetics.

Unit I

The Nature of Aesthetics, its relation to Philosophy and Literature: Indian traditions
V.S. Sethuraman. - Indian Aesthetics: An Introduction

Unit II

The Concept of Rasa:

- (a) Bharata Muni's *Natya Shastra* and its Critics
- (b) Abhinavagupta's *Rasa Siddhanta*.

The Concept of Dhvani:

- (a) Anandavardana's *Dhanyaloka*, with reference to *Abhidha*, *Lakshana*, *Vyanjana* and *Tatparya*.
- (b) Its extension to music, dance and drama.

Unit III: Poetry

- | | |
|---------------------|---------------------------|
| Sri Aurobindo | – Rose of God |
| | – Transformation |
| | – Life and Death |
| Rabindranath Tagore | – The Child |
| | – <i>Gitanjali</i> (1-15) |

Unit IV: Fiction

- | | |
|---------------------|-------------------------------------|
| Puthumaipittan | – The Complete Short Stories (1-10) |
| Hermann Hesse | – Siddhartha |
| M.T. Vasudevan Nair | – Kaalam (Time) |

Unit V: Non-Fiction

- | | |
|------------------------|----------------------|
| Ananda K. Coomaraswamy | – The Dance of Shiva |
|------------------------|----------------------|

Reference:

- Barlingay S.S - *A Modern Introduction to Indian Aesthetics*
Coomaraswamy, Ananda K. "Cosmopolitan View of Nietzsche," in *The Dance of Shiva: Fourteen Indian Essays*, Revised Ed., New York: The Noonday Press, 1957.
G.K. Bhatt- *Rasa Theory*
M. Hiriyanna - *Essentials of Indian Philosophy*.
M. Hiriyanna - *Outlines of Indian of Philosophy*
Nair, Vasudevan M.T. *Kaalam*. Translated by Gita Krishnankutty, Orient Blackswan Private Limited, 2012.
Pudumaipittan. *The Complete Short Stories*. Translated by R E Asher, SahityaAcademi, 2014.
Rabindranath Tagore- *Art and Aesthetics 22. Bharats' Natyashastra*Tr,
Sethuraman, V.S., editor. *Indian Aesthetics: An Introduction*. Trinity Publications, 2000.
Sri Aurobindo. *The Future Poetry*. (Pondicherry: Sri Aurobindo Ashram Publication, 1997)

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COMPARATIVE LITERARY STUDIES

Objective:

- To inculcate an awareness of Comparative Literary Studies in learners.
- To expose learners to the methodology and application of theories in Comparative literature.
- To help researchers understand Thematology and Genre studies, and Translation Studies.

Unit – I

Historical Survey – American and French schools – Attitudes and Approaches – Comparatism – Historical Survey of Comparative Studies in India.

Unit – II

Historical Comparisons: Influence and Imitation – Reception and Survival – Analogy and Communication.
 Literary History: Epoch – Period, Generation and Movement.

Unit – III

Aesthetic Comparisons: Thematology – Themes – Motifs and Types.

Unit – IV

Translation Studies: Translation as an art – Role of translation
 Literature and Psychology/Mythology/Sociology etc

Unit – V

Practice of Comparative Literature: Comparative study of Bama's *Karukku* and Alice Walker's *Color Purple*.

References:

- Bama 2014: *Karukku*. Oxford University Press.
 Basnet, Susan 1993: *Comparative Literature*. Blackwell.
 Bhatnagar, M K 1999: *Comparative English Literature*. Atlantic Publishers and Distributors.
 George, K M 1984: *Comparative Indian Literature*. Kerala Sahitya Akademi.
 Guillen, Claudio 1993: *The Challenge of Comparative Literature*. Cambridge.
 Prawar SS 1973: *Comparative Literature Studies*. Duckworth.
 Stalknett NP et al. Editors 1951: *Comparative Literature*. Carbondolle.
 Spivak, Gayatri Chakravorty 2005: *Death of a Discipline*. Seagull. Calcutta
 Walker, Alice 2011: *The Color Purple*. Orion.
 Wellek, Rene and Austin Warren 1963: *Theory of Literature*. Harmondsworth.
 Weisstein, Ulrich 1973: *Comparative Literature and Literary Theory*. Bloomington.

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THEORIES AND PRACTICES OF ENGLISH LANGUAGE TEACHING

Objectives:

- To sensitize the scholars towards the various methods of teaching in English.
- To enable scholars to research in improving the methods of teaching L2.
- To synchronize technology and language teaching.

Unit I :

- Historical development of English in India
- Status of English language in India (pre-independence and post-independence)
- Problems in Teaching English in India
- Functions of English as a Language

Unit II :

- Methods of English Language Teaching
- Principles of English Language Teaching
- The goals of Language Teaching
- Varieties of English Language

Unit III :

Language Learning Methods - Traditional Method -Audio-lingual Method – Suggestopedia- Total Physical Response-Direct Method-Natural Approach- Cognitive Approach- CLL – Silent Way- Content Based learning- Task Based Learning – NLP- Other modern practices.

Unit IV:

- Role of an English Teacher
- ICT in English Language Teaching
- Language games
- Mother-tongue influence on English

Unit V :

- Developing Language skills
- Teaching English for specific purposes
- Facilitating workplace communicative competency
- Teaching Interview skills.

References

- 1) The Story of English in India- N.Krishnaswamy
- 2) Communication Techniques- A.P Girdhar
- 3) Approaches and methods in language teaching (Second edition) by Jack C. Richards & Theodore S.Rodgers, Cambridge University Press, 2001
- 4) English Language Teaching Today: Linking Theory and Practice– Willy A Renandya, Handoyo Puji Widodo
- 5) Teaching of English (2013) by M.S Sachdeva

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TRANSLATION STUDIES

Objectives:

- To understand the nuances of translation.
- To interact productively with literatures from different languages and diverse cultures.
- To have a better understanding of one's own culture by comparing with other cultures

Unit – I **Introduction**

Definition – Scope – Limitations – History

Unit – II **Schools of Translation**

Equivalence – Skopos theory – descriptive translation – cultural translation

Unit – III **Poetry**

A. K. Ramanujan – Interior Landscape

Unit – IV **Non-Fiction**

Bama – Karukku

Sir William Jones – Kalidas' Shakunthala

Unit – V **Fiction**

U. R. Anantha Murthy – Samskara (OUP 1979)

References:

Bassnett, Susan. *Political Discourse, Media and Translation*, Cambridge Scholars, 2010.

Bassnett Susan and Trivedi Harish, "Post-Colonial Writing and Literary Translation" in *Post Colonial Translation: Theory and Practice*. Ed. London: Routledge, 1999.

Spivak, Gayatri Chakrovorty. "The politics of Translation" "The Politics of Translation", in Lawrence Ventui (ed.), *The Translation Studies Reader*. London. New York: Routledge, 2000.

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PSYCHOANALYTIC STUDIES

Objectives:

- To enable the students to understand the basic concepts in Psychology.
- To enable learners to understand the nuances of Psychology and apply the same in the study of literature.

Unit I:

Sigmund Freud – “Creative Writers and Day Dreaming”
The Psychology of the Dream Processes

Unit II:

Carl Gustav Jung – *Analytical Psychology: Theory and Practice*
“Psychology and Literature”

Unit III:

Jacques Lacan – *The Four Fundamental Concepts of Psychoanalysis*

Unit IV:

E. H. Erikson – “The Growth of the Ego” from *Childhood and Society*

Karen Horney – *Self Analysis*

Unit V:

Harold Bloom – The Poetic Origins and Final Phase

Claude Levi Strauss – Myth and Meaning

Further Reading:

1. Shakespeare -- Hamlet
2. Thomas Hardy -- *The Well Beloved* (1897), Wordsworth Classics.
3. Breuer and Freud -- *Studies on Hysteria*
4. Lodge, David. *Twentieth Century Literary Criticism: A Reader*. 1973.

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GENDER STUDIES

Objectives:

- To sensitize the students towards the various issues and challenges faced by women.
- To create an awareness of the potential capabilities of women and to empower them.

Unit I

Simone de Beauvoir: The Second Sex

Unit II

Mary Wollstonecraft: A Vindication of the Rights of Woman

Unit III

Chimamanda Ngozi Adichi : Dear Ijeawele, or A Feminist Manifesto in Fifteen Suggestions

Unit IV

Amina Wadud: Inside The Gender Jihad: Women's Reform in Islam

Unit V

Patricia Hill Coillins: Black Feminist Thought: Knowledge, Consciousness and the Politics of Empowerment

Further Reading:

- *The Subjection of Women*-----John Stuart Mill
- *Sexual Politics* is a 1970 book by Kate Millett,¹¹
- *A Room of One's Own* is an extended essay by Virginia Woolf, first published in September 1929.¹
- *We Should All Be Feminists* is a book-length essay by the Nigerian author Chimamanda Ngozi Adichie. First published in 2014
- *The Emergence of Feminism in India, 1850-1920* By Padma Anagol
- *Literary Theory and Criticism: An Oxford Guide* edited by Patricia Waugh

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CULTURAL STUDIES: THEORY & PRACTICE

Objectives:

- To sensitize and enable the scholars understand the theories in Cultural Studies.
- To inculcate in learners the idea of understanding culture in all its complex forms.
- To make the researchers identify, analyze and address the specific cultural issues in literary texts.

Unit I

Wilfred L. Guerin & et.al : *What is Cultural Studies?*
Jonathan Culler : *Literature and Cultural Studies*
Stuart Hall : *Notes on Deconstructing "The Popular"*

Unit II

Walter Benjamin : *The Work of Art in the Age of Mechanical Reproduction*
Foucault : *Space, Power and Knowledge*
Judith Butler : *Subjects of Sex/Gender/Desire*

Unit III

Leopold Senghor : *Negritude: A Humanism of the Twentieth Century*
Homi. K. Bhaba : *The Post Colonial and the Postmodern: The Questions of Agency*
Richard Kerridge : *Environmentalism and Eco-criticism*

Unit IV

Christopher Norris : *Science and Criticism beyond the Culture Wars*
Ranjit Guha & Gayatri Spivak: *Introduction to Subaltern Studies. (Vol.1)*
Janardhan Waghmare : *Black Literature and Dalit Literature*

Unit V

Ishmael Reed : *Yellow Back Radio Broke-down*
Amos Oz : *Tale of Love and Darkness*
Sivakami P : *Grip of Change and Author's Notes*

References:

- Arendt H. *Illuminations*. Fontana, 1992.
Culler, Jonathan. *Critical Theory*. Oxford UP, 2000.
Dangle, Arjun. *The Poisoned Bread*. Orient Black Swan, 2009.
During, Simon. *The Cultural Studies Reader*. Routledge, 1993.
Guerien, Wilfred L & et.al. *A Handbook of Critical Approaches to Literature.6th ed*. Oxford UP, 2005.
Samuel, Raphael. *People's History and Socialist Theory*. Routledge, 1981.
Waugh, Patricia. *Literary Theory and Criticism*. Oxford UP, 2014.

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GREEN STUDIES

Objectives:

- This paper seeks to introduce to the students, to Ecocriticism which is one of the most relevant critical theories of the post-modern era.
- To advocate a more thoughtful and ecologically sensitive relationship of man to nature.

Unit I – Introduction

Introduction	– Definition, scope and importance.
William Howarth	– Ecocriticism in Context
Cherryl Glotfelty	– Literary Studies in the Age of Environmental Crisis
Lawrence Buell	– Ecological Imagination; Ecofeminism, Ecopsychology Paradigm shifts.

Unit II – Essays

Catherine V. Gardner	– Ecofeminism and the city: An Ecofeministic Perspective on the Urban Environment.
Andre Light	– Boyz in the woods: Urban Wilderness in American Cinema

Unit III – Poetry

Margaret Atwood	– Red Fox
Kamala Das	– The Sandalwood Trees
Gary Snyder	– From Turtle Island

Unit IV – Prose

Selections from Also Leopold's Sand Country Almanac (The Land Ethic)
 Selections from Edward Abbey's Desert Solitaire (Water, and Serpents of Paradise)

Unit V – Fiction

Amitav Ghosh	– The Hungry Tide
Rabindranath Tagore	– Muktha Dhara
Easterine Kire	– When the River Sleeps

References:

Glotfelty, Cherryl & Harold Fromm. *The Ecocriticism Reader*. The U of Georgia, 1996.
The Oxford Handbook of Eco criticism, Greg Garrad, OUP 2014, 1Edition
 The Green Studies Reader: From Romanticism to Ecocriticism, Laurence Coupe Routledge (3 August 2000) 1Edition
 Barry Peter, *Beginning Theory*, 2010, 3rd Edition.
 Maria Mies & Vandana Shiva, *Ecofeminism*. Rawat Publications 1993, 1Edition
 Bennett Michea. *The Nature of Cities: Ecocriticism and Urban Environments*. The University of Arizona press, 1999.

Electronic Source - www.greenschool.org

Prescribed text

A Fable for Tomorrow from Silent Spring – Rachel Carson
The Hungry Tide, Amitav Ghosh, Harper Collins, 2011.
 Tagore Rabindranath, Sasta Sahitya Mandal, 2012.
 Kire Easterine: When the River Sleeps Zuban Publishers, 2011.

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INDIGENOUS LITERATURE

Objectives:

- To disseminate the Indigenous Knowledge System.
- To comprehend the Indigenous Culture and Narrative Patterns
- To help the researchers assure further researches on the multifaceted aspects of Indigenous Literature.

Unit I - Theory

Armand Garnet Ruffo : "*Why Native Literature?*"

Renate Eigenbrod : "*A Necessary Inclusion: Native Literature in Native Studies*"

Linda Tuhiwai Smith : *Choosing the Margins: The role of research in indigenous struggles for social justice*

Unit II - Poetry

Lionel Hogarty : *Dream Time, A Vera takes a Ride*

Kimberly Blaser : *Goodbye to all That*

Maurice Kenney : *They Tell Me I am Lost, Amerindian*

Mary Tallmountain : *Good Griecce, Indian Blood*

David Diop : *Africa*

Mamang Dai : *The Voice of the Mountain*

Unit III – Biography & Fiction

C K Janu : *Mother Forest: The Unfinished Story of C K Janu*

Scott Momaday : *House Made of Dawn*

Thomas King : *Green Grass, Running Water*

Mahashwetha Devi : *Draupadi*

Unit IV – Fiction II

Eden Robinson : *Monkey Beach*

Alexis Wright : *Carpentarie*

Leslie Marmon Silko : *The Yellow Woman*

Kath Walker : *Mirrabooka*

Unit V - Drama

Jack Davies : *The Cake Man*

Wole Soyinka : *A Dance of the Forests*

Reference:

Eigenbrod, Renate. "A Necessary Inclusion: Native Literature in Native Studies", *Studies in American Indian Literatures*. Eds. Cox, James h. & Austin Daniel, Volume 22. Nebraska Press, 2010.

Janu, C. K. *Mother Forest: The Unfinished Story of C K Janu*. Tr. Ravishanker. Kali for Women, 2004.

Ruffo, Armand Garnet. *Introduction to indigenous literary criticism in Canada*. Ed. Heather Macfarlane & et.al, Canada Broadview Press, 2016.

Smith, Linda Tuhiwai. ed. *Decolonizing methodologies: Research and Indigenous peoples*. Zed Books, 2012.

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POSTCOLONIAL LITERATURE

Objectives:

- To enable scholars understand the dimensions of Postcolonial Literature
- To help scholars identify the various themes presented in Postcolonial Literature
- To make the scholars be aware of the postcolonial texts.

Unit I:

Introducing Post- Colonial Literatures –Invader and settler colonies, Commonwealth Literature, New Literatures

Ngugi wa Thiong’O - “The language of African Fiction” From
Decolonizing the Mind

Unit II: African literature

Poetry: MakabongweNkambule- I Am Africa
Prose: Chinua Achebe - Novelist as Teacher
Novel: ChimamandaNgoziAdichie–*Half of a Yellow Sun*

Unit III: Canadian literature

Poetry: James Reaney - Maps
Prose: Susana Moodie - From *Roughing It in the Bush*
Novel: Sinclair Rose- *As for Me and My House*

Unit IV: New Zealand

Poetry: Allen Curnow – “Time”, “House and Land”
Prose: KonaiThaman, - ‘Decolonizing Pacific Studies’
Novel: Patricia Grace - *Potiki*

Unit V: Australian Literature

Poetry: Peter Porter – “Your Attention Please”
Prose: Barbara Baynton – “The Chosen Vessel”
Novel: Patrick White – *Voss*

Reference:

- Adichie, Chimamanda. *Half of a Yellow Sun*. Harper Perennial. 2007.
- An Anthology of Commonwealth Poetry* – Ed., C. D. Narasimhaiah
- Ashcroft, Bill, Gareth Griffiths and Helen Tiffin. *Key Concepts in Post-Colonial Studies*, London and New York: Routledge, 1998. Print.
- Boehmer, Elleke. *Colonial and Postcolonial Literature: Migrant Metaphors*. Oxford: Oxford University Press, 1995.
- Bhabha, Homi. *Nation and Narration*, London and New York: Routledge, 1990. Print.
- King, Bruce, Ed. *The New National and Postcolonial Literatures: An Introduction*, Oxford: Clarendon, 1996. Print
- Leela Gandhi, *Postcolonial Theory: A Critical Introduction* (New Delhi, OUP. 1998)
- Loomba, Ania. *Colonialism/Postcolonialism*. London: Routledge, 1998
- Moodie, Susanna. From *Roughing It in the Bush*. *An Anthology of Canadian Literature in English*. OUP. 2010.
- The Postcolonial Studies Reader* ed. Bill Ashcroft, Gareth Griffiths, Helen Tiffin(London, Routledge,1995) Ania Loomba, *Colonialism/Postcolonialism* 2nd ed. (London, Routledge,2007)
- Thiong’o, NgugiWa. “The Language of African Fiction”. *Decolonising the Mind*. East African Education Publishers. 2004.

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DIASPORIC STUDIES

Objectives:

- To make the scholars understand the concepts of Diasporic Studies.
- To make the scholars appreciate the Diaspora texts.
- To make the scholars be aware of the sufferings of the settlers.

Unit 1

Concepts: Diaspora, Neo-Diaspora, Ethnicity, Alienation, Issues of Location, Nostalgia and Memory, Loss, Nation-State and Exile, and Cultural Hybridity.

Unit II

ChelvaKanaganayakam – Introduction to *Lutesong and Lament*
 AvtarBrah - Thinking Through the Concept of Diaspora
 - The Homing of Diaspora the Diasporising of Home

Unit III: Poetry

Mahakavi - Ahalikai
 M A Nuhman - Passion
 Cheran - Yaman
 Agha Shahid Ali - "The Wolf's Postscript to "Little Red Riding Hood"

Unit IV: Short stories

From JhumpaLahiri's *The Unaccustomed Earth*
 - The Unaccustomed Earth
 - Hell-Heaven
 - Once in a lifetime
 - Year's End

Unit V: Novel

V. N. Giritharan - An Immigrant
 Mary Anne Mohanraj - The Stars Change

References:

- Brah, Avtar. "Thinking through the Concept of Diaspora". *The Post-Colonial Studies Reader*. 2nd ed. Eds. Ashcroft, Bill, Griffiths Gareth, Tiffin Helen. London: Routledge, 2006. pp. 443-446.
- Cheran. *A Second Sunrise*. Edited and translated from Tamil by Lakshmi Holmström and SaschaEbeling. NavayanaPublicatins, 1982.
- Emerson, Ralph Waldo. *Self-Reliance*. Create Space Independent Publishing Platform. 2017.
- Clifford, James. "Diasporas", *The Post-Colonial Studies Reader*, 2nd ed. Eds. Ashcroft, Bill, Giritharan, V.N. *An Immigrant*. Trans. Latha Ramakrishnan. 2012.
- Griffiths Gareth, Tiffin Helen. London: Routledge, 2006. pp 451-454.
- Jain, Jasbir. "The New Parochialism: Homeland in the Writing of The Diaspora". *In Diaspora: Theories, Histories, Texts*. Ed. MakarandParanjape, New Delhi: Indialog Publication Pvt.Ltd, 2001. pp.79-81.
- Lahiri, Jhumpa. *The Unaccustomed Earth*. Vintage. 2009.
- Mishra Vijay: *Theorizing the Diasporic Imaginary*, Routledge, 2007.

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AMERICAN STUDIES

Objectives:

- To make the scholars be aware of the life and culture of American people
- To Gain competence in African American theories and methods appropriate to research work in American Studies
- To understand the relationships between race, power, gender, class, sexuality, religion, and technology in America.

Unit I

Background to American Literature American myths of origin; Cisatlanticism; Adamic myths; multiculturalism. Puritanism; Unitarianism; Transcendentalism.
 Afro-American Theories: Alain Locke–Self Criticism: the Third Dimension in Culture

Unit II: Poetry

William Carlos Williams - The Red Wheel Barrow
 - This is Just to Say
 Wallace Stevens - The Snow Man
 - Anecdote of the Jar
 Karen Volkman - Create Desire

Unit III: Fiction

Harper Lee - To Kill a Mockingbird
 John Steinbeck - Grapes of wrath
 Zora Neil Hurston - Their eyes were watching God

Unit IV: Non-Fiction

W. E. B. Du Bois - Of the Faith of the Fathers
 James Thurber - University Days
 William Faulkner - Nobel Acceptance speech

Unit V: Drama

Edward Albee - Who's Afraid of Virginia Woolf?
 CJ Hopkins - Horse Country

Reference:

Albee, Edward. *Who's Afraid of Virginia Woolf?*. Scribner Classics. 2003.
American Literature. Volume 2, Ed. William E. Cair. Newyork: Penguin Academics, 2004.
 Hopkins, CJ. *Horse Country*. Bloomsberry Academic. 2014.
 Napier, Winston, 1953-*African American Literary theory: A Reader*
 William J. Fisher et al, "An Anthology American Literature of the Nineteenth Century".
 Delhi, S. Chand & Company, 2008.
 William Carlos Williams, "This Is Just to Say" from *The Collected Poems: Volume I, 1909-1939*, New Directions Publishing Corp.
 Karen Volkman, "Create Desire" from *Spar*. Copyright © 2002 by Karen Volkman.
 Reprinted by permission of University of Iowa Press.
 Wallace Stevens, "The Snow Man" from *The Collected Poems of Wallace Stevens*. Knopf
 Doubleday Publishing Group

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MEDIA AND LITERATURE

Objectives

- To orient the scholars to develop media consciousness.
- To interpret literary texts with media literacy.
- To encourage researchers to pursue multidisciplinary research.

Unit I

Stuart Hall : *Deviancy, Politics and the Media*

Unit II

Marshall McLuhan : *Understanding Media*
 Anders Skare Malvik & Sarah. J. Paulson : *Introduction: Technology-Subjectivity-Aesthetics: Three Perspectives On Contemporary Media Culture*
 Richard Hoggart : The 'Real' World of People: Illustrations from Popular Art: Peg's Paper

Unit III

David Beniof : The film script of *Troy*
 James Cameron : The film script of *Avatar*

Unit IV

John Carlin : *Playing the Enemy: Nelson Mandela and the Game that made A Nation*
 Clint Eastwood : *Invictus* (Movie)

Unit V

Jayakanthan : *Of Men and Moments* (Translation)
 A. Bhimsingh : *Sila Nerangalil Sila Manithargal* (Movie)

References:

- Hall, Stuart. *Deviancy, Politics and the Media*. Centre for Contemporary Cultural Studies Birmingham, 1971.
- Jayakanthan. *Of Men and Moments*, Trans. K S Subramanian. Sahitya Akademi, 2014.
- Lodge, David. *20th Century Literary Criticism: A Reader*. Longman, 1972.
- Malvik, Anders Skare & Paulson, Sarah.J. *Literature in Contemporary Media Culture*. John Benjamins Publishing Company, 2016.
- McLuhan, Marshall. *Understanding Media*. McGraw-Hill, 1964.
- www.imdb.com/title/tt1057500
- www.imdb.com/title/tt0157039

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVEL-12

PhD Course Structure for our University Departments

(Effective from the academic year 2018-2019 onwards)

Sri Paramakalyani Centre of Excellence in Environmental Science

PhD Programme: Environmental Science

PhD PROGRAMME: ENVIRONMENTAL SCIENCE

S.No	TITLE OF THE SUBJECT
1.	Environmental Pollution and Toxicology
2.	Instrumentation and Methodology for Environmental Analysis
3.	Environmental Chemistry
4.	Waste Recycling and Resource Recovery Technology
5.	Fundamental Chemistry
6.	Environmental Nanoscience
7.	Environmental Microbiology
8.	Pollution Control Engineering and Bioremediation
9.	Solid and Hazardous Waste Management
10.	Introduction to Nanoscience
11.	Synthesis of Nanomaterials
12.	Characterization techniques for Nanomaterials
13.	Methods of Nanofabrication
14.	Nanomedicine
15.	Nanocomposite
16.	Nanobiotechnology
17.	Environmental Pollution Control
18.	Research and Teaching Methodology
19.	Agricultural Entomology and Pest Management
20.	Sustainable Agriculture
21.	Eco Friendly Bioproducts
22.	River Ecosystem Ecology
23.	Restoration Ecology and Management
24.	Biostatistics and Science Writing
25.	Freshwater Ecology
26.	Biological Invasions and Management
27.	Mini Project

Environmental Pollution and Toxicology

Unit I

8hrs

Introduction – Major Industrial Effluents – Sewage – Characteristics, Fertilizers – Pesticides and other agrochemicals – Heavy metals – Mercury, Cadmium, Chromium, Lead, Aluminum, Arsenic, Copper, Nickel and their toxicity – Ground water contamination – Soil Pollution – Environmental impacts of use and throw plastics - Hospital wastes and their environmental impacts

Unit II

8hrs

Air pollution – Sources – Oxides of Carbon, Nitrogen, Sulphur, Hydrocarbons – Transport and Diffusion – Effects of air pollutants on life and properties – Measurement of airborne contaminants-Acid rain – Ozone depletion – Global warming and their consequences – Radioactive Pollution – Thermal pollution – Noise pollution – Sources and effects – Fate of air, water and soil pollutants - Episodes of pollution

Unit III

8hrs

Principles and Methodologies for the quantitative analyses of TOC, chromium, cadmium, arsenic, mercury, copper, lead, nickel and zinc in waste water – Estimation of NO_x, CO₂, CO, SO₂ and SPM in air.

Unit IV

8hrs

General principles of toxicology - Scope of toxicology - Outlines of toxicological testing methods, cost effective bioassays - Toxicity and Probit Analysis - Bioassays – Mechanism of action of toxicants - Routes of exposure - Routes of entry of xenobiotics - Absorption and Translocation – Biotransformation - Combined action of toxicants - Factors influencing toxicity - Dose effect and Dose response relationship

Unit V

8hrs

Toxicity – Cytotoxicity, Immunotoxicity, Hepatotoxicity, Molecular toxicity, Neurotoxicity - Carcinogens, mutagens and teratogens. Ecotoxicology and human toxicology, Behaviour of toxicants in the environment – Occupational exposure to industrial toxicants - Bioaccumulation, Biomagnification – Toxic residues - Residual analytical methods - Safety evaluation of toxic chemicals

Reference

1. Josephy, P. D., Mannervik, B., de Montellano, B.O., 1997. Molecular Toxicology. Oxford University Press, UK.
2. Tomlin, C., 2000. The Pesticide Manual. 11th edition,. British Crop Protection Council. Several editions. updated every few (2-4) years.
3. Bryant, R., Bite, M., Hopkins, WL., 1999. Global insecticide directory, 2nd ed. Ed.. Ag. Chem. Inform. Services, Agranova.
4. Krishnan Kannan, K., 1997. Fundamentals of Environmental Pollution, S. Chand Company, New Delhi.
5. Sharma, B. K., Kaur, H., 2000. Environmental Chemistry, Goel Publishing House, Meerut, India.
6. Anderson, K., Scott, R., 1981. Fundamentals of industrial toxicology, Ann. Arbor. Science Publishing Inc. Michigam. USA.
7. Ecobicham, D., 2004. The basis of toxicity testing, CRC press, USA.

8. Prasad, D.N., Kashyap, V., 1999. Introduction to toxicology, S. Chand Company, New Delhi
9. De Matters, F., Smith, L., 1995. Molecular and Cellular Mechanisms of Toxicity CRC Press, USA
10. Dara, S.S., 2000. A text book of environmental chemistry and pollution control. S. Chand Company, New Delhi.
11. Sharma, P. D., 1993. Environmental Biology and Toxicology, Rastogi Publications, New Delhi.
12. A.G. Murugesan and C. Rajakumari, Environmental Science and Biotechnology – Theory and Techniques, MJP Publishers.
13. Nation, J. L., 2008. Insect Physiology and Biochemistry, Second Edition, CRC Press, USA.
14. Josephy, P. D., Mannervik, B., de Montellano, P.O., 1997. Molecular Toxicology, Oxford University Press, UK.
15. Finney, D. J., 1971. Probit Analysis. 3rd edition. Cambridge University Press, UK
16. Subramanian, M.A., 2004. Toxicology: Principles and methods, MJP Publishers.
17. APHA. 1975. Standard methods for the examination of waste water. AWWA, New York.
18. A.K. Gupta. Industrial Safety and Environment. 2013. University Science Press.

Instrumentation and Methodology for Environmental Analysis

Unit- I **8hrs**

Centrifugation: Low speed-high speed-ultra refrigerated centrifuges. Principles and operation methods of weighing devices- Preparation of buffers and stock solutions of media/ reagents- Preparation of normality- ppm- solutions. Microtome-Cryocutting-Sectioning-Staining, Haemocytometer

Unit –II **8hrs**

Chromatographic techniques- TLC- Electrophoresis: Polyacrylamide gel electrophoresis (PAGE) and agarose gel electrophoresis. Biosensors: Definition – components of biosensors- types of biosensors- Enzyme electrodes- Bacterial electrodes- Enzyme immunosensors- Environmental biosensors. Instrumentation techniques: HPLC, SEM, XRD, GC, UV, FTIR, DSC/TGA, TEM, AFM

Unit- III **8hrs**

Scientific research: Methods of scientific research- Preparation of review article- editing research paper- collection of literature- references- bibliography and thesis writing

Unit-IV **8hrs**

Principles of pollution analysis: Gravimetric Methods- Volumetric Methods- Solvent Extraction evaporations- Toxic metal pollutants analysis (Chromium, Mercury)- Air pollution analysis- Sampling Methods for Aerosols- Sampling of Gaseous Pollutants-Analysis of aerosols- Analysis of gaseous pollutants (SO₂, H₂S, NO₂-NO_x, CO-CO₂, ozone and NH₃)

Unit-V **8hrs**

Principles of Monitoring Methods- Analysis of Soil Quality- pH, EC, Total Nitrogen-Organic Carbon-C: N ratio – Water Quality- Residual Chlorine- Fluorides. Estimation of Phenols. Pesticide Analysis- Spectroscopic Analysis and GC- Noise Measurement – Sampling of Odors- Measurement of Odor.

References

- 1.Chatwal, G. and Anand, S. 1989. Instrumentation methods of chemical analysis. Himalayas Publishing House, Delhi.
- 2.Robinson, J.W. (ed) 1991. Practical Handbook of spectroscopy CRC Press, Boston.
- 3.Webster, J.C. (ed). 2005. Bioinstrumentation. John Wiley & Sons Inc., Singapore
- 4.Guruman, N. 2006. Research methodology for Biological Sciences. MJP Publishers, Chennai.
- 5.Palanichamy, S. Shunmugavelu, M. 2006. Research methods in Biological sciences. Sarojini for Palani paramount Publication. Anna Nagar Palani.
- 6.Cannel, J.P.1998. Natural products isolation, Humana Press New Jersey.
- 7.Harbone, J.B. 2003. Phytochemical methods. (5th Edition) Chapman &Hall, London.
- 8.Keith Wilson, 2000. A practical guide to clinical biochemistry.
- 9.Murugesan A.G. and Rajakumari C. Environmental Science and Biotechnology Theory and Techniques. 2009 (3rd Edition). MJP Publishers.
- 10.S.M. Khopkar. (2001). Environmental Pollution analysis. New Age International (p) Limited, Publishers

Environmental Chemistry

UNIT I

7hrs

Introduction to Environmental Science – Water, Air, Earth, Life and Technology – Ecology – Energy and Cycles of Energy – Human impact and Pollution – Atmosphere and Atmospheric chemistry – The Geosphere and Soil – The Biosphere

UNIT II

7hrs

Overview to Environmental chemical analysis – Classical methods – Spectrophotometric method – Electrochemical methods – Gas Chromatography – Mass spectrometry – Analysis of water samples – Analysis of sulfur dioxide – Analysis of Hydrocarbons

UNIT III

7hrs

Introduction to water pollution – Nature and types of water pollutants – Elemental pollutants, Heavy metals and Metalloids – Organic pollutants – Pesticides in water – Water treatment and water use – Sewage treatment – Removal calcium and other metals- Water Reuse and recycle

UNIT IV

7hrs

Particles in the atmosphere – Physical behavior of particles in the atmosphere – The composition of inorganic particles – Toxic metals – Radioactive particles – The composition of organic particles – Effect of particles – Control of particulate emissions

UNIT V

7hrs

Origin of Hazardous wastes – Transport of Hazardous wastes – Effect of Hazardous wastes – Fates of Hazardous wastes - Hazardous wastes in the Geosphere - Hazardous wastes in Hydrosphere - Hazardous wastes in Atmosphere - Hazardous wastes in Biosphere

References

1. Manahan SE, Environmental Chemistry (6th Ed.), Lewis Publishers, USA
2. Schwarzenbach, Rene P., Phillip M. Gschwend, and Dieter M. Imboden, Environmental Organic Chemistry, John Wiley & Sons, New York, 1993.
3. Simpson, Peter, Basic Concepts in Organic Chemistry—A Programmed Learning Approach, Chapman and Hall, London, 1994.
4. Solomons, T. W. Graham, Organic Chemistry, 6th ed., John Wiley & Sons, New York, 1998.
5. Sorrell, Thomas N., Organic Chemistry, University Science Books, Sausalito, CA, 1999.
6. Timberlake, Karen C., Chemistry: An Introduction to General, Organic, and Biological Chemistry, Benjamin/Cummings, Menlo Park, CA, 1999.
7. Vollhardt, K. Peter C. and Neil E. Schore, Organic Chemistry: Structure and Function, 3rd ed., W.H. Freeman, New York, 1999.

Waste Recycling and Resource Recovery Technology

Objectives:

To impart knowledge on waste recycling and resource recovery from wastes.

Unit I: Introduction

Solid waste – Sources – Domestic, industrial and agriculture sources- Industrial wastes- Mineral wastes – Identification waste – Minimizing options -Recovery and Recycle- Composting- Vermi composting – Incineration – Energy from waste- Pyrolysis, chemical processing- Legislative measures for garbage disposal.

Unit II: Fly Ash

Introduction- Nature- Direct Replacement of Cement- Waste Land Development- Soil Amendment to grow Crops- Utilization of Flyash In Afforestation, Limitation of Land Application of Fly Ash.

Unit III: Plastic Waste, Industrial Waste

Introduction – Amount and types of plastic waste – Recycling of plastic waste-cement manufacture from industrial solid waste – Paper industry waste – Calcium carbide industry waste.

Unit IV: Bio Fuels & Bio Ethanol

Bio ethanol production technologies- Bio hydrogen- its application – Methanogenesis from agroindustrial residues- Bio mass – Gasifier based power plants.

Unit V: Waste Water

Introduction reuse- Quality, the basic treatment processes – Benefits of reuse in agriculture – The costs of reuse projects and economic justification – Factors essential for the success of reuse projects- Case study.

Textbook:

1. Agarwal S.K. “Wealth from Waste”, Kul Bhushan Nangia, APH Publishing Corporation, New Delhi, 2005

References:

1. Nemerow N.L., “Industrial Water Pollution”, Addison – Wesley Publishing Company inc., USA, 1978
2. Wesley Eckenfelder Jr. W, Industrial water pollution control, McGraw Hill book Co, New Delhi, 1989.
3. Mahajan S.P. “Pollution Control in process industries”, Tata McGraw Hill Publishing Co Ltd., New Delhi, 1989.

FUNDAMENTAL CHEMISTRY

Unit I Inorganic chemistry –Zero group elements 5 Hrs (3L+2P)

Isolation of inert gases by physical and chemical methods – preparation and properties of xenon tetrafluoride, xenon hexafluoride, xenon oxytetrafluoride – uses of noble gases – clathrates and their uses.

Unit II Organic chemistry – Principles of reactions 6 Hrs (3L+3P)

Heterolytic and homolytic cleavage – nucleophiles and electrophiles – reaction intermediates – preparation and properties of carbonium ions, carbanions and free radicals – types of reactions – substitution, addition, elimination and polymerization reactions.

Unit III Physical chemistry – Photochemistry 7Hrs (4L+3P)

Definition – composition between thermal and photochemical reactions – Laws of photochemistry-Beer Lambert's law-Grothus Draper law-Einstein's law-Quantum yield-low and high quantum yield-determination of quantum yield-fluorescences, phosphorescence, thermoluminescence, chemiluminescence and bioluminescence – definition with examples – photosensitization.

Unit IV Polymer chemistry 7 Hrs (4L+3P)

Definition-Monomers, Oligomers, Polymers – Classification of polymers – Natural, synthetic, linear, cross linked and network – plastics, elastomers, fibres, homopolymers and Co-polymers. Thermoplastics – Polyethylene, Polypropylene, polystyrene, Polyacrylonitrile, poly vinyl chloride, nylon and polyester – Thermosetting plastics - :Phenol formaldehyde and epoxy resin – Elastomers – Natural rubber and synthetic rubber – Buna N, Buna – S and neoprene.

Unit V Applied chemistry 7 Hrs (4L+3P)

Lubricants – classification - criteria of good lubricating oils – synthetic lubricating oils – poly glycols and poly alkene oxides – greases or semi solid lubricants examples – solid lubricants – graphite. Preparation and uses of shampoo, nail polish, sun screens, tooth powder, tooth paste, boot polish, moth ball, chalk piece.

Suggested List of Exercises:

Books Studies:

1. R. T. Morrison, R. N. Boyd and S. K. Bhattacharjee, Organic Chemistry, 7th Edition, Pearson Prentice Hall, 2011.
2. S. H. Pine, Organic Chemistry, Tata McGraw Hill, 5th Edition, 2008.
3. Michael B. Smith, Jerry March, March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, John Wiley & Sons, 6th edition, 2007.

Books References:

1. L. Finar, Organic Chemistry, Vol. I & II, 5th Edition, Longman Ltd., New Delhi, 1975.
2. D. Nasipuri, Stereochemistry of Organic Compounds: Principles and Applications, 4th edition, New Academic Science Publisher.
3. Peter Sykes, Guidebook to Mechanism in Organic Chemistry (6th Edition), Longman Scientific & Technical, 1985
4. K.J. Laidler, Chemical Kinetics, Tata McGraw Hill
5. Gurdeep Raj, Chemical Kinetics, Goel Publishing House.
6. P.W. Atkins, Physical Chemistry
7. W.J. Moore, Physical Chemistry, Longmans
8. A.A. Frost and R.G. Pearson, Kinetics and Mechanism, Wiley Eastern, Pvt. Ltd.
9. F.W. Billmeyer, Text book of Polymer science, Wiley- Interscience
10. Fundamentals of Photochemistry – K.K. Rohatgi – Mukherjee (Revised Edition) New age International publications, Reprint 2002.

Environmental Nanoscience

UNIT 1

8hrs

Background to nanotechnology: scientific revolutions – types of nanotechnology and nano machines – atomic structure – molecules & phases – energy – molecular and atomic size – surfaces and dimensional space.

UNIT 2

8hrs

Nanomaterials Fabrication: Principles and Methods - Nanomaterials Fabrication-Specificity and Requirements in the fabrication methods of nanoparticles oxide-Semiconductor nanoparticles-metallics-Bimetallics and alloys-carbon based nanomaterials.

UNIT 3

8hrs

Membrane Process: Overview of membrane processes-transport principles for membrane processes-Membrane fabrication using nanomaterials-Nanoparticle Membrane reactors-Active membrane systems.

UNIT 4

8hrs

Nanocomposites: Introduction-Advantages and Disadvantages of Nano-sized Additions-Application of Nanocomposites-Areas of Application-Clay-based Nanocomposites.

UNIT 5

8hrs

Environmental Applications of Nanomaterials: Nanomaterials for Groundwater Remediation –Reactivity, fate and lifetime, Nanoiron reactivity, Reaction products, Intermediates and efficiency, Effects of competing oxidants, Delivery and transport issues, Injection methods and delivery vehicles.

References

- 1.Nanotechnology: basic science and emerging technologies – Mick Wilson, KamaliKannangara, Geoff Smith, Michelle Simmons, BurkhardRaguse, Overseas Press (2005).
- 2.Amorphous and Nanocrystalline Materials: Preparation, Properties, and Applications, A.Inoue, K.Hashimoto (Eds.) (2000)
- 3.Nanocomposite science and technology, PulickelM.Ajayan, Linda S.Schadler, Paul V.Braun, Wiley-VCH Verlag, Weinheim (2003).
- 4.Nanobiotechnology: Concepts, Applications and Perspectives, ChristofM.Niemeyer, / ChadA.Mirkin, (eds.), Wiley-VCH, Weinheim, (2004)
- 5.Bionanotechnology: Lessons from Nature, by: David S. Goodsell, Wiley-Liss. (2004).
- 6.Nanotechnology - Fundamentals and Applications. Manasikarkare.I.K. International Publishing HousinPvt.Ltd. New Delhi.

Environmental Microbiology

UNIT I: **8hrs**
hrsIntroduction – History of microbiology – Scope of microbiology- Concept of Microbial Ecology– Succession and Colonization of Microbes in Environment- Positive and Negative roles of Microbes in Environment- Atmosphere as habitat and medium for microbial dispersal – Air borne diseases – Air sanitation

UNIT II: **8 hrs**
Biogeochemical cycles – Carbon, Nitrogen, Sulfur, Phosphorus, Iron and other elements - Microbial Nitrogen fixation – Anabaena, Azospirillum and Rhizobium – Nitrogenase, Hydrogenase

UNIT III: **8 hrs**
Microbiology of waste water: Waterborne pathogens – Salmonella, Shigella, Vibrio cholera, Gastroenteritis, Escherichia coli, Hepatitis viruses, Chikungunya, Swine flu and Dengue. Tests for water quality – Microbiological water quality standards - Detection of faecal contamination - Detection of virus – Biological oxygen demand - Eutrophication – Microbial indicators of water pollution-Water purification and recycling process.

UNIT IV: **8 hrs**
Microbiology of Soil – Soil types and their microbes- Microbes in soil fertility- Humus- Microbial degradation of lignin – Tannin – Rhizobacteria- Microbial degradation of pesticides – Microbial interactions with inorganic pollutants – Microbial leaching of metals – Microorganisms in abatement of heavy metal pollution - Microbial composting of biowastes

UNIT V: **8 hrs**
Strategies in bioconversion - bioconversion of lignocelluloses into product-Biogas from wastes – Specific methanogenic activity – Microbial production of fuels: Ethanol, Methane and Hydrogen – Microbial production of biopolymers

References

1. Atlas & Bartha, 1981, Microbial Ecology and Fundamental Applications, The Benjamin Cummings Publishing Co
2. Grant and Long, 1981, environmental Microbiology, Blackie and Sons Ltd., BishopbridgeGlassgow
3. Ralph Mitchell, 1974, Introduction to Environmental Microbiology, Prentice Hall London
4. Cambell, 1983, Microbial control of pollution, Blackwell Scientific Publication
5. A.K. Chatterji , Introduction to Environmental Biotechnology, Prentice – Hall of India, Newyork
6. A.G. Murugesan and C.Rajakumari, 2005, Environmental Science and Biotechnology – Theory and Techniques, MJP Publishers
7. J.C. Fry et al., 1992. Microbial Control of Pollution, Cambridge University Press
8. K. Vijaya Ramesh, 2003, Environmental Microbiology, MJP Publishers, Chennai. ISBN No – 81-8094-003-9.
9. A.H. Patel. 2016. Industrial Microbiology. Trinity Press. ISBN 978-93-85750-26-7
10. R.C. Dubey and D.K. Maheswari, 1999. A Textbook of Microbiology. S. Chand and Company LTD, New Delhi. ISBN No – 81-219-1803-0.

POLLUTION CONTROL ENGINEERING AND BIOREMEDIATION

UNIT I: 8 hrs

Concept of pollution control and management – Characteristics of major industrial effluents – primary – secondary and tertiary treatment of effluents – Ion exchange – reverse osmosis – electro dialysis – colour removal from industrial effluents – Sludge treatment and disposal – Modelling of activated sludge process.

UNIT II: 8hrs

Working principles of the following reactors – Rotating Biological Contactors, Fluidized Bed Reactor, Trickling filter - Expanded Bed Reactor, Contact Digesters, Packed Column Reactors, UASB Reactor – Sequencing batch reactors – High Rate reactors – Microbial removal of nitrogen and phosphorus – Nutrient removal through biomass production – Hospital waste management – Air Pollution Control Strategies: Automotive and industrial emission control, greenhouse gases emission control– biological purification of contaminated air

UNIT III: 8hrs

Metal microbes interactions – Microbial immobilization and transformation of metals – Genetic aspects of heavy metal resistance – Anaerobic decomposition of organic matter – Pesticide biodegradation – Microbial leaching of metal – Biotechnological applications for pesticide waste disposal – Oil degradation by microbes – Aquatic macrophytes for waste water treatment – Biotechnology in soil pollution abatement

UNIT IV: 8hrs

Bioremediation General perspectives – Microbes for bioremediation – Bioremediation techniques– Advantages and disadvantages Bioremediation monitoring and case studies– Effluent irrigation in agriculture – phytoremediation: approaches and types, factors influencing phytoremediation – advantages and disadvantages – Microalgal species for aquaculture – Mass cultivation techniques – Harvesting and Drying of Algal Biomass – Bioaugmentation for commercial production of algae

UNIT V: 8hrs

Genetics of microbial bioremediation – Microbial genetic plasticity – Role of plasmids in bioremediation – Evolution barriers for new microbes – Enhancement of novel microbial degradative abilities – Genetics and gene manipulation –Transgenic microbes for treating toxic chemicals – Gene transfer in the environment – GEMS and biosafety – Ethics of microbial biotechnology – application of genetic engineering in bioremediation

References

1. Pradipta Kumar Mohapatra (2007), Text book of Environmental Biotechnology, I.K. International Publishing House Pvt. Ltd
2. Jogdand. S.N. (2003) Environmental Biotechnology, Himalaya Publishing House
3. Chatterji, (2003), Introduction to Environmental Biotechnology, Prentice Hall of India Pvt. Ltd
4. A.G.Murugesan and C.Rajakumari, Environmental Science and Biotechnology – Theory and Techniques, MJP Publishers
5. J.C. Fry et al., 1992. Microbial Control of Pollution, Cambridge University Press
6. C.S.Rao, (1997), Environmental Pollution Control Engineering, New Age International Pvt. Ltd, India
7. Dara.S.S. (2000), Environmental Chemistry and Pollution Control, S. Chand & Co., Pvt. Ltd

8. William C. Blackman, Jr, (1996), Basic Hazardous waste management (Ed.) CRC Press Inc
9. Sharon Mc Eldowney et al, (1993), Pollution Ecology Biotreatment – Longman Scientific & Technical, Harlow, England
10. Herber F. Lund – Industrial Pollution control handbook
11. Mahajan, S.P. Pollution control processing in industries
12. Trivedy, R.K. (1995). Encyclopedia of environmental pollution and control, Vol.2. Enviromedia
13. Jenkins,D & B.H.Olson, Waste water microbiology, Pergamon Press
14. Kaul, Nandy & Trivedy, (1989). Pollution control in Distilleries Enviromedia, India
15. P. Rajendran and P. Gunasekaran (2006) Microbial bioremediation, MJP publishers

Solid and Hazardous Waste Management

Unit 1

8hrs

Introduction: Sources and generation of solid waste, their classification and chemical composition; characterization of municipal solid waste; hazardous waste and biomedical waste. Effect of solid waste disposal on environment: Impact of solid waste on environment, human and plant health; effect of solid waste and industrial effluent discharge on water quality and aquatic life; mining waste and land degradation; effect of land fill leachate on soil characteristics and ground water pollution.

Unit 2

8hrs

Solid waste and Hazardous waste Management: Different techniques used in collection, storage, transportation and disposal of solid waste (municipal, hazardous and biomedical waste); landfill (traditional and sanitary landfill design); thermal treatment (pyrolysis and incineration) of waste material; drawbacks in waste management techniques. Types of industrial waste: hazardous and non-hazardous; effect of industrial waste on air, water and soil; industrial waste management and its importance; stack emission control and emission monitoring; effluent treatment plant and sewage treatment plant.

Unit 3

8 hrs

Resource Recovery : R- reduce, reuse, recycle and recover; biological processing - composting, anaerobic digestion, aerobic treatment; reductive dehalogenation; mechanical biological treatment; green techniques for waste treatment.

Unit 4

8hrs

Waste- to- energy : Concept of energy recovery from waste; refuse derived fuel (RDF); different WTE processes: combustion, pyrolysis, landfill gas (LFG) recovery; anaerobic digestion; gasification.

Unit 5

8 hrs

Integrated waste management: Concept of Integrated waste management; waste management hierarchy; methods and importance of Integrated waste management.: Life cycle assessment: Cradle to grave approach; lifecycle inventory of solid waste; role of LCA in waste management; advantage and limitation of LCA; case study on LCA of a product.

References

1. Asnani, P. U. 2006. Solid waste management. *India Infrastructure Report 570*.
2. Bagchi, A. 2004. *Design of Landfills and Integrated Solid Waste Management*. John Wiley & Sons.
3. Blackman, W.C. 2001. *Basic Hazardous Waste Management*. CRC Press.
4. McDougall, F. R., White, P. R., Franke, M., & Hindle, P. 2008. *Integrated Solid Waste Management: A Life Cycle Inventory*. John Wiley & Sons.
5. US EPA. 1999. *Guide for Industrial Waste Management*. Washington D.C.
6. White, P.R., Franke, M. & Hindle P. 1995. *Integrated Solid waste Management: A Lifecycle Inventory*. Blackie Academic & Professionals.
7. Zhu, D., Asnani, P.U., Zurbrugg, C., Anapolsky, S. & Mani, S. 2008. *Improving Municipal Solid waste Management in India*. The World Bank, Washington D.C.

INTRODUCTION TO NANOSCIENCE

UNIT I

8hrs

Scientific revolution- Atomic structures-Molecular and atomic size-Bohr radius – Emergence of Nanotechnology – Challenges in Nanotechnology - Carbon age–New form of carbon (from Graphene sheet to CNT).

UNIT II

8hrs

Influence of nucleation rate on the size of the crystals- macroscopic to microscopic crystals and nanocrystals - large surface to volume ratio, top-down and bottom-up approaches-self assembly process-grain boundary volume in nanocrystals-defects in nanocrystals-surface effects on the properties.

UNIT III

8hrs

Definition of a Nano system - Types of Nanocrystals-One Dimensional (1D)-Two Dimensional (2D) -Three Dimensional (3D) nanostructured materials - Quantum dots - Quantum wire-Core/Shell structures.

UNIT IV

8hrs

Surface energy – chemical potential as a function of surface curvature-Electrostatic stabilization- surface charge density-electric potential at the proximity of solid surface-Van der Waals attraction potential.

UNIT V

8hrs

Properties of Individual Nanoparticle - Metal Nanoclusters- Semiconducting Nanoparticle- Rare Gas and molecular Clusters- Method of synthesis - RF plasma- Chemical methods- Thermolysis - Pulsed Laser Methods.

References

1. M. Wilson, K. Kannangara, G Smith, M. Simmons, B. Raguse, *Nanotechnology: Basic science and Emerging technologies*, Overseas Press India Pvt Ltd, New Delhi, First Edition, 2005.
2. C.N.R.Rao, A.Muller, A.K.Cheetham (Eds), *The chemistry of nanomaterials: Synthesis, properties and applications*, Wiley VCH Verlag GmbH&Co, Weinheim, 2004.
3. Kenneth J. Klabunde (Eds), *Nanoscale Materials Science*, John Wiley & Sons, Inc, 2001.
4. C.S.S.R.Kumar, J.Hormes, C.Leuschner, *Nanofabrication towards biomedical applications*, Wiley –VCH Verlag GmbH & Co, Weinheim, 2004.
5. W. Rainer, *Nano Electronics and information Technology*, Wiley, 2003.
6. K.E.Drexler, *Nano systems*, Wiley, 1992.
7. G.Cao, *Nanostructures and Nanomaterials: Synthesis, properties and applications*, Imperial College Press, 2004
8. R. Cantor, P.R.Samuel, “Biophysical Chemistry”, W.H., Freeman & Co., 1985.
9. Watson, James, T.Baker, S.Bell, A.Gann, M.Levine, and R.Losick. “Molecular Biology of the Gene”, 5th ed., San Francisco: Addison-Wesley, 2000.
10. Alberts, Bruce, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter. *Molecular Biology of the Cell*. 4th ed. New York: Garland Science, 2002.
11. Branden, Carl-Ivar, and John Tooze. *Introduction to Protein Structure*. 2nd ed. New York: Garland Pub., 1991.
12. Creighton, E, Thomas, “Proteins: Structures and Molecular Properties”, 2nd Ed. New York: W.H. Freeman, 1992.
13. B.Lewin, “Genes IX”, International Edition. Sudbury: Jones & Bartlett, 2007.

SYNTHESIS OF NANOMATERIALS

UNIT I

8hrs

Synthesis of bulk nanostructured materials - Sol Gel processing- Mechanical alloying and milling - Grinding – high energy ball milling-types of balls-WC and ZrO₂-materials –ball ratio-limitations- melt quenching and annealing.

UNIT II

8hrs

Self Assembled Monolayers (SAM) - Vapour Liquid Solid (VLS) approach- Chemical Vapour Deposition (CVD) - Langmuir-Blodgett (LB) films - Spin coating - Electrochemical approaches: Anodic oxidation of alumina films, porous silicon and pulsed electrochemical deposition - Spray pyrolysis - Flame pyrolysis - Thin films - Lithography.

UNIT III

8hrs

Homogenous Nucleation -diffusion and surface controlled growth process - synthesis of metallic nanoparticles - semiconductor nanoparticles-metal oxide nanoparticles - vapor phase reactions - solid state phase segregation -Heterogenous nucleation - kinetically confined nanoparticles.

UNIT IV

8hrs

Evaporation-condensation - Vapor- liquid - solid (VLS) - VLS model - Nucleation and growth - surface and bulk diffusion – kinetics – growth of various nanowires –control of size –precursors and catalysts - single- and multi- wall CNT - Si nanowires – density and diameter – doping in nanowires.

UNIT V

8hrs

Thin films- Environment for thin film deposition (Gas and Plasma) - Introduction to vacuum technology-physical vapour deposition techniques (Reactive sputtering (DC and RF), laser ablation); Epitaxy-different types of Epitaxy - Lattice mismatch - Liquid Phase Epitaxy (LPE) - Molecular Beam Epitaxy (MBE)- Pulsed laser deposition (PLD) - Atomic layer deposition (ALD)

References

1. W. Gaddand, D.Brenner, S.Lysherski and G.J.Infrate (Eds), *Handbook of nanoscience, Engg and Technology*, CRC Press,2002.
2. G.Cao, *Nanostructures and Nanomaterials: Synthesis, properties and applications*, Imperial College Press, 2004.
3. J.George, *Preparation of thin films*, Marcel Dekker, InC., New York, 2005.
4. C.N.R.Rao, A.Muller, A.K.Cheetham (Eds), *The chemistry of nanomaterials: Synthesis, properties and applications*, Wiley VCH Verlag GmbH&Co, Weinheim, 2004

CHARACTERIZATION TECHNIQUES FOR NANOMATERIALS

UNIT I

8hrs

X-ray diffraction – powder diffraction–single crystal XRD –thin film analyses – determination of lattice parameters-structure analyses-rocking curve-strain analyses-phase identification-particle size analyses using Debye- Scherer`s formula - X-ray photoelectron spectroscopy (XPS)- Auger electron spectroscopy (AES)- low energy electron diffraction and reflection high energy electron diffraction (LEED, RHEED).

UNIT II

8hrs

Electron Microscopy (Basic principle only)-Scanning Electron Microscope (SEM) – Field Emission scanning Electron microscope (FESEM)-Atomic force microscopy (AFM), – Transmission Electron Microscopy (TEM)- Scanning Probe Microscopy (SPM)- scanning Tunnelling microscopy (STM), scanning near field optical microscopy (SNOM) .

UNIT III

8hrs

Infra red spectroscopy (IR) - UV-visible-Absorption and reflection-Raman Spectroscopy – Micro- Raman spectra--Tip enhanced Raman-Surface Enhanced Raman scattering (SERS) – Photoluminescence (PL)– Cathodeluminescence (CL).

UNIT IV

8hrs

Magnetic measurements using vibrating sample magnetometer (VSM) - magnetic force microscopy (MFM) – SQUID-Electron Paramagnetic Resonance (EPR)-Nuclear Magnetic Resonance (NMR) spectroscopy . Magnetic Resonance Imaging (MRI).

UNIT V

8hrs

Hall Effect - Quantum Hall effects and its applications –Four –Probe resistivity measurements- LED Characteristics-measurements of band gap - FET characteristics and its applications.

References

1. Ghuzang G.Cao, *Nanostructures and Nanomaterials: Synthesis, properties and applications*, Imperial College Press, 2004
2. Zhong Lin Wang, *Hand Book of Nanophase & Nanostructured materials* (Vol. I&II), Springer, 2002.
3. B.D. Cullity, *Elements of X-ray diffraction*, Addison Wesley, 1977
4. B.W.Moot, *Micro-indentation hardness testing*, Butterworths, London , 1956.
5. R.M.Rose, L.A.Shepard and J. Wulff, *The structure and properties of materials*, Wiley Eastern Ltd., 1966.
6. S.M. Sze, *Semiconductor Devices – Physics and Technology*, Wiley, 1985.
7. D. K. Schroder, *Semiconductor Material and Device Characterization*, John Wiley & Sons, New York, 1998.
8. C. Richard Brundle Charles A. Evans, Jr.Shaun Wilson, *Encyclopedia of Materials Characterization* Butterworth-Heinemann, 1992.

METHODS OF NANOFABRICATION

UNIT I

8hrs

Introduction to microelectronics fabrication and Moore's empirical law - Limitations – Si processing methods: Cleaning/etching, oxidation, Gettering, doping, epitaxy- semiconductor device road map –gate dielectrics, poly Si, high k dielectrics.

UNIT II

8hrs

Necessity of clean a room – different types of clean rooms – maintenance - Importance of Lithography techniques – Photolithography – Electron Beam lithography – Extreme UV lithography – X-ray Lithography – Focused ion beam Lithography (FIB).

UNIT III

8hrs

Types of etching - Reactive ion etching (RIE) - Wet chemical etching - Isotropic etching – Anisotropic etching- electrochemical etching.

UNIT IV

8hrs

Self-assembly, self-assembled monolayers, directed assembly, layer-by layer assembly, patterned growth - control of position and diameter - Combinations of top-down and bottom-up techniques: current state of the art - DNA self-assembly-Nanocrystals - Nanowires by catalytic (Au, Ni and Ag) and non-catalytic VLS approach.

UNIT V

8hrs

Nanoimprint lithography (NIL) –soft polymer photoresistive - moulding /replica - printing with stamp pads - RIE etching - patterned growth - control of position, size and density - Dip-pen lithography - setup - working principle.

References

1. M. Madou, Fundamentals of microfabrication CRC press, 1997.
2. G. Timp, Nanotechnology, AIP press, Springer Verlag, New York , 1999.
3. M.J.Jackson, Micro fabrication and Nanomanufacturing, CRC press.2005
4. G.Cao, Nanostructures and Nanomaterials: Synthesis, properties and applications, Imperial College Press, 2004
5. W.T.S Huck, Nanoscale assembly : Chemical Techniques (Nanostructure Science and Technology, Springer, 2005).
6. H. Schiff et al Fabrication of polymer photonic crystals using nanoimprint lithography, Nanotechnology 16, 261, (2005).
7. R.D.Piner, Dip-pen lithography, Science 283, 661(1999).

NANOMEDICINE

UNIT I

8hrs

Nanomedicine: Introduction – Basic of Nanobiotechnology in Relation to Nanomedicine – Landmarks in the Evolution of Nanomedicine – Classification of Nanobiotechnologies – Visualization and Manipulation on Nanoscale.

UNIT II

8hrs

Nanomolecular Diagnostics: Introduction – Nanodiagnostics – Nanoarrays for Molecular Diagnostics – Nanoparticles for Molecular Diagnostics – Nanobarcodes Technology – Nanoparticle-Based Colorimetric DNA Detection Method – Nanobiotechnology for Detection of Proteins – Nanobiosensors – Applications of Nanodiagnostics.

UNIT III

8hrs

Nanopharmaceuticals: Introduction – Nanobiotechnology for Drug Discovery & Development – Drug Delivery – Nanoparticle based Drug Delivery - Liposomes – Nanospheres – Nanotubes – Future Prospects of Nanobiotechnology based Drug Delivery

UNIT IV

8hrs

Role of Nanotechnology in Biological Therapies: Introduction – Vaccination – Cell & Gene Therapy – Antisense Therapy – RNA Interference - Nano-Oncology – Nanomicrobiology – Regenerative Medicine & Tissue Engineering - Nanodentistry - Nanobiotechnology & Nutrition.

UNIT V

8hrs

Miscellaneous Applications of Nanobiotechnology – Nanoimmunology – Nanobiotechnology for Public Health - Role of Nanobiotechnology in Biodefence - Worldwide Development & Commercialization of Nanomedicine – Research & Education in Nanomedicine – Future of Nanomedicine – Ethical, Safety and Regulatory Issues of Nanomedicine.

References

1. The Handbook of Nanomedicine – Kewal K. Jain, Humana Press (Springer) (2008)
2. Bio-Applications of Nanoparticles – Warren C.W. Chan, Lands Bioscience & Springer Science Business Media, LLC (2007)

NANOCOMPOSITE

UNIT I

Introduction of Nanocomposites: Nanocomposites- Definition - Nanocomposites past and present- Nomenclature -Solids -Atomic and molecular solids -Role of statistics in materials - Primary , secondary and tertiary structure - Transitions

UNIT II

Properties and features of nanocomposites: Physics of modulus - Continuum measurements - Yield -Fracture -Rubbery elasticity and viscoelasticity - Composites and nanocomposites - Surface mechanical properties -Diffusion and permeability -Features of nanocomposites - basics of polymer nano composites

UNIT III

Processing of nanocomposites: Viscosity -Types of flow -Viscosity - Experimental viscosity - Non-newtonian Flow -Low-viscosity processing -Solvent processing -Particle behavior -In situ polymerization -Post-Forming -Hazards of solvent Processing -Melt, high -shear, and direct processing

UNIT IV

Characterization of nanocomposites: Introduction to characterization - Experiment design - Sample preparation -Imaging -Structural characterization - Scales in nanocomposites - Texture -Electromagnetic energy -Visualization - Physicochemical analysis -Characterization of physical properties -Identification -Mechanical -Surface mechanical properties.

UNIT V

Applications of nanocomposites: Nanocomposites -Optical, structural applications - Nanoparticulate systems with organic matrices -Applications - Biodegradable protein nanocomposites -Applications Polypropylene nanocomposites - Application as exterior automatic components -Hybrid nanocomposite materials - Application for corrosion protection

References

1. Thomas E. Twardowski, Introduction to Nanocomposite Materials -Properties, Processing, Characterization, DesTech Publications, April 2007
2. Boston New York Washington, DC. and Woodhead publishing Ltd, England, 2006.
3. Parag Diwan and Ashish Bharadwaj. Nanocomposites Pentagon Press
4. Nanocomposite Science and Technology Pulickel M. Ajayan , Linda S. Schadler, Paul V. Braun, 2006, Wiley-VCH

NANOBIOTECHNOLOGY

Objectives:

Understand the bases for Introduction to Nanotechnology

The principle of surface Biology and Analysis of Biomolecular Structure.

UNIT I

Introduction to Nanotechnology – Scientific Revolutions – Types of Nanotechnology and Nanomachines – Nanotechnology Products and Applications – Future Applications of Nanotechnology – Risks of Nanotechnology.

UNIT II

Nanobiotechnology Overview – Nanobiometrics – Introduction – Lipids as nano-bricks and mortar – Biocompatible Inorganic Devices - Cell-Nanostructure Interactions - Structure information-DNA – Nanostructured Systems from Low-Dimensional Building Blocks.

UNIT III

Protein-based Nanostructures – S-Layers – Engineered Nanopores – Microbial Nanoparticle Production – Magnetosomes-Nanoscale Magnetic Iron Minerals in Bacteria – Polymer Nanocontainers – Biomolecular Motors Operating in Engineered Environments – Nanoparticle-Biomaterial Hybrid Systems for Bioelectronic Devices and Circuitry.

UNIT IV

DNA-Protein Nanostructures – DNA-Templated Electronics – Biomimetic Fabrication of DNA-Based Metallic Nanowires and Networks – Mineralization in Nanostructured Biocompartments: Biomimetic Ferritins for High-Density Data Storage - DNA-Gold-Nanoparticle Conjugates.

UNIT V

Surface Biology: Analysis of Biomolecular Structure - Application of Nanoparticle in Biomedical research: Introduction – Nanotechnologies for Cellular and Molecular Imaging – Nanoparticles for Cancer Drug Delivery – Bioconjugated Silica Nanoparticles for Bioanalytical Applications - Impact of Biomedical Nanotechnology – Nanobiomedical Technology: Financial, Legal, Clinical and Societal Challenges to Implementation

References

1. Nanobiotechnology: Concepts, Applications and Perspectives – Christof M. Niemeyer, Chad A. Mirkin, John Wiley & Sons Inc (2004)
2. Nanofabrication Towards Biomedical Applications – Challa S.S.R. Kumar, Josef Hormes, Carola Leuschner, John Wiley & Sons Inc (2005)
3. Nanotechnology: Basic Science and Emerging Technologies – Michael Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Buckhard Raguse, Chapman & Hall/CRC Press (2002)

Environmental Pollution Control

Unit – I : Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

Unit –II : Industrial wastewater Management: – Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

Unit – III : Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of Land filling.

Unit – IV : Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

Unit – V: Hazardous Waste: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste- Disposal and Control methods.

Text Books

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

Research and Teaching Methodology

Objective:

The main aim of this study is to understand the scope, depth and the overall direction of the research and teaching methods.

UNIT I (12hrs)

Significance of Life Science Research – Types of Research – Formation of Research Problem –Formulation of Hypothesis – Sources of Data – Methods of Data Collection – Sampling design: Random and Non-random.

UNIT II (12hrs)

Meaning of Research - Objectives of Research - Types of Research - Research Approaches Significance of Research - Research and Scientific Methods - Criteria of Good Research - Funding agencies- Choosing the Research Problem- Layout of the Research Report – Types – Precautions in writing Research Reports – Footnotes Bibliography- bibliographic software

UNIT-III (12hrs)

Statistical analysis: Tests of Hypothesis- Parametric and Non-Parametric test: 't' and 'f' Test ANOVA – χ^2 Test-statistical software including SAS, SPSS, sigma and origin

UNIT-IV (10hrs)

Basic Correlation: Definition, Meaning- Correlation types: Simple, Partial and Multiple Correlation - Regression: Meaning - Linear Regression- Difference between Correlation and Regression.

UNIT-V (14hrs)

Methodology of teaching:Teaching- Objective of teaching, Phase of teaching- Teaching methods: Lecture method, Discussion method, Discovery learning, Inquiry, Problem solving method, Project method Seminar, Integrating ICT in teaching: Individualized instruction , Ways for effective presentation with power point –Documentation – Evaluation: Formative, summative, & Continuous and comprehensive evaluation- Later adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral development- Teaching Later Adolescents.

References:

1. Sampath, K., Pannerselvam, A. & Santhanam, S. (1984). Introduction to education and technology. (2nd reviseded.). New Delhi: Starting publishers.
2. Sharma, S.R. (2003). Effective classroom teaching modern methods, tools and techniques. Jaipur:Mangal:Deep.
3. Vedanayagam, E.G. (1989). Teaching Knowledge for college teachers. New york :Sterling Publishers.
4. Berg, B. L., Lune, H., 2004. Qualitative research methods for the social sciences, Pearson Boston.
5. Kothari, C.R., 2004. Research Methodology Methods and Techniques, New Age International

6. Merriam, S. B., 1998. Qualitative Research and Case Study Applications in Education. Revised and Expanded from " Case Study Research in Education.", Jossey-Bass Publishers, Sansome St, San Francisco, CA.
7. Bogdan, R.C., Biklen, S. K., 1998. Qualitative research in education. An introduction to theory and methods, Allyn & Bacon, A Viacom Company, MA 02194.
8. Davis, M., 1997. Scientific Papers and Presentations|| San Diego: Academic Press.
9. Isaac, S., Michael, W., 1971. Handbook in research and evaluation, (2nd ed.), San Diego, USA.
10. McDonald, J. H., 2009. Handbook of biological statistics, Vol. 2, Baltimore, Sparky House Publishing. MD, USA.
11. Gomez, K.A., Gomez, A.A., 1984. Statistical procedures for agricultural research, John Wiley & Sons.
12. Townend, J., 2012. Practical statistics for environmental and biological scientists, John Wiley & Sons.

Agricultural Entomology and Pest Management

Pests and diseases are one of the most important factors affecting crop production. Proper management is critical in order to avoid damages, meet regulatory standards, protect the environment and decrease pesticide resistance. This course focuses on pest and disease management in vegetables, greenhouse crops and flowers. However, the principles that are discussed in this course are relevant also for many other crops.

Objectives

1. To learn about agriculturally important pests.
2. To learn the different methods to avoid occurrence of pests.
3. To study the principles of biological control and pesticides, their properties and how to wisely use them.

UNIT I

Introduction to Insects; Insect Classification and Agricultural Pests; General anatomy of insects: Digestive system, Respiratory system, Circulatory system, Reproductive systems of male and female, Excretory system, Nervous system, Endocrine system. Economic importance of insects: Harmful, beneficial and productive insects.

UNIT II

Insect Behaviour and Reproduction: Mechanoreception – Mechanical stimuli, detection and processing; Thermoreception; Chemoreception; Semiochemicals; Vision/light reception-Reproduction.

UNIT III

Pest management - Sampling and monitoring arthropods - Methods of sampling and monitoring, Sampling plan – components & types; Insecticides – Types and formulation; Classification of insecticides on the basis of their chemical nature, mode of entry and mode of action. Application of insecticides; Problems associated with using insecticides - Toxicity to humans and wildlife, Resistance to insecticides.

UNIT IV

Integrated pest management – Concepts and principles; Components of IPM – Ecological aspects of pest management, Host plant resistance and biological components of IPM – Host plant resistance, biological control predators, parasitoids, microbes (fungi, bacteria, virus), entomopathogenic nematodes. Pest management through botanicals, behavioural modification and radiation technology.

UNIT V

Spray application techniques - Contact pesticides, Systemic insecticides and Translaminar insecticides, spray application, types nozzle selection, spray pressure and sprayer capacity. Biotechnology approaches and IPM case studies - Biotechnology approaches in IPM; IPM case studies - field crops and pulses (Paddy), Commercial crops (Cotton and sugarcane), vegetable (Tomato) and fruits (Mango).

Text books:

1. Richards, O.W., Davies, R. G., 1977. Imms' general textbook of entomology. Volume 2: classification and biology, Springer, pp. 388.
2. Whitten, M.J., 1992. Pest management in 2000: what we might learn from the twentieth century In: Kadir, A.A.S.A. (Ed.), Pest Management and the Environment in 2000. C.A.B.I., Wallingford, pp. 9-44.
3. Hall, F. R., Menn, J. J., 1998. Biopesticides: Use and Delivery (Methods in Biotechnology), Humana Press, 1st Edition, pp 640.
4. Pedigo, L. P., Rice, M. E., 2006. Entomology and Pest Management, 5th edn. Upper Saddle River, NJ, USA.
5. Harris, J., Dent, D., 2001. Priorities in Biopesticide Research and Development in Developing Countries (Biopesticides), CABI Publ.
7. Burgess, H.D., 1981. Microbial control of pest and diseases, Academic press, New York.
8. Hunter-Fujita, F. R., Entwistle, P. F., Evans, H. F., Crook, N.E., 1998. Insect Viruses and Pest Management, John Wiley, New York, pp. 620.
9. Ramakrishna Ayyar, T., 1940 Handbook of economic Entomology for South India, Government Press, Madras [Chennai], pp. 528.

Sustainable Agriculture

Sustainable agriculture is farming in sustainable ways (meeting society's food and textile needs in the present without compromising the ability of future generations to meet their own needs) based on an understanding of ecosystem services, the study of relationships between organisms and their environment.

Objectives

1. To achieve environmental health by meeting current needs without sacrificing future needs.
2. To attain economic profitability by sustainable use of energy sources along with renewable energy production and consumption
3. To adopt labour practices along with social and economic equity.

Unit I

12 hours

Fundamentals of Agronomy - Importance of agriculture, Agricultural classification of crops, Soil and climatic requirements, varieties, cultural practices, special systems of cultivation, harvesting and processing of major crops, Soil productivity and fertility. - Crop nutrition - nutrients -classification - Nutrient sources - organic manures -fertilizers – biofertilizers; Irrigation - methods - drip and sprinkle irrigation systems. Water management of different crops - rice, banana and vegetables.

Unit II

12 hours

Plant Breeding and Seed technology - Morphology and systematics of crop plants - General features - morphology of roots, stem, leaves, flowers, fruits and seeds .Introduction to field crops - Classification of field crops. Principles of plant breeding - Modes of reproduction, Sexual, Asexual, Apromixis and their classification; Modes of pollination, genetic consequences, differences between self and cross pollinated crops; Methods of breeding. Seed Technology - definition-structure of a seed-seed development process, Definition, Characters of good quality seed, Factors affecting seed quality - ecological influences , packing practices, harvest and post-harvest handling, Genetic and agronomic principles of seed production, Seed testing procedures for quality assessment- Physical, Purity, germination and viability test.

Unit III

12 hours

Fundamentals of organic farming - Conventional, sustainable, and alternate agriculture- Alternate agricultural systems- biodynamic farming, natural farming, organic farming, permaculture, homa farming, and other formslimitations- Modernization of agriculture and its relation to sustainability. -Natural resource management as a part of sustainable resource management -crop production practices; Organic agriculture - Organic farming and food security-Principles of organic farming. Tools and practices of organic farming: Planned crop rotation, Green manures and cover crops, Manuring and composting, multiple cropping.Intercropping in relation to maintenance of soil productivity Farming System Approach for Sustainable Crop Production.

Unit IV

12 hours

Farming System Approach for Sustainable Crop Production - crop production, different cropping systems; Cropping pattern - Multiple cropping and various forms- advantages and disadvantages- Intercropping- ecological basis of intercropping systems- types; Crop planning, crop calendar and cropping scheme preparation-factors affecting cropping schemes. Plant interactions- Allelopathy, Competition; Farming systems- components- Livestock-poultry- aquaculture- apiculture- sericulture. Incorporation of components of Integrated farming system in homestead farming. Integrated farming system (IFS) models for uplands and low lands for sustainable and organic agriculture- Evaluation of farming systems.

Unit V

12 hours

Government Policies and Programmes related to agriculture – National Agricultural Policy in brief; Agricultural policies regarding land and labour; Agricultural policies regarding seeds - National Seeds Policy -varietal development and plant variety protection - seed production - quality assurance - seed distribution and marketing - infrastructure facilities - transgenic plant varieties - import of seeds and planting material - export of seeds -promotion of domestic seed industry Agricultural policies regarding fertilizers - Fertilizer pricing policy - payment of subsidy. Agricultural policies regarding plant protection chemicals - pesticide production and consumption in India - protection of consumers from adverse impacts of pesticides. Agricultural policies regarding irrigation, machinery, technology.

Text Books:

1. Balasubramanian, P and Palaniappan, S.P. 2001. Principles and Practices of Agronomy
2. AgroBios(India)Ltd., Jodhpur.
3. Cox, G.W and Atkins, M.D. 1979. Agricultural Ecology : An Analysis of World Food Production Systems. W.H. Freeman and Company, San Francisco
4. De, G.C.1989.Fundamentals of Agronomy. Oxford & IBH Publishing Co., New Delhi.
5. Havlin, J. L., Beaton, J. D., Tisdale, S.L., and Nelsothn, W.L. 2006. Soil Fertility and Fertilizers: An Introduction to Nutrient Management (7 ed.). Pearson Education, Delhi.
6. Chalam, G.V., J. Venkateswarlu. 1966. Agricultural Botany in India-Vol. 1. Asia publishing house, Bombay, New Delhi
7. Daniel Sundararaj, D and G. Thulasidas, 1993. Botany of field crops. Macmillan India Ltd., New Delhi.
8. Palaniappan, S.P and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub., Jodhpur.
9. Government of India. Five year Plan Documents.
10. Government of India.Economic Survey. Published by Planning Commission (various issues)
11. Government of India.Economic Review. Published by State Planning Board (various issues).

Eco friendly Bioproducts

It is essential to develop alternative technologies to prevent any further damage health and the environment. Speeding their implementation can benefit our environment and truly protect the planet. Explore the goals of green technology, introducing sustainable living, develop renewable energy and reduce waste.

Objective:

1. To provide knowledge on biofertilizer
2. To develop students technical skills on bio fertilizer production

Unit I General Biofertilizers

12 Hours

Bacterial, fungal and algal biofertilizers; mycorrhiza -types-endo, ectomycorrhiza and orchidaceous mycorrhiza, Problems and prospects of biofertilizers. Rhizobium- Physiology, Rhizobium interactions, mass cultivation

Unit II Production of Biofertilizers

12 hours

Largescale production of biofertilizers, Blue green algae, VAM fungi- Field application of biofertilizers - method of application; Chlorella biofertilizer-growth parameters-Mushroom cultivation.

Unit III Bacterial Biofertilizers

12 hours

Cyanobacteria as biofertilizers – Azolla- Bacterial biofertilizers - Mass production of Azospirillum, Azotobacter and Phosphobacteria; N₂ fixation - Phosphate solubilization and mobilization.

Unit IV Biopesticides

12 hours

Definition, kinds and commerce of biopesticide, Bacillus thuringiensis, insect viruses and entomopathogenic fungi – its characters, physiology, mechanism of action and application of bioinsectides - neem and related natural products.

Unit V Vermicompost Technology

12 hours

Introduction to vermiculture, biology, economic important, their value in maintenance of soil structure, production of organic fertilizers by vermiculture- Earthworm farming, Extraction (harvest), vermicomposting- vermiwash collection, composition and use harvest and processing.

Suggested List of Exercises:

Books Studies:

1. Altman, A., 1997. Agricultural biotechnology, CRC Press.
2. Ariëns, E.J., Van Rensen J., Welling, W., 1988. Stereo selectivity of pesticides. Biological and chemical problems. Chemicals in agriculture. Volume 1, Elsevier Science Publishers, The Netherland.
3. Blackburn, R.S., 2009. Sustainable textiles: Life cycle and environmental impact. Elsevier Science Publishers, The Netherland.
4. Board, N., 2004. The complete technology book on vermiculture and vermicompost CRC Press.
5. Costanza, R., Norton, B.G., Haskell, B. D., 1992. Ecosystem health: new goals for environmental management, Island Press.USA.
6. Kannaiyan, S. 2002. Biotechnology of Biofertilizer, Narosa Publishing House, New Delhi.

Book References:

1. Franklin R.H., Julius, J.M. 1999. Biopesticides - Use and Delivery. Humana Press Inc, USA.
2. Purohit, S.S. 2003. Agricultural Biotechnology, Agrobios, India.
3. Nutman, P.S. 1976. Symbiotic nitrogen fixation in plants, Cambridge Univ. Press, London.
4. Cavaco-Paulo, A., Gubitz, G., 2003. Textile processing with enzymes Elsevier Science Publishers, The Netherland.
5. Chouhan, N., Kumar, A., Sharma, A., Ameta, R., 2013. Eco-Friendly Products. Green Chemistry: Past, Present, and Future: CRC Press.
6. Croft, B.A., 1990. Arthropod biological control agents and pesticides. John Wiley and Sons Inc., UK.
7. Entwistle, P.F., Cory, J., Bailey, M., Higgs, S., 1993. *Bacillus thuringiensis*: an environmental biopesticide: theory and practice, John Wiley and Sons Inc. UK. (epnt), CBS Publishers and Distributors, New Delhi.
7. Yadav, A.K., Motsara M.R and Raychaudhuri S., 2001 Recent Advances in Biofertilizer Technology, SPURT publication, New Delhi.

River Ecosystem Ecology

Preamble: The goals for this course are to gain an understanding of: 1) major physical and biological features of streams and rivers, 2) the range of diversity of running waters around the world, 3) fundamental processes producing patterns of riverine structure and function, and 4) critical issues associated with the conservation and management of streams and their biota.

Objective:

The main aim of the course is to teach the Stream/River ecology.

To provide scientific knowledge on Stream/River management.

Unit 1

Introduction – Stream order – Stream flow – Hydrology- Flow alteration- Environmental Flow- Fluvial Geomorphology – Discharge – Channel Morphology.

Unit 11

Stream water chemistry – Nutrient dynamics – Nutrient pollutions –Scaling of Sediment dynamics in the River Environment– Sediment Management - Influence of chemical factors on stream / river biota.

Unit 111

Stream / River ecological theories – River continuum concept – importance of connectivity in stream / Riverine Ecology- River Fragmentation- Biogeochemistry of NPC (nitrogen, phosphorus, carbon) – Organic matter budgets.

Unit 1V

Biotic interactions – Terrestrial aquatic linkage. Primary producer – Heterotrophic energy – Source in stream/river – Trophic relationships – Drift composition and periodicity – Functional basis of drift – Riparian vegetation.

Unit V

Stream/River management – River modifications – Dams and impoundments – Alien species – Climate change – Recovery and restoration of running waters.

Reference Books:

1. Nancy D. Gordon, Thomas A. McMahon, Brian L. Finlayson, Christopher J. Gippel, Rory J. Nathan. Stream Hydrology: An introduction for Ecologists.
2. Barbara A. Hauser. Drinking Water Chemistry: A Laboratory Manual.
3. Richard F. Hauer, Gary Lamberti. Methods in Stream Ecology: Volume 1: Ecosystem Structure.
4. Walter K. Dodds and Matt R. Whiles. Freshwater Ecology: Concepts and Environmental Applications of Limnology.
5. David J. Allan. Stream Ecology: The Structure and Function of Running Waters.
6. Philip J. Boon, Paul J. Raveen. River Conservation and Management.
7. Gary J. Brierley and Kirstie A. Fryirs (2005) Geomorphology and River Management: Applications of the River Styles Framework. Blackwell Publishing, Oxford, UK, 398pp.
8. Kathleen Weathers, David Strayer, Gene Likens. Fundamental of Ecosystem Science.
9. Vannote et al . The River Continuum Concept.
10. Allan, J. David, Castillo, Maria M. Stream Ecology: Structure and function of running waters.

RESTORATION ECOLOGY AND MANAGEMENT

Preamble: The primary goal of this course is to develop critical thinking skills in the application of ecological principles to restoration.

Objective:

1. To understand the ecological concepts relevant for restoring ecosystems and critically think about the scientific/logistic challenges of applying these concepts into a restoration plan.
2. Students will describe the role of key ecological concepts in restoration

Unit I

Restoration Ecology - Definition, principles, concepts and strategies.(long term vs. short term); physical, chemical and biological restoration; role of ecological principles in restoration, role of pioneer species in restoration and holistic approach in restoration.

Unit II

Restoration of natural resources; restoration of river corridor, water resources and mine spoils. Approaches to Flood Plain Management, Concepts and Programs related to Restoration and Management of Lakes, Rivers and streams, Riverine = Riparian ecosystem and Wetlands, Fluvial restoration.

Unit III

Planning and evaluating aquatic ecosystem restoration — Project planning, Purpose of evaluation, Selecting assessment criteria and synthesizing data. Introduction to watershed, concept and significance. Physical and hydrological characteristics of watershed. Drain — line treatment; Area treatment — Goals, features and watershed as unit of sustainable development.

Unit IV

Integrated Aquatic Ecosystem Restoration- Introduction, Institutional barriers to Integrated Aquatic Restoration, Importance of Integrated restoration to wildlife, Appropriate scale for restoration, Use of Historical records in reconstructing watersheds. Impact of human activities on water resources, climate change threats to water quality, Shifts in freshwater ecosystems

Unit V

National restoration goals, Policy and Program. redesigning for restoration Integrated Water Resource Management (IWRM),. Role of. public participation, government agencies and NGOs in conservation and restoration; environmental education and its role in conservation and restoration. Finish Biotic restoration Landscape ecology and restoration Finish monitoring and adaptive management

Reference Book

1. John Cairns Jr., 1992. Restoration of Aquatic Ecosystems - Science, Technology and Public Policy. National Academy Press. Washington D.C.
2. Adamus, P.R., Clairain, E. J., Smith R.D., Young R. E., 1987. Wetland Evaluation Technique (WET). Vol II. Methodology Operational Draft. U.S. Army Corps of Engineers waterways Experiment Station, Vicksburg, Miss.
3. Barker, LA and E. B. Swain, 1989. Review of lake management in Minnesota. Lake Reservoir Manage. 5:1-10.

4. Young, T. P. 2000. Restoration ecology and conservation biology. *Biological Conservation* 92: 73-83.
5. Hobbs, R. J. and Harris, J. A. 2001. Restoration ecology: repairing the Earth's ecosystems in the new millennium. *Restoration Ecology* 9: 239-246.
6. Van Diggelen et al. 2001. Ecological restoration: state of the art or state of the science? *Restoration Ecology* 9: 115-118.
7. Ehrenfeld, J. G. 2000. Defining the limits of restoration: the need for realistic goals. *Restoration Ecology* 8: 2-9.
8. McClanahan, T. R. and Wolfe, ft W. 1993. Accelerating forest succession in a fragmented landscape: the role of birds and perches. *Conservation Biology* 7: 279-288.
9. Palmer et al. 1997. Ecological theory and community restoration ecology. *Restoration Ecology* 5: 291-300.
10. Cairns, J.Jr., and T. V. Crawford, eds. 1991. *Integrated Environmental Management*. Lewis Publishers, Chelsea, Mich. 214 pp.

Biostatistics and Science writing

Course overview:

Biostatistics is essential to analyse biological variations by the interpretation of results obtained from various research studies. This course would help in acquiring knowledge on the statistical tools relevant for the study. Science communication is a rapidly expanding area and meaningful engagement between scientists and the public requires effective communication. Contents of this course would enable research scholars to get started with science writing and effective communication

Objectives:

to understand the basic concepts and utility of common statistical techniques for biological data.

to stress on the importance and appropriateness of statistical methods, their assumptions, validity and interpretation.

to understand the methods of communicating science research to the community.

to use writing for the purposes of reflection, action and participation in academic inquiry.

Unit I

6 Hrs

Introduction to Biostatistics - population, sample, variable, parameter, primary and secondary data, screening and representation of data, frequency distribution, tabulation, bar diagram, histograms, pie diagram.

Unit II

10 hrs

Mean, median, mode, quartiles and percentiles, variance, standard deviation, coefficient of variation; Probability and distributions- definition of probability (frequency approach), independent events. Addition and multiplication rules, conditional probability.

Unit III

10 hrs

Correlation and Regression analysis: Correlations and regressions-: Relation between two variables, scatter diagram, definition of correlations, curve fitting, principles of least squares, Two regression lines, Karl Pearson's coefficient of correlation, Rank correlation, chi-square test for independence, P-value of the statistic, confidence limits, one way analysis of variance.

Unit IV

6 hrs

Introduction to concepts research communication - popular science writing genres, Components of research article – various types and styles of writing - opinion – correspondence – Research communication – research article – review article.

Unit V

5 hrs

Report writing scholarly and popular media - disciplinary relevance - effective drafting techniques. – Peer review process - Plagiarism - publication ethics – copyright and use of publication - Creative Commons

Text Book/Reading material

1. Gurumani, N. 2010 An introduction to Biostatistics. MJP Publishers. Chennai. 376 pp.
2. Rao, P.S.S S and J. Richard 2012 Introduction to Biostatistics and Research Methods (Fifth Edition) PHI Learning Private Limited. 322 pp.
3. Banerjee, K. P. 2007 Introduction to Biostatistics. S Chand publishers, New Delhi.
4. Ramakrishnan, P. 2015 Biostatistics Saras publication, 416 pp.

Reference

1. Pagano M. and Gauvreau, K, 2000 Principles of Biostatistics, Duxbury Press, USA.
2. Turabian, K. L. 2007 A Manual for Writers of Research Papers, Theses, and Dissertations 7th edition. University of Chicago Press. 470 pp.

Freshwater Ecology

Course Overview This course will develop the principles of aquatic ecology, with a focus on their application to freshwater ecosystems (streams, rivers, wetlands, and lakes). This course aims at providing a comprehensive understanding of all the major element cycles, patterns of energy flow through ecosystems, and the links between ecosystem structure and function so that we can critically evaluate how complex processes (climate change, watershed urbanization) may directly or indirectly impact aquatic ecosystems.

Objectives:

To understand the interaction of biotic and abiotic factors in aquatic systems.

To have an overview of the role of hydrological cycle and importance of aquatic systems.

To critically evaluate the complexity of ecosystem processes (nutrient distribution, impact of climatic change) in aquatic ecosystems

To impart knowledge on various threats and conservation strategies.

Unit I

10 Hrs

Introduction to Aquatic ecology – Hydrological cycle - Properties of Water – Stratification and Mixing Classification – biotic and abiotic components. Biotic integrity.

Unit II

8 Hrs

Energy and Trophic Dynamics - Primary production in streams, rivers, and lakes - Energy transfer – modification of organic matter - Stream metabolism

Unit III

10 Hrs

Various Freshwater bodies – streams, rivers, lakes Swamps and marshes: Physicochemical conditions. Nutrient cycling. Biotic components. Origin and characteristics of river. Functions. Biological productivity. watershed and water drainage.

Unit IV

9 Hrs

Major threats to freshwater systems - Impact of dams and fragmentation on river ecology. River continuum concept. Pollution and eutrophication. Climate change implications on freshwater systems. Habitat quality and Biomonitoring potential

Unit V

7 Hrs

Conservation and Management of aquatic ecosystems – role of government and agencies – Restoration ecology - Ecological concepts of restoration ecology - Barriers to effective management

Text Book/Reading material

1. Dey. S and B. Nasrin 2014 Ecology of Aquatic systems. Scientific International (Pvt.) Ltd.
2. Munshi J. D., and J. Datta 2015 Fundamentals of Limnology. Astral Publisher.
3. Agarwal. S.C., 1999 Limnology 4th edition CBS Publishers.

Reference

1. Allan, J.D. and Castillo, M.M. 2009. Stream Ecology (Second Ed.). Springer, Netherlands.
2. Keddy, P.A. 2000. Wetland Ecology. Principles and Conservation. Cambridge University Press, Cambridge.
3. Dodds. W and W. M. Whiles 2010 Freshwater Ecology 2nd Edition Concepts and Environmental Applications of Limnology. Academic Press. 829 Pp.
4. Closs, G., Downes, B and A. Boulton 2004 Freshwater Ecology: A Scientific Introduction EPZ Edition
5. Falk, D. A., Palmer, M. A. et al. 2006. Foundations of Restoration Ecology. Island Press, Washington, DC.
6. Frid C and M Dobson 2013 Ecology of Aquatic Management Second Edition. Oxford University Press 352 pages

Biological Invasions and Management

Course Overview

Invasive species are among the world's worst threats to biodiversity and is likely to cause economic and environmental damage. This course aims to provide an overall understanding of the impact of invasive species and its management. The important aspect of this course is to extend the learning to help in protecting the species and ecosystems from the impact of invasive species.

Objectives

To learn the basic concepts of invasive species and their impacts

To understand the patterns of invasion and traits of successful invasive species

To develop concepts based on the information available from various invasion models

To design and develop management measures to control exotic invasive species

Unit I

8 Hrs

Biological invasions – invasive species: impact, overview of the problem and modes of exotics spread both historically and currently, political impacts.

Unit II

6 Hrs

Accidental introductions - Aquatic and terrestrial environments - Human mediated spread and other intentional introductions - Epidemics and epizootics

Unit III

8 Hrs

Characteristics of successful invasive species - Community and ecosystem - structure and function - Disruption of normal ecosystem function by exotics

Unit IV

8 Hrs

Patterns and dynamics of spread of invasive species – overview of invasion models – Case studies – Biosecurity failures - Feral Cat Management in Tasmania – African cat fish in India.

Unit V

10 Hrs

Invasive species management – organizations – IUCN – Invasive Species Specialist Group (ISSG) – National biodiversity authority (NBA) - methods of invasive species control – awareness and strategies

References:

1. Shigesada N and K. Kawasaki, 1997, Biological Invasions: Theory and Practice , Oxford University Press, Oxford.
2. Simberloff D 2013 Invasive Species: What Everyone Needs to Know. Oxford University Press,. 352 pp
3. Lockwood, Julie L., Martha F. Hoopes and Michael P. Marchetti. 2007. Invasion Ecology. Malden, MA: Blackwell Publishing.
4. Mooney, Harold A. and Richard J. Hobbs. 2000. Invasive Species in a Changing World. Washington: Island Press.

**Manonmaniam Sundaranar University
Tirunelveli**

Ph.D. Course work in Folklore

S.No	Title of the Paper	Credits
1	Folklore Concepts	4
2	Folklore Theories	4
3	Folk Art & Culture	4
4	Material Culture	4
5	Folk Religion & Ritual	4
6	Oral History	4
7	Performance Studies	4
8	Culture Studies	4
9	Applied Folklore	4
10	Research Methodology for Folklore Studies	4
11	Mini - Project	4

PAPER - I

FOLKLORE CONCEPTS

Course Objective:

The course would provide a broader exposure to fundamental concepts of Folklore, its inter-disciplinary nature, history of international Folkloristics and history of Folklore in India and Tamilnadu

UNIT I: Discipline, Definition and Fundamental Concepts

Problems in defining folk and lore – Scope and relevance of Folkloristics discipline- The problem of nomenclature in Tamil Folkloristics - Multidisciplinary nature of Folkloristics; Classification of Folklore: Oral literature - Folk performances - Folk religion and ritual – Material Culture

Folklore, Tradition, Culture and issues of classicism; Salient features of Folklore: orality, memory, mnemonic devices, repetition, formulae, theme, motif, author, text, texture, context, form, content, meaning and inter-textuality; Genre: analytical and ethnic; Informant and co-researcher; Emic and etic perspectives; Version, variation, oicotype and archetype; other concepts: meta folklore, oral literary criticism, Aesthetics and Worldview

Prescribed Readings:

Leach, Maria. 1949: Standard Dictionary of Folklore Mythology and Legend, Fung and Wagnalls; Dundes, Alan. 1989: Folklore Matters, Knoxville: The University of Tennessee Press; Dorson, Richard M. 1972: Folklore and Folklife, Chicago: The University of Chicago Press;

UNIT II Folk Narratives:

Definition, Classification, text, structure, function and Performing context

Prose Narratives: Myth, Legend, Folktale

Verse Narratives: Epic, Ballad, Song

Fixed Phrase Genres: Proverb, Riddle and Phrases

Prescribed readings:

Bascom, R. William 1981: “The Forms of Folklore: Prose Narratives”, Contributions to Folkloristics, Meerut: Folklore Institute.pp.95-123; Degh, Linda. 1972: “Folk Narrative”, Folklore and Folklife, Richard M. Dorson (ed.), Chicago: Chicago University Press, pp.53-157 - Claus, Peter J. 1991: “Tale-Types and Motifs”, Folkloristics and Indian Folklore, Udupi: Regional Resources Centre for Folk Performing Arts, pp.74-94 Devy, Ganesh. N, 2008. The Oxford India Elwin: Selected Writings. New Delhi: Oxford University Press.

UNIT III Folk Religion, Ritual and Belief

Definitions of Religion: Sociological: Emile Durkheim and Max Weber; Anthropological: Max Muller, James Frazer, Levy Bruhl, Arnold von Gennep, Claude Levistrauss and Victor Turner; Psychoanalytical: Sigmund Freud, CG Jung and Jacques Lacan

Types of Religion; Religious traditions in Tamilnadu;
Folk religion and religion of elite; Great tradition and little tradition
Parochialization, Sanskritization and Universalization
Characteristics of folk deities: major deities - classification; regional, cultural, socio-
historical significance

Prescribed Readings:

Messenger, John, C. 1972. 'Folk Religion' in R.M. Dorson (Ed.), *Folklore and Folklife*, Chicago: University of Chicago. Dhananjeyan, A. 2012. *Kulakuriyiyalum meenavar vazhakkarakalum*. Chennai: NCBH; Pilavendiran, S. 2001. *Tamil Cinthanai marapu*. Bangalore & Chennai: Thannanane Pathippakam, pp. 64 - 113. Dharmaraj, T. (Tho.). 2006. *Sanankalin Samihal*, Palayamkottai: FRRC. Arunan, 2006. *Kolaikkalankalin vakku moolankal*: Nandan, Kathavarayan, Madurai Veeran, Muthupattan. Madurai: Vasanthan Veliyeetakam.

UNIT IV: Material Culture

Inter-disciplinary nature of Material Culture
Artefacts, Crafts and Museum objects
Every-day life objects; Vernacular Architecture
Musical Instruments
Dress & Ornaments
Food Studies

Prescribed Readings:

Glassie, Henry. 1999. *Material Culture*. Bloomington & Indianapolis: Indiana University Press; Gerritsen, Anne and Giogio Riello (eds.). 2017. *Writing Material Culture History*. New Delhi: Bloomsbury; Guha – Thakurtha, Tapati. 2004. *Monuments, Objects, Histories: Institutions of Art in Colonial and Post-colonial India*. Ranikhet: Permanent Black; Neil MacGregor, 2012. *A History of the World in 100 Objects*. London: Penguin

UNIT V Performing Arts

Definitions and concepts of Folk Performing arts: Performing and non-performing arts; special features of folk performing arts
Folklore as performance. Types of performance.
Classification of performing arts: Musical forms, Verbal arts, Dance forms and Koothu

Prescribed Readings:

Bauman, Richard, 1989: "Performance", *International Encyclopedia of Communication*, Dorson (ed) *Folklore and Folk life*, Chicago: Chicago University Press, pp. 253 - 280; *Aesthetics*, Austin: University of Texas Press, pp. 66 - 105.

PAPER - II FOLKLORE THEORIES

Objective:

To provide broader outline of Folklore theories and exposure to particular theories such as Mythological, Historical Geographical theory, Oral Formulaic theory and Genre theory.

UNIT I

a) HISTORIC-GEOGRAPHICAL THEORY or FINNISH THEORY

Life history of the Folk forms - Kaarle Krohn - Assembling the Variants - Labelling and arranging - Marking the date and place of recording - Placing literary versions in chronological order - Analysis of the genre into its principal traits - Counting frequency of occurrence of each possible handling of the trait – The construction of archetype - criticism - Russian criticism.

b) HISTORICAL RECONSTRUCTIONAL THEORY

Aim: Recapturing the vanished historical period: Grimm brother's Teutonic Mythology; George Lawrence Gomme: Folklore as a historical science; Kunio Yanagita and his followers; Peter J.Claus and his studies on Tulu Paddhanaas; New development of synthesizing folkloric and historical technique.

Prescribed Readings

Dorson, Richard M. (ed.), 1972: *Folklore and Folklife: An Introduction*, Chicago: University of Chicago Press; Linda Degh, 1969: *Folktales and Society: Story Telling Hungarian Peasant Community*, Bloomington: Indiana University Press; Krohn, Kaarle. 1986: *Folklore Methodology: Formulated by Julius Krohn and Expanded by Nordic Researchers*, University of Texas Press; Thompson, Stith, 1977: *The Folktale*, Berkeley: University of California Press; Thompson, Stith, 1955-58: *Motif-Index of Folk Literature 6 vols.* Helsinki: FF Communications; Shulman, David D. 1980: *Tamil Temple Myths*, Princeton: Princeton University Press; Maruthathurai, 1988: *Purana Ilakkiya Varalaru*, Chennai: Ainthinai Pathippakam; Aru.Ramanathan, 1988: *Varalaatru Nilaviyal Aaivumurai - Arimukamum Aaivukalum*, Thanjavur: Tamil Palkalai Kazhagam.

UNIT II: FUNCTIONALISM & STRUCTURALISM

a) FUNCTIONAL THEORY

Radcliffe-Brown's Structural Functionalism.

Malinowski's Theory of Synchronic Functionalism; Ideas of William Bascom and Linda Degh

b) STRUCTURALISM & SEMIOTICS

Ferdinand de Saussure, Viladimir I. Propp, Claude Levi-Strauss

c) Formalism - Bakhtin Circle

Prescribed Readings

Saussure, Ferdinand de. *A Course in General Linguistics*. Propp, VI. *Morphology of Folktales*; Levi-Strauss, Claude, *Structural Anthropology*. Radcliff - Brown, A. R, *Structure and Function in Primitive Society*. Malinowski, B. *Myth in Primitive Psychology*. Muthiah, I., *Payanpattu mozhiyiyal*. Tamilavan, *Structuralism*. Muthumohan. *Amaippiyal pin amaippiyal*. Dhananjayan. *Vilimpunilai makkal vazhakkarukal*.

UNIT III: ORAL FORMULAIC THEORY or PARRY-LORD THEORY

The Oral Formulaic Theory as presented by Lord - the oral composition of folk epics - compositional techniques - the use of formula - manipulation of formula system - scene building techniques - learning the themes. Critical Reactions.

Prescribed readings

Beverly J. Stoeltje, 1988: "Introduction: Feminist Revision", *Journal of Folklore Research*, pp. 141 - 154. —, 1988: "Gender Representation in Performance: The Cow girl and Hostess". *Journal of Folklore Research*, pp. 219-241; Richard Bauman, 1977: *Verbal Art as Performance*, Illinois: Wavel and Press. Stuart Blackburn, 1980: *Performance as Paradigm: The Tamil Bowsong Tradition*, University Microfilms International. Albert Bates Lord, 1976: *The Singer of Tales*, New York: Atheneum.

UNIT IV PSYCHOANALYSIS

a) PSYCHO-ANALYTICAL THEORY

Freud and their Folkloric interpretations.

b) Jung's School of Analytical Psychology, Archetype and Collective Unconscious.

Dundes' Psychological interpretations.

Prescribed readings

Jan Brunvand, 1978: *The Study of American Folklore: An Introduction*, New York: Ante Aarne, 1962: *The Types of Folklore*, Helsinki: FF Communication; Alan Dundes, 1978: *Essays on Folkloristics*, Meerut: Folklore Institute; Gershon Legmenn, 1978: *No Laughing Matter: An Analysis of Sexual Humour, Vos. 1&2*, Bloomington: Indiana University; Ramanujan, AK. *Indian Oedipus*. Vaidhyathan, TG and Jeffrey J Gripal. *Vishnu on Freud's Desk: A Reader in Psychoanalysis and Hinduism*.

UNIT IV GENRE THEORY

a. Folklore Theories of Genre.

Roger D. Abrahams: Simple and Complex Forms.

Dan Ben - Amos: Ethnic Genres and Analytical Category.

Lauri Honko: Real and Ideal Genre.

b. Tamil/indigenous categories of Genre

Prescribed readings

Dan Ben-Amos, 1976: *Folklore Genres*, Austin: University of Texas Press

Lauri Honko, 1989: *Folkloristic Theories of Genre*, Helsinki: Studia Fennica.

PAPER - III
FOLK ART & CULTURE

Objective:

This course aims to give deeper understanding about the concepts, Art and Craft and their relevance in Folk Cultural life practices

UNIT I: Art and Craft

Definitions, difference and classification; Inter-disciplinary background, Scope and

Prescribed Readings:

Nicholas Mirzoeff (ed.). 1998. *The Visual Culture Reader*. London: Routledge; Adamson, Glenn. 2010. *The Craft Reader*. Berg Publishers.

UNIT II: Folk and Popular: Art and Artistic Practices

High, Popular and Folk Art; Artists and their life

Prescribed Readings:

Adamson, Glenn. *The Craft Reader*. Berg Publishers; Kajri Jain, 2007. *Gods in the Bazaar: The Economies of Indian Calendar Art*. Durham & London: Duke University Press; Christopher Pinney. 2004. *Photos of the Gods: The Printed Image and Political Struggle in India*. London: Reaktion Books.

UNIT III: Folk Crafts and Craft Making Traditions

Crafts, Artisans, Traditional and Modern Craft Industries

Prescribed Readings:

T. Sanathanan, 2018. *Naveenathuvamum yazhppanathil kanpiyap payilvum*. Colombo:

UNIT IV: Vernacular Architecture

Essentials of Vernacular Architecture; Elements of Vernacular Architecture in contemporary Architecture

Prescribed Readings:

Henri Glassie, 1999. *Vernacular Architecture*. Pennsylvania: Material Culture of Philadelphia & Bloomington: Indiana University Press;

UNIT V: Folk Aesthetics

Aesthetics: Definition & Philosophical debates; Classification: Folk and Classical; Essential Aspects of Folk Aesthetics; Identifying elements of Folk Aesthetics in Classical texts and traditions

Prescribed Readings:

Muthiah, I. *Nattupura panpaattu marapu: marru marapu*. Jerrold Levinson (ed.), 2005. *The Oxford Handbook of Aesthetics*. Oxford: Oxford University Press.

PAPER - IV
MATERIAL CULTURE

Objective:

This course aims to give deeper understanding about the concepts, Art and Craft and their relevance in Folk Cultural life practices

UNIT I: Material Culture: Art and Craft

Definitions, difference and classification;
Inter-disciplinary nature of Material Culture
Artefacts, Crafts and Museum objects; Every-day life objects;
Vernacular Architecture
Musical Instruments

Prescribed Readings:

Glassie, Henry. 1999. *Material Culture*. Bloomington & Indianapolis: Indiana University Press; Gerritsen, Anne and Giorgio Riello (eds.). 2017. *Writing Material Culture History*. New Delhi: Bloomsbury; Guha – Thakurtha, Tapati. 2004. *Monuments, Objects, Histories: Institutions of Art in Colonial and Post-colonial India*. Ranikhet: Permanent Black; Neil MacGregor, 2012. *A History of the World in 100 Objects*. London: Penguin

UNIT II: Food Studies

Food: Types – Ritual, Everyday Life, & Medicinal; Food & Identity;

Prescribed Readings:

Colleen Taylor Sen, 2016. *Feasts and Fasts: A History of Food in India*. New Delhi: California Press.

UNIT III: Dress, make-up, costume and ornaments

Dress & Identity; Cosmetic Materials; Masks; Artisans of Ornaments

Prescribed Readings:

Susan J. Vincent, 2009. *The Anatomy of Fashion: Dressing the Body from the*

UNIT IV: Vernacular Architecture

Essentials of Vernacular Architecture; Elements of Vernacular Architecture in

Prescribed Readings:

Henri Glassie, 1999. *Vernacular Architecture*. Pennsylvania: Material Culture of

UNIT V: Craft industry: Traditional & Modern

Crafts, Artisans, Traditional and Modern Craft Industries; Craftsmen and their socio-

Prescribed Readings:

T. Sanathanan, 2018. *Naveenathuvamum yazhppanathil kanpiyap payilvum*. Colombo:

PAPER - V
FOLK RELIGION AND RITUAL

Objective:

To provide the students exposure to Folk Religion, deities and Ritual Performance

UNIT - I: Introduction to Folk religion

Religion: Definitions and Concepts; Types of Religion; Religious traditions in Tamilnadu;
Folk religion Vs. Religion of elite
Great tradition and little tradition
Parochialization, Sanskritization and Universalization

Prescribed Readings:

Messenger, John, C. 1972. 'Folk Religion' in R.M. Dorson (Ed.), *Folklore and Folklife*, Chicago: University of Chicago. Dhananjeyan, A. 2012. *Kulakuriyalum meenavar vazhakarukalum*. Chennai: NCBH; Pilavendhiran, S. 2001. *Tamil Cinthanai marapu*. Bangalore & Chennai: Thannanane Pathippakam, pp. 64 - 113. Dharmaraj, T. (Tho.). 2006. *Sanankalin Samihal*, Palayamkottai: FRRC. Arunan, 2006. *Kolaikkalankalin vakku moolankal: Nandan, Kathavarayan, Madurai Veeran, Muthupattan*. Madurai: Vasanthan Veliyeetakam.

UNIT - II: Folk Deities and Religious Processes

Folk deity: death and deification - creation of the deity during worship and destruction (concepts of 'mulavar' and 'ursavar' in folk cult)

Forms of deities: 'pitiman' deities - folk deities and identity formation - contests and conflicts

characteristics of regional deities and classification

Religious processes: Worship patterns, pilgrimage, vows,

UNIT - III: Rituals

Myth, ritual and enactment

Ritual symbolism and social structure - the ritual process

Possession, divination and Animal Sacrifice

Prescribed Readings:

Turner, Victor, 1977. 'Ritual Symbolism, Morality and Social Structure among the Ndembu' & 'Betwixt and Between : The Liminal Period in Rites de Passage', *The Forest of Symbols*, Ithica: Cornell University Press, pp. 48-58 & pp. 93-111; van Gennep, Arnold, 1977. 'The Classification of Rites', 'The Territorial Passage', 'Individual and group' - *The Rites of Passage*, London: Routledge and Hegin Paul, pp. 1-40 & 189-194; Sivathamby, K. 2005. *Pandai Tamil Samukathil Natakam*. Chennai: NCBH

UNIT - IV: Mask, Ritual and Performance

Mask: concept and types - Ritual and Performance
Examples: Dusserah festival at Kulasekarapattinam

Prescribed Readings:

Sunadar, K. *Suyamukamum thirumukamum*, Madurai: Kaaron Neeron Pathippakam.

UNIT - V: Case studies

Mother goddess cult - Mariyamman, Ankalamman, Draupadi and Seven sisters cult;
Ayyanar cult: Pantheon deities;
Kootthandavar, Annanmar
Popular Religion (Islam and Christianity)

Prescribed Readings:

Blackburn, Stuart, H. 1988. *Singing of Birth and Death*, Philadelphia: University of Pennsylvania Press; Meyar, Eveline. 1986. *Ankalaparamecuvvari : A Goddess of Tamilnadu her myths and cults*, Wiesbaden : Frang Steiner Verlag; Beck, Brenda EF. 1982. *The Three Twins: The Telling of a South Indian Folk Epic*. Bloomington: Indiana University Press; Bayly, Susan. 1989. *Saints, Goddesses and Kings: Muslims and Christians in South Indian Society 1700 - 1900*. Cambridge: Cambridge University Press; Sivabramanian, A. *Durga Vazhipadu*. Frasca, Richard. *The Theatre of Mahabharatha*. Netunchezhiyan, K. Ayyanar Vazhipadum Asivakamum;

PAPER - VI
ORAL HISTORY

Objectives

To enable the students to understand and handle Oral History as the “Voice of the Voiceless”.

To provide the students in different perspectives of Historiography

Unit I : Oral Tradition as History:

- a) Oral tradition as a source of history: Definition - Oral tradition as evidence.
- b) Dynamic processes of Oral tradition: Memorized speech, Accounts, Epic, Tales,
- c) Limitations and Uniqueness of Oral tradition: Chronology and interdependence -

Prescribed Readings:

Vansina, Jan 1985. *Oral Tradition as History*, Wisconsin: The University of Wisconsin

Unit II : Folk Tradition and History:

- a) Folk tradition as historical fallacy - Folklore as embellished history - Folklore as a mirror of history - Folk tradition as historical fact.
- b) Alternative Histories: Subaltern history - Oral history - ethno history - folk history.

Prescribed Readings:

Montell, Lynwood, 1996. Preface to The Saga of Coe Ridge, in David K. Dunaway and nanku vakai nilaipatukal, in *Puthia Araichi*, vol.5, pp. 69-103; Sundar, K. 2002.

Unit III: Typology and Ethnic history:

- a) Typology of Oral history: Oral autobiography - origins of place names - oral history of communities.
- b) Writing of Ethnic history : The nature of historical evidence - Types of oral documents - Oral history – Writing of ethnic history.

Prescribed Readings:

Mehaffy, George L., & Davis O.L.Jr., 1983. *Oral History: A Guide for Teachers*, Austin: University of Texas Press pp.41-68; Okihiro, Gary Y., 1996. Oral History and the

Unit IV: Oral History

Folklore & Oral History; Oral History as a Discipline

Prescribed Readings:

David K. Dunaway and Willa K. Baum (edited), *Oral History. An Interdisciplinary*

Unit V: Construction of History: Case Studies in Tamil

Pandit Iyothedhasar's construction of the history of Tamil Buddhism through folk religious and ritual practices: Amman Festival and Death Rituals; counter untouchability practices (saanikudam utaithal).

Sedal by Imaiyam; Kavalai by Azhagiya Nayaki Ammal; Dalit journals (ed. J Balasubramaniam)

Prescribed Readings:

Aloysius, G. 2000. *Iyothedhasar Sinthanaikal - Volume II*, Palayamkottai: Folklore Resources and Research Centre. Aloysius, G. Religion as Emancipatory Identity.

Paper VII

PERFORMANCE STUDIES

Objective:

To provide basic concepts of Performance, theoretical approaches to Performance and outline of Folk Performing Arts

To train the students in different Folk Performing art forms

UNIT I: Introduction

Definitions and concepts of performance - performer and audience - performance configuration - performance, context and text

Definitions and concepts of Folk Performing arts: Performing and non-performing arts; special features of folk performing arts

Folklore as performance. Types of performance.

Prescribed: Readings

Bauman, Richard, 1989: "Performance", International Encyclopedia of Communication, Vol.3, pp.262- 266; Finnegan, Ruth 1992: "Observing and Analysing Performance", "Concepts of Performance and Their Significance", "Audiences, Performers, Participants", "Other Components of Performances' in Oral Traditions and The Verbal Arts -A Guide to Research Practice, London: Routledge, pp.91111; Gassie, Henry 1972: "Folk Art", in Richard M. Dorson (ed) Folklore and Folk life, Chicago: Chicago University Press, pp. 253 - 280; Gunasekaran, K.A. 1993: naattuppura nikazh kalaikal, Chennai: NCBH. Varun Pathippagam; Otten, Charlotte M. 1971: Anthropology and Art: Readings in cross-cultural Aesthetics, Austin: University of Texas Press, pp. 66 - 105.

Unit II: Theoretical Approaches to Performing Arts

Tolkappiyam - Meippattiyal: Literature as performance (traditional theories)

Performance theory; Koothu forms; absent audience

Crisis and Performance; Ritual, visuality and Performing arts; Carnival and comic; War and Performance Studies

Prescribed Readings

Frasca, Richard. *Theatre of Mahabharatha*; Bauman, Richard. Verbal Arts as Performance; Bauman, Performance, *International Encyclopedia of Communication*. Sundar, K. *Suyamukamum thirumukamum*. de Bruin, Hanna. *Kattaikuthu*. Dhananjeyan, A. *Vilimpunilai makkal vazhakkarakal*. Bakhtin, Mikhail. Rabelais and his World. Schechner, Richard. Performance Theory; Are there universals in Performance; Turner, Victor. Anthropology of Performance;

Unit III: Classification of Folk Performing Art forms in Tamil Nadu

Classification of performing arts: Musical forms, Verbal arts, Dance forms and Koothu forms; Other classifications: Ritual arts, Secular arts, etc. An overview of Folk Forms

Dance forms: kummi, oyilaattam, karagaattam, chakkaiyaattam, kuravan kurathi aattam, thevaraattam, `kaavadi, kazhiyalaattam, kolaattam, paraiyaattam, jamaa periyamelam, jimplaa melam, jikkaattam; Koothu forms: therukkoothu, Thanjavur Koothu forms, paavaikkoothu, isai naadagam.

Prescribed Readings:

Arivunambi 1989: *thamizhagathiltherukkoothu*, Puthucherry: Puthuvai Palkalaikazhakam; Gunasekaran, K.A. 1992: *naattupura nadanangalum paadalkalum*, Chennai: NCBH; Lourdu, S.D. 2000: *naattaar vazhakkaattriyal, sila adippadaikal*, Palayamkottai: FRRC; Ramanathan, Aru. 1997: *naattuppuraviyal aaivukal*, Chennai: Manivasakar Pathippagam, pp. 183- 212; Ramanathan, Aru. *Nattupura Kalaigal*; Ramasamy, Mu. 1983: *thorpaavai nizharkoothu*, Madurai: Publication division, Madurai Kamarajar University, pp. 1 - 192.

UNIT IV: Performance Traditions: Bardic Performance

Ballads and narrative performance: Manuscripts and Bards, leader and group; Villuppaattu (Bow song): Performing group - composition and Delivery styles - Manuscripts and Artistes; Udukkuppaattu: Re-enactment rituals - Magical verses - Ritual events; Kaniyan koothu: Ritual events.

Prescribed Readings

Blackburn, Stuart, H. 1988: *Singing of Birth and Death*, Philadelphia: University of Pennsylvania Press; Degh, Linda, 1972: "Folk Narrative" in Richard M. Dorson (ed.), *Folklore and Folklife*, Chicago, The University of Chicago Press, pp. 53-84; Gomathinayagam, T.S., 1979: *thamizh villuppaattukal - oar arimugam*, Chennai: Thamizh Pathippagam; Lourdu, S.D. 2000: *naattaar vazhakkaattriyal Kotpaadukal*, Palayamkottai: FRRC; Ramaswamy, M. *Tirunelveliyl Draupati manapankapatutthappatta pothu*;

UNIT V: Text, Performance and Audience

The Oral performance milieu: Verbal adjustments - formulaic structure - tune, rhythm, metre and tempo - prose style - performers and their audiences; Narrative and Ritual in Performance; transforming text into a performing text; Perceptions of text – sacred and secular

Recommended Readings

Asirvatham, John, 1985: *thamizhar koothukal*, Chennai, International Institute of Tamil Studies. Frasca, Richard Armando 1990: *The Theatre of the Mahabharatha: Therukkuthu performances in South India*, Honolulu: University of Hawai Press; Lourdu, S.D. 1997: *naattaar vazhakkaattriyal, sila adippadaikal*, Palayamkottai: FRRC; Maruthadurai, Aru, 1993: *thamizhaga naattupura vazhibaattuk koothukal*, Musiri: Aruna Publications. Murugesan, K. 2000: *amaippiyal nokkil thamizhaga naattupura nadanangal*, Thanjavur: Tamil University. Muthusamy, N. 1982: *antru poottiya vandi*, Sivagami: Annam; Thulasi Ramasamy, 1987: *paavaikkoothu*, Chidambaram: Manivasakar Publications. Sudhananda, Samuel. *Attamum Amaippum*. Madurai: Madurai Kamaraj University; Velusamy, N. 1986: *karaga aattakkalai*, Madurai: Thenmozhi Noolakam. Venkat Saminathan, 1985: *paavaikkoothu*, Sivagangai: Annam.

PAPER - VIII CULTURE STUDIES

Objective:

To provide basic knowledge in media and culture studies, particularly the interrelationship between popular culture and modernism, music, society and social media.

UNIT - I: Popular Culture and Modernism

Mass Culture - Free time and popular culture - Culture Industry
Frankfurt School - Gramsci, Althusser, Stuart Hall

Prescribed Reading

Adorno, Theodore, 1991. *The Culture Industry*. London and New York: Routledge, pp. 61-97, 187-197, 98-106; Baudrillard, Jean, 1998. *The Consumer Society : Myths & Structures*. London, Thousand Oaks, New Delhi: Sage Publications, pp. 151-158; Paddison, Mare. 1996. *Adorno, Modernism and Mass Culture: Essays on Critical theory and Music*. London : Kahn & Averile;

UNIT - II: Popular Culture and Society

Culture and Administration - New World Orders - Consumption and theories of consumption.

Women and Mass Media - Gender differences in media professionalism - Role of Women in Media

Prescribed Reading

Adorno, Theodore, 1991. *The Culture Industry*. London and New York: Routledge, pp. 107-131; Baudrillard, Jean. 1998. *The Consumer Society : Myths & Structures*. London, Thousand Oaks, New Delhi: Sage Publications, pp. 151-158; Chowsky, Noam. 1998. *World Orders, Old and New*, Delhi: Oxford University Press, pp. 4-8, 178-188; Blackburn, Stuart. 2003. *Print, Folklore and Nationalism in Colonial South India*. Delhi: Permanent Black; Venkatachalapathy, AR. Muchandi Ilakkiyam, 2004. *Muchandi Ilakkiyam*. Nagercoil: Kalachuvadu; Venkatachalapathy, A. R. 2012. *The Province of the Book: Scholars, Scribes, and Scribblers in Colonial Tamilnadu*. Ranikhet: Permanent Black. Fernandez, G.D. 1987. *Women in Media in Philippines, From Stereotype to Liberation*, Media Asia 14(4); Hobson, D. 1980. *Housewives and the mass media*, Stuart Hall, D. Hobson, A. Lowe and P. Willis (eds.) *Culture, Media, Language*, London: Hutchinson; Hatano, R., 1987. *Japanese Women in Media*, Media Asia 14 (4); Joseph, Ammu. 2000. *Women in Journalism, Making News*; Okibo, C. and S. Murphy, 1986. *Sex in Newsroom, Male-female Differences in Perception of Media Professionalism*, Paper at IAMCR, New Delhi; Sharma Srma, et.al., 1987. *Women and Media in South Asia*, Media Asia 14(4);

UNIT - III: Social Media in Contemporary Society

Social Media and journalism - news making, circulation, effect; social media and culture; social media and politics; social media and activism

Prescribed Reading:

Chaturvedi, Swati. 2016. *I Am a Troll: Inside the Secret World of the BJP's Digital Army*. Juggernaut Publication; Mandiberg, Michael (ed.), 2012. *The Social Media Reader*. New York and London: The New York University Press.

UNIT - IV: Textual Studies

Text, Semiotics of text: composition, structuration; politics and strategies: ignore, inclusive, exclusive, substitution;

Prescribed Reading

Foucault, Michel, 1981, The Order of Discourse, in Robert Young (ed.) *Untying the Text - A Post Structuralist Reader*, London: Routledge and Kegan Paul,

UNIT - V: Tamil Folk Narratives

Texts and Narratives; (to read or perform), historicity
Cultural Narratives in Tamil context: Oral, Written (frozen/live?), Performance narratives
Inter-text and textual variations: (Remembering traditions, Reading practices, performing practices)

Prescribed Reading

Velcheru Narayana Rao, David Shulman and Sanjay Subramaniam, 2003. *Textures of Time: Writing History in South India 1600-1800*, Permanent Black. Madurai Veeraswamy kathai: Vellaikugai (Arunthadhiyar magazine): Chithiraputhira nayinar kathai; Thomas Sebeok, *Signs: An Introduction to Semiotics*. Toronto, Buffalo & London: University of Toronto Press; Nirmal Selvamony, 1998. *Persona in Tolkappiyam*. Chennai: International Institute of Tamil Studies.

PAPER - IX APPLIED FOLKLORE

Objective:

To enable the students in diverse areas of Applied Folklore and the interrelationship between Folklore and Popular Culture

UNIT - I: Concepts of Folklore Process

- a) Folklore Process: Fresh Definitions of Folklore - The Folklore Process - The First Life of Folklore: 12 Stages of Folklore Process - The Second Life of Folklore: 10 stages of Folklore.
- b) Folklorism and Criticism.

Prescribed Readings

Bausinger, Hermann. 1986: 'Toward a critique of Folklorism criticism' in James R. Dow and Hannjost Lixfeld (ed.) *German Volkskunde* Bloomington: Indiana University Press, pp.113-123; Bendix, Regina 1988: "Folklorism" The Challenge of concept, *International Folklore Review*-6, pp.5-15; Honko, Lauri 1993: "Folklore Process" *A Paper presented in FF Summer School*, Turku, Finland.

UNIT - II: Folklore and Literature: Theoretical aspects

- a) Folklore and Literature: Folklore is indistinguishable from Literature - Elements of Folklore in Literature - The writers' imitation of Folklore.
- b) Folklore as the precursor of Literature: Inter-textual relationship of Folklore and Classical Literature; Role of Folk forms in the creation of Classical Tamil Literature; The influence of Folklore in Cilappatikaaram.
- c) Folk forms and Aesthetics

Prescribed Readings

Ramanathan, Aru. 1997: 'Thamizhilakkiyathil Naattuppura Ilakkiyathaakkam', *Naattuppura Iyal Aivukal*, Chennai: Manivaasagar Pathippagam - Subramaniam, P.R. 1968: 'Folklore As the Precursor of Literature' in *Four papers on Literature and Linguistics*, Madurai: Meenakshi Puthaka Nilayam. pp.13-27 - Taylor, Archer 1965: 'Folklore and the Student of Literature' in Alan Dundes (ed.) *The Study of Folklore*, Berkeley : University of California pp.34-42; TPM, Kanal Vari

UNIT - III: Folklore in Literary Forms or Ethnographic Literature

- a) Folklore in a literate Society: The Concept and ideology and the uses of the elements of Folklore in literary and art forms.
- b) Folklore in Fiction, Autobiography and Poetry: 'Koochai' by Cho.Dharuman, Karukku by Bama and selected poems by modern poets.

- c) Understanding of Ethnographic Literature (novels, short stories and poems); Problems in understanding of Ethnographic Literature

Prescribed Readings

Mody Boatright 1973: 'Folklore in a Literate Society' in Ernest B. Speck (ed.) Mody Boatright, *Folklorist - A collection of Essays*, pp.116-123 Austin: Texas Folklore Society - Vizhi Pa: Idhaya vendhan 2002. Dalit Azhakiyal, Chennai: Kaavya.

UNIT - IV: Popular Journalism and Folklore

- a) Popular Culture and Folk Culture - Journalism as popular culture - Popular employment of folklore in children's literature: adaptation of folksongs, folktales in children's literature (School books, comics, weekly supplements of dailies and weeklies and monthlies, publications for Non-formal education programmes etc)
- b) Ethnographic writings in Tamil (Ki.Ra.,Pa. Jayapragasam, Ira. Manikandan, Mana, Vata Veera Ponnaiah and others)

Prescribed Readings

Peter Dahlgren, 1992: 'Journalism as popular culture: Introduction' in *Journalism and Popular Culture*, New Delhi: Sage Publications. pp.1-23 - Colin Sparks, 1992: 'Popular Journalism: Theories and Practice', in *Journalism and Popular Culture*. pp.24-44 - Iain Chambers, 1986: *Popular Culture: The Metropolitan Experience*, London: Methuen. pp.3-14.

UNIT - V: Tamil Cinema, Theatre and Folklore

- a) Elements of Folklore in Tamil theatre – traditional, colonial, modern and contemporary forms of theatre
- b) Elements of Folklore in Tamil cinema– mythological, colonial, popular, nativity, neo-nativity and contemporary Tamil cinema

Prescribed Readings:

Theodore Baskaran, 1981. *The Message Bearers: The nationalist politics and the entertainment media in South India, 1880–1945*, Chennai: Cre-A; Theodore Baskaran, 1996. *The Eye of the Serpent: An introduction to Tamil cinema*, Chennai: East West Books. MSS Pandian, 2015. *The Image Trap: M.G. Ramachandran in Film and Politics*. New Delhi: Sage

PAPER - X
Research Methodology for Folklore Studies

Objective:

To train the students how to plan and prepare for Folklore and ethnographic Fieldwork
To equip themselves how to carry out fieldwork and what should s/he do during and after field work such as report writing and analyzing data

UNIT - I: Field Work: Pre-field preparation, informants and rapport establishment

What is Fieldwork? Difference in doing Fieldwork: Anthropology and Folklore
Available literature - existing records and films made in the regions. Selection of issues; 'Informant is not an object but a fellow human being'

Prescribed Readings

Goldstein, Kenneth S. 1964: *A Guide for Field workers in Folklore*, Pennsylvania : The
1986: Folk Groups and Folklore Genres: An Introduction, Longan utah: Utah State

UNIT - II : Collection methods Proposal for Collection project

Observation method - Kinds of context: natural, artificial and induced natural - what to
Types of folklore data - Primary and secondary - Field work and archival work
Collection project proposal - types of collection projects: survey, depth and local projects.
Problem statement and analysis.

Prescribed Readings:

Goldstein, Kenneth S. 1964: *A Guide for Field workers in Folklore*, (pp. 13 - 26; 77 -
Work for Beginning Folklore Students, (pp. 77-81)

UNIT - III : Ethnography

What is ethnography? - positivism and naturalism - reflexivity - ethnography as method
Writing ethnography - ethnography as text: organizing texts - historical method,

Prescribed Readings :

Hammersley, Martyn and Paul Atkinson, 1983 : *Ethnography Principles in Practice*,

UNIT - IV : Critical Ethnography

Issues and problems in ethnographic descriptions of culture
New Ethnography - Ethnography of Speaking - Critical Ethnography - New Trends in
Ethnography in Tamil Contexts - Colonial, Indologists, New Ethnologists, South

Prescribed Reading:

Valentine Daniel, 1984. *Fluid Signs: Being a Person the Tamil Way*. Berkeley, Los

UNIT – V: Understanding ethnographic works of Western and Tamil scholars

Reading selected writings of Missionaries and Colonial officials; Reviewing colonial
Reading selected writings of Tamil scholars - colonial and contemporary - western and

Prescribed Readings:

Edgar Thurston. 1907. *South Indian Castes and Tribes*. Madras: Asian Educational

PAPER - XI Mini Project

The research scholar needs to undertake a mini project and submit a dissertation, consisting a minimum of 50 pages, at the end of the second semester as informed by the guidelines of the University.

MANONMANIAM SUNDARANAR UNIVERSITY
Abishekapatti – 627 012

Ph. D. Program in Geotechnology / Geology
(For all affiliated colleges / Research centers and University Department)

Course Structure and Syllabus as per the Choice Based Credit System (CBCS)
(Curriculum Effective From 2018-2019 Onwards)

Course Structure for Ph. D. Program in Geotechnology / Geology –2018-2019 onwards

Course	Name of the Course	credits	Hours /week
Core-I	Analytical Techniques in Geology	4	4
Core-II	Coastal Environments	4	4
Core-III	Groundwater Chemistry	4	4
Core-IV	Engineering Geology	4	4
Core-V	Geohazards	4	4
Core-VI	Research Methodology	4	4
Core-VII	Geomagnetism	4	4
Core-VIII	Geophysical prospecting methods	4	4
Core-IX	Remote Sensing & GIS	4	4
Core-X	Mini Project	4	4

1. ANALYTICAL TECHNIQUES IN GEOLOGY

L T P C
4 0 0 4

Unit-I: Introduction to advanced laboratory techniques: Working principles and concepts of Differential Thermal Analysis (DTA), X-ray Diffractions (XRD), Scanning Electron Microscope (SEM), ICP MS, X-ray fluorescence (XRF), Energy-dispersive X-ray spectroscopy (EDS, EDX, or XEDS), Mass spectrometer, CT-scan tomography, Fission Track Dating, etc.

Unit-II: Sample Preparations: Techniques of sample preparation, applications and limitations of Differential Thermal Analysis (DTA), X-ray Diffractions (XRD), Scanning Electron Microscope (SEM), ICP MS, X-ray fluorescence (XRF), Energy-dispersive X-ray spectroscopy (EDS, EDX, or XEDS), Mass spectrometer, CT-scan tomography, Fission Track Dating, etc. in the field of geosciences.

Unit-III: Optical Studies: Understanding of petrological and stereozoom microscopes. Identification of common rock forming minerals. Sample preparation techniques for petrological sections studies, geochemical and palaeontological studies. Review of literatures on the applications of advance laboratory techniques in geology.

Unit-IV: Pollution And Quality Analysis Of Ground Water: Municipal /industrial /agricultural /miscellaneous sources & causes of pollution, attenuation/ underground distribution / potential evaluation of pollution, physical /chemical /biological analysis of ground water quality, criteria & measures of ground water quality, ground water salinity & samples, graphical representations of ground water quality.

Unit-V : Surface, Sub-Surface Investigation Of Ground Water: Geological, geophysical exploration, remote sensing ,electric resistivity ,seismic refraction based methods for surface investigation of ground water. Test drilling & ground water level measurement, sub-surface ground water investigation through geophysical / resistivity /spontaneous potential /radiation / temperature / caliper / fluid conductivity / fluid velocity /miscellaneous logging.

References:

1. Recent developments in geochemical microanalysis: Chemical Geology by Reed, S. J. B., 1990, Volume. 83, PP. 1-9.
2. Elements of X-ray Diffraction by Cullity B.D., 1978, Addison-Wesley Publishing Company.
3. Principles of isotope geology by Faure, G., 1986, John Wiley and Sons, Inc., New York.
4. Introduction to Analytical Electron Microscopy by Goldstein, J., 1979, Plenum Press, New York and London.
5. Introduction to X-ray Powder Diffractometry by Jenkins, Ron and Snyder, Robert L., 1996, Vol. 138, Wiley & Sons, New York.
6. Electron Microprobe and Scanning Electron Microscopy in Geology by Reed, S. J. B., 1996, Cambridge University Press, Cambridge.
7. Handbook of Instrumental Techniques for Analytical Chemistry by Frank A. Settle, 1997, Prentice Hall, Upper Saddle River, NJ.
8. Stable isotope geochemistry by Hoefs J., 1987, Springer-Verlag, Berlin, Germany.
9. Microprobe Techniques in Earth Sciences by Potts, P. J., Bowles, J. F. W., Reed, S. J. B., and Cave, M. R., 1995, Chapman and Hall, London.
10. Electron Microprobe Analysis by Reed, S. J. B., 1993, Cambridge University Press, Cambridge.
11. Quantitative Electron-probe microanalysis by Scott, V., and Love, G., 1983. : West Sussex, Ellis Horwood.

12. Atomic absorption spectroscopy: Chemical Analysis by Slavin, Morris, 1978, John Wiley and Sons, New York.
13. D.K. Todd and L. F. Mays, "Groundwater Hydrology", John Wiley and sons.
14. K. R. Karanth, "Hydrogeology", Tata McGraw Hill Publishing Company.

2. COASTAL ENVIRONMENTS

L T P C
4 0 0 4

UNIT-I: Introduction – nature of the shore line – coastal erosion, sediment deposition and transport – Cliff erosion, sediment deposition and transport – cliff erosion – storms and coastal erosion – strategies for limiting cliff erosion – emergent and submerging coastlines – causes of changes in shore and elevation – wave cut platforms – drowned valleys.

UNIT-II: Present and future sea level trends – difficult coastal environments – barrier islands – cost of construction in high energy environments – land reclamation from estuaries – recognition of coastal hazards.

UNIT-III: Definition, meaning and scope of coastal regulations – sustainable coastal zone management – river input to the ocean system – Man's influence on river input to the ocean system and comparison of pathways in the coastal zone – land water interface.

UNIT-IV: International initiatives for coastal zone protection – defense of the coastal areas and coastal zone management- principles – bases for decisions on coastal zone development – Essential national and international linkages.

UNIT-V: Planning and management of coastal zone – coastal zone regulations in the world and in India – Success and failures of coastal zone management

References:

1. Coastal and estuarine sediment dynamics by Dyer.K.R, John Wiley and sons.
2. The waters of the sea by Groen, P., Van Nostrand.
3. Sedimentology – process and product by Leeder, M.R.,Pethick, Edward Arnold.
4. Tides, Surges and Mean Sea Level by pugh, D.T.,wiley.
5. The waters of the sea by P.Groen., Van Nostrand.
6. Satellite Oceanography by Robinson, I.S., Ellis Horwood

3. GROUNDWATER CHEMISTRY

L T P C
4 0 0 4

Unit-I: Hydrogeology: Hydrologic cycle and its components, Origin and age of groundwater, Occurrence of groundwater, Global distribution of fresh water. Vertical distribution of groundwater. Aquifers: Types of aquifers. Springs: Types of springs. Hydrologic properties of rocks: Porosity, Permeability, Specific yield, Specific retention, Hydraulic conductivity, Transmissivity and Storage coefficient. Groundwater movements: Sub surface movement, Base flow, Effluent flow and influent flow. Darcy's law, Reynold's number, Laminar flow and turbulence flow. Water level fluctuation: Water table and Piezometric surface and its fluctuations. Pumping test: objectives, layout of the test and measurements.

Unit – II: Water well technology: Well types, drilling methods, construction of well, design of well, development and maintenance of wells. Artificial recharge of groundwater: Concept and methods. Saline water intrusion in aquifers: Saline water intrusion, Ghyben–Herzberg relation between fresh and saline water, Prevention and control of salt water intrusion in the coastal aquifers.

Unit – III: Ground water quality: Sources of salinity, estimation of major elements, reporting of chemical analysis; Groundwater pollution: Problems of arsenic and fluoride, groundwater quality map of India, quality criteria for groundwater use, salt water intrusion in coastal aquifers and remedial measures.

Unit-IV: Hydrochemistry: Analysis surface water and subsurface water; classification of groundwater for use in drinking, irrigation and industrial purposes; presentation of chemical analysis; data and plotting; chemical classification diagram.

Unit-V: Groundwater exploration techniques: Surface investigation of groundwater- Geologic method, electrical resistivity method, seismic method, gravity and magnetic method. Subsurface investigation of groundwater: test drilling, water level measurements. Application of Geophysical logging in Groundwater exploration. Groundwater provinces of India.

References:

1. Alley, W.M., (1993), Regional Groundwater Quality-VNR, New York
2. Davies, S.N. and De Wiest, D.R., (1966), Hydrogeology-John Wiley& sons, Inc, New York, 463p.
3. Fetter, C.W., (1990), Applied Hydrogeology-Mc Graw Hill, Publisher, New Delhi.
4. Freeze, R.A. and John, A., (1979), Groundwater, Cherry, Prentice Hall, Inc, 604p.
5. Hem J.D., (1970), Study and interpretation of the chemical characteristics of Natural water, USGS Edition.
6. Hiscock, K., (2005), Hydrogeology, Principles and Practice, Blackwell Publishing, 389p.
7. Karanth, K.R., (1987), Groundwater Assessment, Development and Management-Tata McGraw Hill New Delhi 720p.
8. Manning, J.C., (2007), Applied Principles of Hydrology, CBS Publishers and Distributers, New Delhi.
9. Raghunath, H.M., (2007), Groundwater 3rd edition, New Age International Publishers,520p.
10. Reddy and Rami, J.P., (2008), A Textbook of Hydrology, University Science Press, Bangalore.
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12. Shaw, E.M., (1994), Hydrology in Practice,3rd edition, Chapman and Hall,London,569p.

13. Subramaniam, V., (2000), Water-Kingston Publ. London.
14. Todd, D.K., (1980), Groundwater Hydrology-John Wiley & sons publishers, New York, 535p.

4. ENGINEERING GEOLOGY

L T P C
4 0 0 4

UNIT-I: Surface and Subsurface Geological Investigations

Field investigations, electrical and seismic geophysical methods in subsurface geological investigations for foundation engineering, Description of discontinuities, bed rock attitudes, thickness, calculation of True thickness and vertical thickness of bed rock. Geological information for slope stabilization.

UNIT-II: Engineering Properties Of Rocks And Soils

Rock description and engineering classification of rocks – weathering and its significance in engineering site- Engineering properties of rocks and soils, RMR, RQD methods, determination of engineering properties in field and laboratory.

UNIT-III: Geological Investigations For Dams & Tunnels

Dams-geological investigations- suitability of site, geological profile from catchment area to Dam site, lithology, structures, topography, slope, drainage system, water budget studies, Reservoir site investigations, siltation analysis, Geological investigations for soft rock and hard rock tunnels construction.

UNIT-IV: Geological Investigations For Coastal Development

Coastal erosion and accretion process and its impact. Geological investigations for harbor construction, Coastal protection structures-Sea walls, bulk heads, groins, jetties.

UNIT-V: Geotechnical Studies Of Landslides And Subsidence

Landslide - Classification, causative factors, control measures. Land subsidence, factors, causes and remedial measures. Geological considerations for monitoring of landslides. geotechnical problems related to foundation for bridge and building site investigations.

References:

1. Krynine and Judd. Principles of Engineering Geology and Geotechnology, McGraw Hill, New York, 1962.
2. Chandler. R.J. Slope Stability and Engineering Developments, 1992.
3. Waltham, T. Foundations of Engineering Geology, SPON Press, London 2002, ISBN 0-415- 25449-3.
4. Bell F G Engineering Geology, Second Edition by, 2007. Butterworth-Heinemann, Oxford
5. Sathya Narayanaswami. Engineering Geology. Dhanpat Rai and Co. 1710, Nai Sarak, Delhi- 110006, 2000.
6. Waltham, A.C. Foundations of Engineering Geology, Blackie Academic Professional Pub., I Ed.,UK,1994.

5. GEOHAZARDS

L T P C
4 0 0 4

Unit-I: Internal structure of the Earth. Endogenic and exogenic earth processes. Earth as a dynamic and continuously evolving system as a result of interactions between lithosphere, hydrosphere, atmosphere and biosphere.

Unit-II: Definition, types and genesis of natural geohazards - Earthquake, Volcanism, Landslide, Tsunami, Flood, Drought, Cyclone, Forest Fire, Meteorite impact, land subsidence, Quick sand, Heat wave, coastal erosion and inundation. Primary, secondary and tertiary impacts of geohazards.

Unit-III: Causes and consequences of geohazards. Anthropogenic intervention with natural processes and exacerbation of hazard vulnerability. Man made hazards.

Unit-IV: Hazard zonation, hazard mitigation. Tools and methods. Relief and rescue operations.

Unit-V: Hazard vulnerability classification of Indian sub-continent. Indian scenario of hazard preparedness. Command structure and operations of National Disaster Management Agency.

References:

1. Bandibas, J.C., Wakita, K. and Kato, H., 2003 Interactive presentation of geological hazard maps using Geohazardview. Jour.Nat.Dis.Sci. v.25. pp.75-83.
2. Government of India, 2004 Disaster management in India – A status report.88p.
3. Government of India, 2007 National disaster management guidelines. 72p.
4. Hamilton, R., 1997 Report on early warning capabilities for geological hazards. IDNDR. 35p.
5. Kato, H., Wakita, K. and Bandibas, J.C., 2003 Eastern Asia geological hazards map: Paper and digital versions. Jour.Nat.Dis.Sci.v.25. pp.65-74.
6. Ramkumar, M. and Neelakantan, R., 2007 GIS technology based geohazard zonation and advance warning system for geohazard mitigation and information dissemination towards relief and rescue operations. Jour.Earth.Sci. v.1. pp.65-70.
7. Ramkumar, Mu., 2008 Geohazards: Causes, consequences and methods of mitigation. New India Publishers, New Delhi.

6. RESEARCH METHODOLOGY

L T P C
4 0 0 4

Unit-I: Types of research- Process of Research-Formulation of objectives. Hypothesis to theory – geological example: Continental drift hypothesis to plate tectonics theory. Research plan and its components.

Unit-II: Methods of research (Survey, observation, case studies, experimental, historical and comparative methods) Methods of Literature collection, Experimental design, planning and execution of investigation.

Unit-III: Analysis of numerical data – Central tendencies, dispersion, testing significance of variations, analyzing correlation of variables. Regression analysis, Principal Component Analysis and Factor Analysis, and Cluster Analysis and its use in geological research. Application of GIS in Spatial analyses of geological datasets.

Unit-IV: Writing of Research proposal, Report and Research paper, Meaning and types – stages in preparation-characteristics-structure-documentation, foot notes and bibliography-Editing the final draft - Evaluating the final draft-checklist for a good proposal/reporter/research paper.

Unit-V: Research ethics – ethical issues, ethical committees; Scholarly publishing – IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.

References :

1. John C. Davis (2002), Statistics and Data Analysis in Geology
2. Kothari C R (2009), Research Methodology, 2nd edition, New Age Institute, New Delhi
3. Kenneth, J.P., Marine Geology, Prentice Hall Inc., 1982
4. Petti John, (2000) Sedimentary Rocks, CBS publications, New Delhi
5. Philips E M & Pugh D.S., (1998), How to get a Ph D, UBS publishers & Distributors, New Delhi
6. Rajit Kumar, (2005), Research Methodology, Pearson edition, New Delhi
7. Venugopal K , (2008), Research Methodology, university of Calicut
8. Rajendra Naragundkar : Marketing Research, Text and Cases, Mc Graw Hill, 2008.

7. GEOMAGNETISM

L T P C
4 0 0 4

Unit-I: Origin and sources of geomagnetic field, geomagnetic field elements, different periodicities and their implications, field variation of external origin, solar quiet variations, disturbed time variations, geographic and geomagnetic coordinates, concept of universal time, local time and magnetic local time, geomagnetic activity indices, importance of geomagnetic observatories.

Unit-II: Understanding the Earth's inner and outer atmosphere, Reversals of Earth's magnetic field, Magnetic observatory instrumentation, Micro pulsations, Analysis of Geomagnetic variations, Application of Geomagnetic data to explore the Earth and its atmosphere, Spherical Harmonic Analysis of Geomagnetic data, Introduction to Geomagnetic Hazards and Space weather.

Unit-III: Palaeomagnetism and history of the Earth's magnetic field, Palaeomagnetism, archeomagnetism and magnetic observatory records, Palaeolatitudes, pole position and apparent polar wander path, Geomagnetism from palaeomagnetism- basis of palaeomagnetic dating, Study areas and major findings.

Unit-IV: Environmental mineral magnetism: A multi-disciplinary approach, Environmental mineral magnetism and palaeomagnetism, Environmental magnetism: objectives and evolution, Characteristic curves for interpreting mineral magnetic data.

Unit-V: Measurements of magnetic susceptibility and remanence, Sediment and rock dating techniques, some complex issues associated with magnetic studies, Environmental magnetism- its application to Indian depositional settings, Magnetic susceptibility and depositional environments, Magneto-minerological s-ratio and palaeoclimate in sediments, Future studies.

References:

1. George Backus, Robert Parker, Catherine Constable, 1996, Foundations of Geomagnetism, Cambridge University Press.
2. Ronald T. Merrill, 2010, Our Magnetic Earth: The Science of Geomagnetism, University of Chicago Press.
3. Ronald T. Merrill, Michael W. McElhinny, Phillip L McFadden, 1998, The Magnetic field of the Earth: Paleomagnetism, the Core, and the Deep Mantle, Academic Press.
4. Nathani Basavaiah, 2011, Geomagnetism: Solid Earth and Upper Atmosphere Perspectives, Capital Publishing Company.
5. Gubbins-Herrero-Bervera, Encyclopedia of Geomagnetism and Paleomagnetism, Springer.
6. Tsuneji Rikitake, Yoshimori Honkura, 2011, Solid Earth Geomagnetism, Springer
7. Jack A. Jacobs, 1963, The Earth's Core and Geomagnetism, Elsevier Science and Technology.
8. William Lowrie, 1997, Fundamentals of Geophysics, Cambridge University Press.
9. Michael W. McElhinny, Phillip L. McFadden, 1999, Paleomagnetism: Continents and Oceans, Elsevier.

8. GEOPHYSICAL PROSPECTING METHODS

L T P C
4 0 0 4

Unit-I: Internal structure of the earth, Structure, composition and evolution of the earth and distribution of elements, Density distribution, shape and mass of the earth. Density vs depth profile, Various Geophysical Exploration Methods, Sea-floor spreading and magnetic polarity reversals, Magneto-stratigraphy.

Unit-II: Basic concepts, Earth's magnetism and gravity, Geomagnetic and gravity fields, Crustal magnetic and gravity anomalies & their sources, Surveying instruments for magnetic and gravity measurements, Magnetic and gravity surveys- ground, airborne, marine and satellite, Magnetic and gravity data processing & interpretation, Case studies.

Unit-III: Classification of electrical methods, Electrical properties of rocks and minerals, Elementary theory, Electrode layouts and field procedure, Processing & interpretation of resistivity data. Electromagnetic theory, Telluric and magnetotelluric methods, Geomagnetic depth sounding, Field survey and instrumentation, Interpretation techniques, Case studies.

Unit-IV: Seismic wave theory; Seismometry; Seismogram interpretation; Earthquake locations and Seismic sources; Determination of Earth structure; Earthquake kinematics and dynamics; Seismotectonics.

Unit-V: Elements of Geodesy, GPS Technology, Contributory Error and accuracy, GPS Observables, measurements and strategies, Terrestrial Reference frame, Applications of GPS, GPS measurements and active crustal motions: Case studies, Other spaceborne Geodetic techniques.

References:

1. Keller, G.V. Electrical Methods in Geophysical Prospecting, Frischnett, Pergamon
2. Patra, H.P. and Mallick, K. Principles of Geoelectric Soundings
3. Telford, W. K and Geldart, L.P., Sheriff, R. F and Keys D.A Applied Geophysics Cambridge
4. Keller and Frischkeicht , 1966, electrical methods in Geophysical prospecting Pergaon
5. Patra and Bhattacharya 1969 , Direct Current, Geoelectrical Sounding, Elsevier
6. Yilmaz, O, 1987, Seismic Data Processing, SEG Publication.
7. Dobrin M.B. Savit C.H. 1988 Introduction to Geophysical Prospecting. Mc. Graw Hill Book
8. Sheriff. R.E. and Geldart. L.P. 1987 Exploration Seismology, Vol. 1. Cambridge Univ. Press.

9. REMOTE SENSING & GIS

L T P C
4 0 0 4

Unit-I: Electromagnetic energy resources, electromagnetic radiation (EMR) spectrum, EMR energy – frequency – wavelength relationship, Boltzman law, Wien Law.

Unit-II: Characteristics of aerial photographs and satellite imagery – false colour composites, photo-elemental characters, reflectance and emittance- Geosynchronous and sunsynchronous orbits, location of a satellite in space, world referencing system.

Unit-III: Remote sensing plate forms - Characteristics of different remote sensing satellites and sensors, resolution, parallex, vertical exaggeration, relief displacement, mosaic, analysis and interpretations of aerial photographs and satellites imagery. Satellite remote sensing digital data products, data format and storage, preprocessing – atmospheric, geometric and radiometric correction, image rectification and registration.

Unit-IV: Digital image processing – contrast enhancement, image arithmetic, filtering, image transformation, classification of satellite image – supervised and unsupervised classification techniques, visible, thermal infra-red, microwave and hyper-spectral remote sensing principles and techniques. Advantages and disadvantages of Remote Sensing –Various application of remote sensing.

Unit-V: Definition of GIS – components of GIS – Geographical concepts – Input data for GIS – Types of output products – GIS Data types – Data representation – Data sources – Data acquisition – Geo referencing of GIS data – Spatial data errors – Spatial data structures. database management – hierarchical, network, relational, object oriented databases, data stream – data encoding and editing, data analysis - Application of GIS.

References:

1. P.K. Guha, Remote sensing for Beginner – EWP, New Delhi, 2003.
2. Sabino. F.F. Remote sensing principles and interpretation, Freeman, San Francisco, 1978.
3. Arnold. R.H. Interpretation of air-photo and Remotely sensed imagery, Printice-Hall, New Jersey, 1997.
4. Drury. S.A. Image Interpretation in Geology – Chapman Hall, London, 1993.
5. Lillesand. T.M. and Kiefu. R.W. Remote sensing and Image Interpretation, Willey, New York.
6. Miller.V.C, Photogeology, McGraw Hill – London, 1961.

10. MINI PROJECT

L T P C
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COURSEWORK FOR DOCTORAL DEGREE

HISTORY

2018



MANONMANIAM SUNDARANAR UNIVERSITY

TIRUNELVELI, TAMILNADU – 627 012.

PART – A (ANY ONE SUBJECT COMPULSORY)

SL.NO	SUBJECT TITLE	CREDITS
1	HISTORICAL METHODS AND RESEARCH	4
2	STATE AND SOCIETY IN MEDIEVAL INDIA	4
3	CONTEMPORARY HISTORY OF INDIA (1947-1991 A.D)	4

PART – B (OPTIONAL)

SL.NO	SUBJECT TITLE	CREDITS
1	SOCIO-CULTURAL HISTORY OF TAMILNADU(1916-1967 A.D)	4
2	SOCIAL MOVEMENTS IN TAMIL NADU(1900-2000 A.D)	4
3	LOCAL HISTORY (KANYAKUMARI,THOOTHUKUDI AND TIRUNELVELI DISTRICTS)	4

SL.NO	SUBJECT TITLE	CREDITS
4	GREAT THINKERS OF MODERN INDIA	4
5	ECOLOGICAL HISTORY OF INDIA (1865-2000 A.D)	4
6	WOMEN’S MOVEMENT IN INDIA (1885-1985A.D)	4

SL.NO	SUBJECT TITLE	CREDITS
7	STATE AND SOCIETY IN ANCIENT INDIA UPTO HARSHA	4
8	HUMAN RIGHTS IN INDIA (1945-1995 A.D)	4
9	HISTORY OF ART AND ARCHITECTURE IN TAMILNADU UPTO 1947 A.D	4

SL.NO	SUBJECT TITLE	CREDITS
10	ARCHAEOLOGY AND EPIGRAPHY:PRICIPLES AND METHODS	4
11	ECONOMIC HISTORY OF INDIA(1800-1947 A.D)	4
12	PROJECT	4

PART – A (1)

HISTORICAL METHODS AND RESEARCH

L T P C
4 0 0 4

Preamble: The Syllabus covers the basic concept of Ancient, Medieval and Modern Historiography. It is also very useful to learn the different trends in Historical writings and Components of Research Methodology.

UNIT – I : Meaning, kinds and Nature of History :

Meaning of History – Definition of History – Scope and purpose of History – Important study of History – Uses and Abuses of History – History and Allied subjects. **(10L)**

UNIT – II : Historiography in Ancient, Medieval and Modern period :

Ancient Historiography – Greek, Rome and India Medieval Historiography – Church, Arab and Indo-Muslim Historiography – Modern Historiography – Post modernist Historiography and Subaltern Historiography in India and Abroad – Selected Modern Historians in India and Abroad – William Byrd, Gerhard Friedrich Muller – Kalkana – Mohammed Iqbal – Alberuni – Amirhusru – Ferishta – Abdur Razzak – Gulbadan Begum – Abudl Hamid Lohani – Positivism – Auguste Comte – Historical Materialism – Karl Marx and Eric Hobsbawn – Imperialist Historians – J.S.Mill, Marx Muller – William Jones – F.W. Hegd – Nationalist Historians – Irbani Habib – Bipin Chandra – B.D. Kosambi pal – Romilathopar – R.C.Majumdar – D.D.Kosambi – K.M.Panikkar – B.A. Smith – Post Modernist – Derida and Michael Foucault – Subaltern Historians – Ranajit Guha – David Arnold – David Hariman – Gyanendra Pandey – Dipesh Chakrabarty – Annals – Marc Block – Fernand Braudel – South Indian Historians – K.K. Pillai – S.Manickam – K.A.Neelakanda Sastri – S.Krishnaswami Iyengar. **(15L)**

UNIT – III : Philosophy of History & Research Methodology

Meaning and Philosophy of History – Definition Development of Philosophy of History in Ancient times – Contribution of Vico, Hegel, Spengler, Tynbee. Choosing of Topic – Reasons for Undertaking Research – Choice of Topic – Historical Surveys – Primary Sources – Secondary Sources – Problem faced by the scholar and Historians – Collection of sources – Qualification of Research scholar. **(12L)**

UNIT –IV : Writing of History :

Objectivity in Historical Writing – Analysis of Sources – Problem of Authenticity or External Criticism – Forgery of documents – How to confirm Authenticity – Problem of credibility (or) Internal Criticism – Positive Criticism – Negative Criticism – Synthesis – Exposition – Documentation – Foot Notes – Abbreviation Glossary – Bibliography – Appendix – Format of Thesis – Format of Articles. **(12L)**

UNIT V - Methodology of Teaching

Teachings –Objectives of Teaching, Phase of Teaching – Teaching Methods: Letcture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project Method, Seminar – Integrating ICT in teaching: Individualised Instruction, Ways for Effective Presentation with Power Point – Documentation – Evaluation: Formative, Summative, & Continuous and Comprehensive Evaluation – Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development- Teaching Later Adolescents (11L)

(TOTAL:60L)

REFERENCE BOOKS

- Mahalingam, T.V., Early South Indian Palaeography.
Majumdar R.C – *Historiography in Modern India*, Bombay, 1970.
Majumdar, R.C., *Historiography in Modern India*, Bombay, 1970.
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Rajayyan, K., *History in Theory and Method*, Madurai, 1993
Ralph De Sola Microfilming.
Rowse, A.L., *The use of History*, London, 1963.
SailanGhose Archives in India
Sastri, K.A.N., *Historical Method*, Mysore, 1956.
Schallenberg, T.R., *Modern Archives – Principles and Techniques*
Sheik Ali, B., *History: It's Theory and Method*, Madras, 1991.
Sircar, D.C., *Indian Epigraphy*
Sivaramamurthi, C., *Indian Epigraphy and Indian Scripts*.
South India Historians: K.K.Pillai, K.A.N. K Rajayan
Sreedharan, E.A., *Text book o9f Historiography 500 BC to 2000 A.D.* Delhi, 2004
Subramanian, N., *Historiography*, Madurai, 1973.
Sampath, K., Pannerselvam, A. & Santhanam, S. (1984). *Introduction to educational technolog.* (2nd revised ed.). New Delhi: Sterling Publishers.
Sharma, S. R. (2003). *Effective classroom teaching modern methods, tools & techniques.* Jaipur: Mangal Deep.
Vedanayagam, E. G. (1989). *Teaching technology for college teachers.* New York: Sterling Publishers.

PART – A (2)

STATE AND SOCIETY IN MEDIEVAL INDIA

L T P C
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Preamble:The Study enables to provide clear cut idea about the condition of Medieval Indian States and Society. The Study is very useful to know about Market reforms, War techniques, Development of Mathematics, Astronomy, Medicine, and Art and Architecture of Medieval Indian Society.

UNIT I

Fixing the period of Medieval India- Sources for the Study of Regional States and Empires- Historiography on Medieval India- Land Grants and Development of Feudalism in North Indian Society- debate on Indian Feudalism **(11L)**

UNIT II

Important Regional Ruling Families- Southern Kingdoms: Cholas, Chalukyas, Pallavas and Rashtrakutas –Temples and Brahmadeyas-Ideological base of Kingship- Devotional Movement in Tamil Country during Cholas and Pallavas-Territorial Divisions of Mandalam and Nadus- Development of trade and Mercantile Corporations- Theory of Segmentary state. **(13L)**

UNIT III

Important Dynasties of Delhi Sultanate: Slave, Khalji, Tughlaq, Sayyid and Lody: State under Delhi Sultanate: Salient features of administration- Bureaucracy and Revenue system- Iqta system- Nobility and Ulemas- Socio-economic Conditions-Urban centres-Market Reforms of Alauddin Khalji- War technology- Knowledge systems: Mathematics, Astronomy and Medicine- Failure of Rajputs against Turks. **(13L)**

UNIT IV

Mughal State: Mughal Empire: Babar to Aurangzeb-Bureaucracy- Administration of Sher Shah Suri- Akbar's Mansab and Jagirdari Systems- Din-Illahi – Socio-economic Conditions- Mughal Literature, Art, Music and Architecture- Decline of Mughal Empire. **(12L)**

UNIT V

Vijayanagara: Krishnadevaraya and his welfare administration- Maratha State: Shivaji and his Administration- Marathas in Tamilnadu- Nayaks of Madurai, Thanjavur and Senji-Nayak administration and Palayakaras system. **(11L)**

(TOTAL :60L)

REFERENCE BOOKS

- Irfan Habib, Medieval India: The Study of Civilization, National Book Trust, 2008
- Irfan Habib, Economic History of Medieval India, Pearson Education, India, 2011
- Noboru Karashima, Concise History of South India: Issues and Interpretations, OUP, 2014
- Kesavan Veluthat, Political Structure of Early Medieval South India, Orient Longman, 1993
- K.A. Nilakanda Sastri, Colas, University of Madras, 1955.
- S.B.P. Nigam, Nobility under the Sultans of Delhi, Munshi Ram Manoharlal, 1968.
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- K.A. Nizami, State and Culture in Medieval India, Adam Publishers and Distributors, 1985
- Sathish Chandra, Medieval India (2 volumes), Har Anand Publications, 2005.
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- Kulke Harman, State in India (1000 - 1700), O.U.P. 1997.
- Richards J.F., The Mughal Empire, Cambridge University Press, 1993.
- Burton Stein, Peasant State and Society in Early Medieval South India, OUP, 1980
- S. Kathirvel, History of Maravas, 1971.
- K. Rajayyan, Rise and Fall of Poligars, University of Madras, 1974.
- R. Champakalakshmi, Tradition, Ideology and Urbanization, OUP, 1996
- Salma Ahmed Farooqui, A Comprehensive History of Medieval India: From Twelfth Century to Mid Eighteenth Century, Pearson, 2011.
- J.N. Sarkar, Shivaji and his Times, Sarvar and Sons, Calcutta, 1961.
- Sunil Kumar, The Emergence of Delhi Sultanate: AD 1192- 1286, Permanent Black, 2010.
- R. Champakalakshmi, Religion, Tradition and Ideology, OUP, 2011.
- Abraham Eraly, The Age of Wrath: A History of Delhi Sultanate, Penguin, 2017.
- Abraham Eraly, The Emperors of Peacock Throne, Penguin, 1997.

PART – A (3)

CONTEMPORARY HISTORY OF INDIA (1947 – 1991A.D)

L T P C
4 0 0 4

Preamble: The Syllabus Covers the entire Panorama of events right from Indias Independence to the assassination of Rajiv Gandhi, the then Prime Minister of India and the formation of Narasimha Rao's Ministry.

The Study will create a deep and intense Political Knowledge of India Since 1947.

UNIT – I

Partition and its fallout – Gandhiji's Martyrdom – Making of Indian Constitution – Adoption of draft report of the Constituent Assembly – Basic features of Indian Constitution – Principles of India Foreign Policy – Merger of Princely States with Indian Union – I General Elections (1952) – Re-organization of States on Linguistic basis. **(12L)**

UNIT – II

Five Year Plans – Thrust to agriculture and Industry – Land Reforms Abolition of Zamindari System. Land Ceiling Acts in States – War with China (1962) and Pakistan (1974) – Contrasting pictures of famines and Green Revolution Language Policy issue – Adoption of two language formula. **(12L)**

UNIT – III

Congress losing elections in many states in 1967 – rise of regionalism and regional politics. Issues in centre – State relations – Split in the congress – Emergence of Indira Gandhi as leader of Congress Party – Indira Gandhi's popularity on account of India's intervention in the formation of Bangladesh – unseating of Indira Gandhi by Allahabad Court Judgment and declaration of Emergency. **(14L)**

UNIT – IV

Emergency abuses and the call for total revolution by Jayaprakash Narayan – Punjab Crisis and Operation Blue Star – Assassination of Indira Gandhi and emergence of Rajiv Gandhi. **(10L)**

UNIT – V

Rajiv Gandhi's initiative in resolving the issues relating to Assam Mizoram and Srilanka – Rajiv Gandhi falling a prey to Tamil Tigers Terror attack – Congress returning to power with great majority with Narasimha Rao as Prime Minister. (12L)

(TOTAL:60L)

REFERENCE BOOKS

Bipan Chandra, (1999). *India after Independence*. Agra, Penguin Books.

Durga Das, (1969). *India from Curzon to Nehru and After*. New Delhi, Rupa & Co. Publishing Company.

Kapoor, A.C. (1963). *Select Constitutions*. (4th ed.). New Delhi, S. Chand & Co.

Kuldip Nayar, (1975). *India after Nehru*. Kanpur, Vikas Publishing House Pvt. Ltd.

Pylee, M. V. (1962). *India's Constitution*. Bombay, Asia Publishing House.

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Venkatesan, K. (2014). *History of Contemporary India: 1947 – 2012*. Rajapalayam, VC Publication.

PART – B (1)

SOCIO – CULTURAL HISTORY OF TAMILNADU (1916 – 1967 A.D)

L T P C
4 0 0 4

Preamble: The Syllabus Covers the entire Panorama of events right from the beginning of Non-Brahmin Movement to the Formation of D.M.K Ministry under C.N.Annadurai in Tamil Nadu.

The Study will create Knowledge about the Socio-Cultural issues like Non-Brahmin Movement, Self-Respect Movement, Depressed Class Movement, Anti-Hindi Agitation and Tamil Nadu Politics and the formation of DMK Ministry.

UNIT – I:

Madras Presidency – Tamil Districts – Impact of the Advent of the Europeans – Christian Missionaries – London Mission - Trancubar Mission – Madura Mission – Objective conditions for conversion – Christianity and Social Transformation. **(11L)**

UNIT-II:

Muthulakshmi Reddy - Abolition of Devadasi system – Right to Temple Entry movement – M. C. Raja’s Bill, Central Legislative Bill – Temple Entry Act passed in Rajaji Ministry, 1938 - Temple Entry in Madurai, Srirangam and Kumbakonam. **(11L)**

UNIT-III:

Early associations on Social and Cultural issues – South Indian Liberal Federations – Justice Party – Non Brahmin Manifesto – Non – Brahmin Movement – Self Respect Movement of Periyar – Status of Women – Self respect Marriage – Tamil revivalism - Anti-Hindi Agitation – Launch of Dravidar Kazhakam – Birth of DMK. **(12L)**

UNIT – IV:

Social Legislation under diarchy - Admission of the Depressed class people into Public School – Labour Schools – scholarship – Hostel for Depressed class students – Buckingham and Carnatic Mill labourer strike and – M.C. Raja’s Reaction – Gandhiji’s Harijan Welfare Schemes – Separate Electorate for Harijans and the Poona Pact. **(13L)**

Unit –V:

Rajaji's vocational education scheme - Anti Hindi Agitations –Two Language Formula – Kamaraj ministry - Mid day meals schemes – Opening of schools – Empowerment of Backward Classes – Programmes of Dravida Munnetra Kazhagam – 1967 Elections and formation of DMK ministry under C.N. Annadurai – D.M.K's Social Legislation – Cultural Symbolism of D.M.K. – Change of the name of State – Measures adopted for the Welfare of Backward Classes and Adi Dravidas.

(13L)

(TOTAL:60L)

REFERENCES BOOKS :

Dube, S. C; – *Caste and Race in India*, Bombay 1969.

Rajayan, K; – *History of Tamilnadu*, 1565 – 1982, Madurai, 1982.

Baliga, B. S ; – *Studies in Madras Administrations*, Vol.I. Madras, 1960

Bishop Caldwell; – *A History of Tinnelveli*, New Delhi, 1982.

I. Udayasankar; – *Periyar E. V. Ramasamy: Communal Justice and Social Recognition*, Chennai, 2006.

Pillai, K.K; - *Tamizhaga Varalarum Makkalum Panpadum*, Madras 1972.

“ ; - *Then India Varalarum*, Madras, 1960.

“ : - *The Caste System in Tamilnadu*, Madras, 1977.. Pate H.R ; - *Tinnevelly District Gazetteer*, Madras, 1917.

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“ ; - *Studies in Madras Administration*, Vol.I, Madras, 1960.

Chandra Babu, B.S; - *Social Protest in Tamilnadu*, Madras, 1993.

Mangala Murugesan, N.K; - *Self Respect movement in Tamilnadu 1920 – 1940* Madurai.

Udhaya Sankar, I; - *Backward Class Movement in Tamilnadu*, 2005.

Venu Gopal, P; - *Justice Party and Social Justice*, Madras 1992.

Raja, M.C; - *Oppressed Hindus*, Madras 1922

Gupta, S.K; - *The Scheduled Caste in Modern India politics: Their Emergence as a Political Power*, New Delhi, 1985.

Hardgrave, I, Robert, Jr.; - *Nadars of Tamilnadu – The Political Culture of Community in change* , Bombay1969.

Radhakrishnan. P; - *Backward Class Movement in Tamilnadu*, in M.N. Srinivas (Ed.), *Caste, its 20th Century Natar*, Penguin India (1996).

PART – B (2)

SOCIAL MOVEMENTS IN TAMILNADU (1900 – 2000A.D)

L T P C
4 0 0 4

Preamble: The Study enables to provide clear cut idea about the important Social Movements like Women's rights movement, Dalit Rights Movement and Movement against Dominant Caste Violence in Tamil Nadu upto 2000 A.D.

UNIT – I: Introduction

Meaning – Definition – Scope – purposes – Differences between Social Movement and Social Justice Movement. **(11L)**

UNIT – II:

Impact of Western Education – Role of Missionaries in creating Social Awareness – First Social Movement – Nadar's Temple Entry Agitation in Madurai, Kamuthi, Kazhugumalai and Sivakasi – Women's Rights to wear Upper garment in South Travancore – Muttukutti Swamigal. **(12L)**

UNIT – III:

Movement for Women's Rights – Western Education's – Impact on Women – Women's participation in Indian National Movement and the Corollary effect of consciousness on their rights – Women's Movement led by Annie Besant – Sarojini Naidu, Aruna Asaf Ali – Women's Movement in the Post-Independence Period. **(13L)**

UNIT – IV:

Social Movement for Dalit Rights – M.C. Raja – Rettaimalai Srinivasan – Deivendrakula Vellalar Movement – Perumal Peter – Immanual Sekaran. **(12L)**

UNIT – V:

Movement against dominant caste violence – Meenakshipuram – Sankaralingapuram – Uthapuram – Movement against Police Violence – Kodyankulam and Tiruneveli (Tamiraparani tragedy) **(12L)**

(TOTAL: 60L)

REFERENCES BOOKS:

- Ambedkar, B.R.; - *The Untouchable who were they and why they became Untouchables?* New Delhi, 1948.
- Antony Raj, S.J; - *A Study on Atrocities against the Dalits in Tamilnadu, Madurai.*
- Chandra Babu, B.S.; - *Subaltern Protest, Emerald Publications, Madras 1995.*
- Chidambaram Pillai, P; - *Rights of Temple Entry, Chennai, 2008.*
- Desai, A. R.; - *Social Background of Indian Nationalism, Bombay, 1970.*
- Dhananjay Keer; - *Ambedkar Life and Missions, Bombay, 1981.*
- Dube, S.C.; - *Caste and Race in India, Bombay, 1969.*
- Hanumanthan, K. R.; - *Untouchability – A Historical Study Upto 1500 A.D. Madurai, 1979.*
- Hardgrave, L, Robert Jr.; - *Nadars of Tamilnadu – The Political Culture of Community in Change, Bombay, 1969.*
- Ranjit Guha; - *Subaltern Studeis, Vol.I – IV, Oxford University Press, Newyork, 1985.*
- Rangaraju, G; - *Temple Entry Politics in Colonial Tamilnadu, Chennai 2006.*

PART – B (3)

LOCAL HISTORY (TIRUNELVELI, KANYAKUMARI AND THOOTHUKUDI DISTRICTS)

**L T P C
4 0 0 4**

Preamble: The Study enable to provide clear cut idea about the Socio-economic and religious Movements of the Southern most Districts of Tamil Nadu like Tirunelveli, Kanyakumari and Thoothukudi.

The Study will create a deep and intense knowledge of Advent of Missionaries, Growth of Education and participation of freedom struggle in the three Districts.

UNIT I

Meaning – Sources – Constructing Local History – Themes and Projects – Local History Research and its Significance – Relating Local History to their region / nation / world. **(10L)**

UNIT II

Tirunelveli during the times of Pandyas – Cholas – Cheras – Tenkasi Pandyas – Vijayanagar – Nayaks – Poligars – Islam in Tirunelveli – Arab Traders in Kayalpattinam, Thoothukudi – Marakkayars – Portuguese and Dutch in Tirunelveli and Thoothukudi – European Missionaries and their contributions – Catholic and Protestant – Cotton Cultivation and its impacts – Building of dams and reservoirs – Setting up of textile industries – Coral Mill, Thoothukudi – Harvey Mill, Papanasam – Joyal Mill, Kovilpatti – Intellectual Origin of Non-Brahman Movement – Swadeshi Movement in Tirunelveli – National Movement : Gandhian Phase. **(13L)**

UNIT III

Social Condition : Caste System – Caste hierarchy – Caste conflicts and Communal Violence – Social Disabilities – Slavery – Devadasi System – Marumakkathayam – Pullappedi – Parappedi – Mannappedi - Feudalism - Social reform movements – Upper Cloth Movement – Temple Entry Movement – Suchindram Satyagraha – New Social Formation – Social Conflicts and Social Change in Colonial Tirunelveli. **(12L)**

UNIT IV

South Travancore before the advent of Europeans – Portuguese Missionaries – Francis Xavier – Conversion of Paravas – Protestant Missionaries – Society for the Promotion of Christian Knowledge – London Missionary Society - Conversion of people to Christianity –

Growth of Education – South Travancore’s advancement in literacy and education – Other Missionary Activities – Salvation Army – Lutheran Mission – Islam – Religious reformists – Muthukutti Swamigal – Introduction of Commercial Crops and its effects. (13L)

UNIT V

South Travancore in the Freedom Struggle – Salt Satyagraha – Nanjilnad Congress Youth League – Quit India Movement – Travancore Tamil Nadu Congress – State - re - organization - Formation of Kanyakumari District – Nesamony. (12L)

(TOTAL: 60L)

REFERENCE BOOKS

George, D. H. (1982). *Kumari Mavattap Pennurimaip Porattam*. Chennai, Mani Pathippagam.

Kalyani Prabakaran, (2013). *Kumari Maavatta Samoogap Panpattu Varalaru*. Chennai, Kaavya.

Patchaimal, K. (2001). *Kumari Mavattam Pirantha Varalaru*. Samytoppu, Thamilaalayam.

Perumal, A. K. (2012). *Then Kumariyin Chariththiram*. Nagercoil, Sudharsan Books.

Perumal, A. K. (2003). *Then Kumariyin Kathai*. Chennai, United Writers.

Peter, D. (2008). *Kumari Mavatta Viduthalai*. Nagercoil, Kanyakumari Institute of Development Studies.

Vivekananthan, S. (2013). *Kumarinattuk Kottaikalum Kottaarankalum*. Chennai, Kaavya.

David Ludden, Peasant History in South India, Oxford University Press

Hardgrave, R. Nadars of Tamilnad

Kathirvel, S., A History of Maravas

Kammen, C., On Doing Local History

Pate, H. R., District Gazetteer: Tinnevelly

Philip, D., Jordan, The Nature and Practice of State and Local History

Robert Caldwell, A History of Tinnevelly

Stuart, H., Manual of Tinnevelly

PART – B (4)

GREAT THINKERS OF MODERN INDIA

L T P C

4 0 0 4

Preamble:The Syllabus Covers the entire Panorama of events right from the evolution of Modern India to Indian Renaissance.

The Study will create a deep and intense knowledge about the Role played by Modern Indian Social reformers and freedom fighters to make democratic India.

UNIT - I

Evolution of Modern India and her Socio-Economic and Political thought. Impact of Western Education – Emergence of indigenous educated elite – Indian Renaissance. **(12L)**

UNIT - II

Trend Setter Raam Mohan Rai – Kesav Chandra Sen – Eswar Chandra Vidyasagar – Dayanand Saraswathi – Swami Vivekananda and Tagore. **(12L)**

UNIT - III

Gokhale – M.G. Ranade – Dadabai Naoroji representing Economic Nationalism – Sir Syad Ahmad Khan, Muslim Moderlist – Tilak, M.N.Roy, Aurobindu, V.O.C. and Subramania Bharathi representing Militant Nationalism – B.R.Ambedkar – and his concept of annihilation of caste Ambedkar as archited of Indian constitution – Kamala Chatto Pathayaya. **(14L)**

UNIT - IV

Gandhi and his ideas on Swaraj, Sathyagraha & Ahimsa, Hindu – Muslim unity and Harijan Welfare. **(10L)**

UNIT – V

Post – Independent Era – Nehru – Vinobha Bhave – Sarvapalli Radhakrishnan – Rajaji – Jayaprakash Narayan – Ram Manohar Lohia – Periyar E.V.R and C.N. Annadurai. **(12L)**

(TOTAL:60L)

REFERENCE BOOKS

Ramachandra Guha, *Makers of Modern India*, Benguin Books India, 2010.

N. Jayabalan, *Indian Political Thinkers Modern Indian Political Thought*, Atlantic Publishers,2010.

Vishnoo Bhagwan, *Indian Political Thinkers*, Atma Ram & Sons,1999.

Verinder Grover, *Rabindranath Tagore*, Deep & Deep Publications, 1993

Raghavan Iyer, *The Moral and Political Thought of Mahatma Gandhi*, Oxford University Press, 2000

Desh Raj Sirswal, *Dr B.R.Ambedkar – The Maker of Modern India*, CPPIS Publication , 2016

Desh Raj Sirswal, *Jyotiba Phule, A Modern Indian Philosopher*, Darshan Journal, 2013

K Veeramani, *Collected works of Periyar E.V.R*, Amazon Digital Services, 2014.

V.Geetha *Towards a Non-Brahmin Millennium: From Iyothee Thass to Periyar*, Bhatkal & Sen,2001

Jayaprakash Narayan, *India : Struggle For Freedom, Political Social andEconomic*, Hope India Publications, 2006

PART –B (5)

ECOLOGICAL HISTORY OF INDIA (1865- 2000 A.D)

L T P C
4 0 0 4

Preamble: This Course aims to understand the evolution of the Eco-System, its impact for human beings, the threat to wild life and the problem of Slash and burn method of Cultivation.

The Course also explains environmental awareness through Chipco and Narmada Bachao Andalan Movements.

UNIT I

Evolution of the Eco-System: Foundation of Biosphere- Process of Evolution from Azoic Age to Quaternary Period- Symbiotic existence of plants and animals- Ascent of Human Beings- Emergence of Hunter-Gatherer Society. **(12L)**

UNIT II

Demographic Spread: Pastoralism- Use of iron and iron-plough agriculture-Settled Agriculture and Population Growth- The Age of Empires-Conservation from Above- Co-existence of different type of resource users. **(12L)**

UNIT III

Colonialism and Disruption of Ecology: Establishment of British rule- Plantation Forestry and Deforestation- The threat to wild life and the problem of slash and burn method of cultivation- British policy on forest management-Legislation on reserve forests- Social conflicts and their consequences. **(12L)**

UNIT IV

Industrialization and Mechanized Agriculture: Green Revolution and the advent of chemical agriculture-Depletion of natural resources for energy use-Industrial Impact-Polution and Ecological Degradation. **(12L)**

UNIT V

Capitalist mode of development and its impact on Eco System: Change in land use pattern-Erosion of local economic base-Displacement of People and Conservation from the below-Chipco movement and Narmada Bachao Andalan- Towards Environmental Awareness. **(12L)**

(TOTAL:60L)

REFERENCE BOOKS

G. Khozim, *The Biosphere and Politics*, Central Books Ltd, 1979.

Hugh Stretton, *Capitalism, Socialism and the Environment*, Cambridge University Press, 1976

William L. Thomas, *Man's Role in Changing the Face of the Earth*, 2 vols., Chicago, 1956

Donald Worster, *The Ends of the Earth: Perspectives on Modern Environmental History*, Cambridge University Press, 1988.

Eugene P. Odum, *Fundamentals of Ecology*, University of Georgia, 1959

Laeq Futehally, *Our Environment*, National Book Trust, 1999.

Alfred W. Crosby, *Ecological Imperialism*, OUP, 1986

Madhav Gadgil and Ramachandra Guha, *This Fissured Land: An Ecological History of India*, OUP, 1993

C.J. Baker, *An Indian Rural Economy, 1880-1955*, OUP, 1995

Joy Tivy, *Agricultural Ecology*, Longman, 1990.

Ramachandra Guha, *The Unquiet Woods*, Orient BlackSwan, 2013.

Mahesh Rangarajan, *Fencing the Forest, Conservation and Ecological Change in India's Central Provinces*, OUP, 1996

Mahesh Rangarajan and Sivaramakrishnan, *India's Environmental History: A Reader*, Orient BlackSwan, 2013.

PART – B (6)

WOMEN’S MOVEMENT IN INDIA (1885 – 1985 A.D)

L T P C
4 0 0 4

Preamble: This Course aims to understand on various organized efforts by women to improve their conditions and remove gender based inequalities and Social evils in India and to raise awareness on women’s participation on Social issues.

UNIT – I HISTORY OF WOMEN’S MOVEMENTS IN THE WORLD:

The fight for women’s educational rights, suffrage and fair working conditions for women and girls. Movement in Britain and USA – Un convention on the Elimination of All Forms of Discrimination against women – 1979 – International Bill of Rights for women 1981 – Women’s Movement in USA, Europe, Africa, Asia and Latin America. **(12L)**

UNIT – II STATUS OF WOMEN IN INDIA:

Status of Women in Pre-Independent India, Independent India, Gandhi and status of Women – Gandhi’s contribution for the betterment of women. The roots of discrimination against women. **(11L)**

UNIT – III WOMEN’S MOVEMENT IN INDIA ;

Social Reform Movements : Their efforts in addressing various women centered issues like, Women’s education, Widow remarriage, abolition of polygamy, child marriage, inheritance and property rights. Role of women in the struggle for freedom : Women’s organizations – All India Women’s organization, Bengal Women’s education League, Women’s role in Civil Disobedience Movement, Non Co-operation Movement, Quit India Movement – Role played by Annie Besant. **(13L)**

UNIT – IV WOMEN’S MOVEMENT IN POST INDEPENDENT INDIA:

Anti-arrack Movement in Andhra Pradesh, Himachal, Haryana, Orissa, Madhya Pradesh – Chipko Movement – Legal Status – political participation, Minority rights – Telengana and Tebhaga Movements – Madhura Movement, Dalit Women issues – Women’s Political Movement for 33% reservation in Registration – Social Welfare activities of All India Women’s Conference. **(13L)**

UNIT – V WOMEN LEADERS:

Bhikhaiji Rustom Cama – Kamala Devi, Aruna Asaf Ali – Durgabai Deshmukh, Satyawati, Swaroop Rani – Muthulekshmi Reddy, Kasturba Gandhi, Vijaya Lekshmi Pandit, Sarojini Naidu. (11L)

(TOTAL:60L)

REFERENCE BOOKS:

Laxmi Rani – Women Empowerment and Family Welfare, New Generation Press, Delhi, 2014.

Geraldine Forbes, Women in Modern India, Cambridge University Press 2008.

Maitrayi Krishnaraj, Women and Society.

Mary Wollescrot, Vidication of Women’s Rights.

P.K. Giri – Crime against Women, Sublime Publications, Jaipur, 2009.

Somya Banerjee (Ed) – National Policy for Women, Arise Publishers, New Delhi, 2009.

Madhu Kumar – Women’s Movements, Random Publications, New Delhi, 2012.

PART – B(7)

STATE AND SOCIETY IN ANCIENT INDIA UPTO HARSHA

Preamble: The Study enable to provide clear cut idea about the different Stages of State formation in ancient India and the unique features of Indian way of life.

UNIT – I ORIGIN OF STATE:

Origin and evolution of state. Four important theories of state: Evolution theory, Force theory, Mystical theory and the contract theory, Kautilya's theory of State. **(12L)**

UNIT – II STATE FORMATION IN ANCIENT INDIA:

From chiefdom to Kingdom – Mahajanapadas and the evolution of territorial state. **(10L)**

UNIT – III INDIA BETWEEN 650 BC – 185BC:

Kingship based Social relations – rigidity of Social structure – Revolt against orthodox religious beliefs – Birth of Heterodox faiths – Influence of Jainism and Buddhism. Empire building : Centralised Administrative System – State Monopoly over agriculture and trade. Asoka's Dharma State – Megasthenes account of Mauryan State and Society. **(14L)**

UNIT – IV INDIA DURING POST-MAURYA PERIOD:

Indo – Greeks and the Kushanas – Trade and Commerce – Inland and Maritime – Guild System – Trade with Rome, Egypt and China – Mutual Cultural influence. **(12L)**

UNIT – V THE CLASSICAL AGE OF INDIA :

Political unity under Guptas – Government – Social changes during the Gupta period – Fa-Hien's account of Indian Social life – Hieun-Tsang's account of people and the religious conditions in the country. **(12L)**

(TOTAL:60L)

REFERENCE BOOKS :

Romila Thapar, The Penguin Early India, 2012.

R. S. Sharma, India's Ancient Past, Orient Black Swam, 2014.

Padma Charan Dhal, Indian Society and Culture Atlantic Publishers (P) Ltd.

A.L.Basham, The Wonder that was India Rupa & Co, Calcutta, 1998.

“.....” – A Cultural History of India, Oxford Press, 2004.

S.P.Nanda, History of Ancient India, Dominant Publishers, New Delhi,2010.

Mahendra Kumar Talware, History of Indian Culture, Mangalam Publications, New Delhi, 2014.

S.C.Ray Chaudary, Social,Cultural and Economic History of India, Surjeet Publications, Delhi, 2002.

PART – B (8)

HUMAN RIGHTS IN INDIA (1945-1995A.D)

L T P C
4 0 0 4

Preamble: The Syllabus covers the entire panorama of events right from Indian Independence to the formation of Indian Human Rights NGO of Peoples watch at Madurai in 1995.

The Study will create a deep and intense knowledge about the evolution of Human Rights, Discrimination against women and issues related to Minorities, Dalits and Tribals.

UNIT - I

Human Rights – Concept – Theories – Evolution – Historical – Political and Philosophical – From Magna Carta to Declaration of Rights of man – Vindication of Women’s Rights. **(11L)**

UNIT - II

Circumstances leading to the appointment of commission on Human Rights by the U.N.O - Universal Declaration of Human Rights (1948). International Covenant on Civil and Political Rights (1966) – International Covenant on Economic, Social and Cultural Rihts (1966) Convention on all forms of Discrimination against Women (1979) – Other Declaration of U.N.O on Human Rights – Helsinki Declaration (1975) – Vienna Declaration (1993). **(13L)**

UNIT - III

India and Human Rights – Constitutional Provisions –Evolution of Fundamental Rights during the Struggle for Freedom – Nature of Fundamental Rights – Directive Principles of State Policy – Proponents of Indian Human Rights Movement – M.G. Ranade (Colonial Exploitation) Jothiba Phule (Mass Education) – Mahatma Gandhi (Multiple Strategies) – Iyothidas Pandithar and B.R. Ambedkar (Depressed Class Voice) – Pandita Ramabai and Darasin Shinde (Women Rights). **(12L)**

UNIT - IV

National Human Rights Commission and its main recommendations – State Human Rights Commission – National Commission for Minorites (1978) – National Commission for SC and ST (1990) – National Commission for Women (1992) Role of NGO’s – Peoples union for Civil Liberties (PUCL) (1976) – Peoples union for Democratic Rights (PUDR) (1976) – Kailas Satyarti’s Childrens Foundation – Peoples Watch, Madurai (1995). **(12L)**

UNIT – V

Contemporary Human Rights issues in India – Dowry Menace – Sexual harassment at working places – Children's issues – female infanticide and child labour – bonded labour – Refugees and their issues – Issues related to minorities Dalits and Tribals. (12L)

(TOTAL:60L)

REFERENCE BOOKS:

A.Andrews and W.D.Hines, International Protection of Human Rights, Mansell Publishing Ltd, London, 1987.

Maurice Carnston,What are Human Rights?, The Bodlay Head Ltd,London, 1973.

Jack Donnelly, The Concept of Human Rights, Croom Helm, London, 1978.

V.R.Krishna Iyer, Human Rights and Law, Vedpal Law House, Indore, 1984.

Sivagami Paramasivan, Studies in Human Rights, Salem, 2000.

Subbian, A Human Rights Systems, New Delhi, 2000.

PART- B (9)

HISTORY OF ART AND ARCHITECTURE IN TAMIL NADU

UPTO 1947A.D

L T P C

4 0 0 4

Preamble: The syllabus covers the basic concept and development of art and architecture in Tamil Nadu right from Sangam period to India's Independence.

The study will create deep and intense Salient features of Art and Architecture in Tamil Nadu.

UNIT-I

Definition – origin and growth – nature - scope – importance – various styles of architecture – Nagara, Vesara, Dravida and their features. **(12L)**

Unit-II

Buddhist architecture – Stupas – Chaityas – Viharas – Jain Architecture – Caves – Pillars. **(12L)**

Unit-III

Hindu Architecture representing Saivism and Vaishnavism: Pallava art and architecture – Chola art and architecture – Pandya art and architecture – Vijayanagar art Architecture – Nayak architecture. **(14L)**

Unit-IV

Islamic Architecture in Tamil Nadu. **(10L)**

Unit-V

Architecture under the foreigners – Portuguese – French – British – Churches and Buildings – Gothic Style. **(12L)**

(TOTAL: 60L)

Reference Books

Basham, A.L. (1975). *History of India*. New Delhi, Oxford University Press.

Mohideen Badusha, A. H. (2009). *History of Indian Architecture*. Tirunelveli, Sultans Publications.

Niccolo Manucci, (2010). *Mughal India*. Delhi, Low Price Publications.

Revathy Girish, (2013). *Architectural Tourism*. New Delhi, Dominant Publishers.

Saharan, M. S. (2014). *Modern Indian History*. New Delhi, Black Prints.

Selvaraj, C. (2009). *Indian Architecture*. Devidode, CSR Publication.

Smith, V.A. (2001). *Early History of India*. London, Odhamas Press.

PART – B (10)

ARCHAEOLOGY AND EPIGRAPHY: PRINCIPLES AND METHODS

L T P C
4 0 0 4

Preamble: The syllabus covers the basic concept of Excavation principles and conservation techniques of Archaeology and Epigraphy.

The study will create a deep knowledge of dating and recording of antiquities and Inscriptions of Cholas, Pandiyas, Pallavas and Vijayanagar.

UNIT - I: INTRODUCTION TO ARCHAEOLOGY

Definition, aim, scope of Archaeology, Pre historic Archaeology – Proto-historic and Historic Archaeology Relationship of Archaeology with social and Natural sciences. Kinds of Archaeology: Archaeological themes: Functionalism, New Archaeology,- Processual Theory Archaeology and Archaeology To-Day. Archaeological finds Artifacts. Weapons- Inscriptions – Coins – Pots heads and Monuments. **(12L)**

UNIT - II: RETRIEVAL OF ARCHAEOLOGICAL DATA

Techniques of Exploration, Surface Exploration. Transformational Process Field Survey On – Site investigations – site survey methods Horizontal Excavation – Vertical Excavation – The on a drant method- Trial Trench – Digging method. Stratigraphy, Principles of Excavation – Excavation of a Burial, Excavation tools – Survey Equipment. **(12L)**

UNIT - III: PRESERVATION AND RECORDING

Aims and Methods of Conservation – Preliminary conservation methods. Organic material – Inorganic material- Natural Preservation. Recording and preparation of Reports. Photography Maps Site Note Books – Catalogue card Trench Report . Relative, Stratigraphy, Typology, Absolute, Carbon 14, Pottasium –Argon, Fission Track. Thermo luminescence, Uranium series Dendro chronology , Pollen analysis – Varve clay analysis. Other methods. Flourine, Nitrogen, Phosphate analysis. Pollen Dating – Historical Dating. **(12L)**

UNIT - IV: INTRODUCTION TO EPIGRAPHY

Definition and meaning of Epigraphy Origin - Kinds - Supplementary source for the study of Political and Cultural History of India. Incriptions - Types of Inscriptions of Texts - T Brahmi - Vatteluttu - Grabtga -Nagaru – Kharoshti. **(12L)**

UNIT – V: INSCRIPTIONS AND DATING

Estampage method-Decipherment of scripts - Cave Inscriptions - Inscriptions of Pallavas, Cholas, Pandiyas and Vijayanagar. Copper Plate Inscriptions - Royal Seals - Symbols of Ruling Powers of North and South India - Difference between Stone Inscriptions and copper Plate Inscriptions. Inscriptions on Pottery.

(12L)

(TOTAL:60L)

REFERENCE BOOKS

- Joseph W. Miches 1973, Dating Methods in Archaeology.
- Rajan K. 1976, Archaeology: Principles and Methods.
- Raman K.V. 1986, Principle and Methods of Archaeology.
- Balasubramanian .R 2002, Delhi Iron Pillar – New Insights.
- Daniel Glyn .E, 1967, The origin and Growth of Archaeology.
- Buhler .G, Indian Palaeography, New Delhi, 1968.
- Pandey .R.B, Indian Palaeography, Benaras, 1952.
- Mahalingam T.V. Early South Indian Palaeography, University of Madras, 1967.
- Rajan.K., Kalvettiyal(Tamil), Thanjavur.
- Subramanian, T.N., South Indian Temple Inscriptions.
- Sivarama Murthy,C., Indian Epigraphy and South Indian Scripts.
- Hultzsch E.,Venkayya.V.,and Rai Bahadur.,South Indian Inscriptions(34 Vol).,1890.
- B.R.Gopal,South Indian Studies,Mysore,1990.

PART – B(11)

ECONOMIC HISTORY OF INDIA (1800-1947 A.D)

L T P C
4 0 0 4

Preamble: The Syllabus covers the entire panorama of events right from 1800 to Indian Independence.

The Study will create deep and intense economic policies and developments made by British in India, Industrial and Agricultural bases set by the British for further developments and knows about the exploitation of the Indian economy by the British.

UNIT I

The rise of British East India Company as a territorial power-De-industrialization and loss of independent livelihood to artisans engaged in traditional arts and crafts in the aftermath of Industrial Revolution in England- Impact of Company rule on agrarian conditions-de-urbanization- Impoverishment of the rural society. **(12L)**

UNIT II:

Experiments in land revenue administration- Permanent Settlement/ Zamindari, Ryotwari and Mahalwari systems-Introduction of commercial agriculture-cash crops: cotton, groundnut, indigo, tobacco- plantation crops: coffee, tea, rubber- Oppressive land revenue system-resettlement operations-neglect of irrigation- Protection to money-lending class-practice of usury and resultant indebtedness leading to rural distress- emigration to Empire colonies to escape starvation deaths under indentured labour system. **(13L)**

UNIT III:

Transfer of power to Crown in the wake of Great Rebellion- Investment of British surplus capital in India- Building of railways under guaranteed interest scheme-Home Charges-Drain of wealth- Free Trade policy of the British- Worsening terms of trade - Maintaining balance of payments by export of gold- Growth of European enterprises in cotton textiles, jute and plantations. **(12L)**

UNIT IV:

Recurring famines and epidemics-inadequate relief measures of the imperial government-Nationalists' critique on fiscal and monetary policy of the colonial state- banking, currency and exchange rates- The fallout of Swadeshi movement and World War I- Emergence of indigenous capital and industrial labour- state industrial policy- factory legislation- labour and trade union movements. (12L)

UNIT V:

Discriminating protection and measures aiming at decolonization-Great Depression and Its impact on agriculture, trade and industry- overvaluing of Indian rupee- Colonialism adding to the Depression- experiences during World War II- Bombay Plan-End of Colonial rule. (11L)

(TOTAL:60L)

REFERENCE BOOKS

Veera Anstey, *The Economic Development in India*, Longman, 1936

Radha Kamal Mukherjee & H.L. Dey, eds. *Economic Problems of Modern India*, 2 vols., Macmillan, 1941.

Baker, C.J. *An Indian Rural Economy: The Tamilnadu Countryside*, Oxford University Press, 1984

Bhattacharya, D. *A Concise History of Indian Economy*, Prentice Hall, 1977.

Bipan Chandra, *Nationalism and Colonialism in Modern India*, Vikas, 1979

Buchanan, D.H. *The Development of Capitalist enterprise in India*, Frank Cass, 1966

Dadabhai Naoroji, *Poverty and Un-British Rule in India*, Publication Division, Govt. of India, 1962.

Daniel Thorner and Alice Thorner, *Land and Labour in India*, Asia Publishing House, 1962

David Washbrook,. "The Commercialization of Agriculture in Colonial India: Production, Subsistence and Reproduction in the 'Dry South', C. 1870-1930." *Modern Asian Studies*:28, no. 1 (1994).

Dharma Kumar, Tapan Raychouhry eds. *The Cambridge Economic History of India, volume II, 1757-1970*, Cambridge, 1983

Dutt, R. C. *The Economic History of India*, Vols. I & II, Publication Division, Govt. Of India, 1970.

Dutt, R.P. *India Today*, Manisha Granthalaya, Calcutta, 1979.

Gadgil, D.R. *Industrial Evolution of India in Recent Times*, Oxford University Press, 1954

Gopal, S. *Permanent Settlement in Bengal and its Results*, OUP, London, 1949.

Hugh Tinker *A New System of Slavery: The Export of Indian Labour Overseas 1830-1920*. London: Inst. of Race Relations, 1974.

Irfan Habib, 'Colonialization of Indian Economy (1757-1900)' *Social Scientist*, No. 3, 1975

Loganathan, P.S. *Industrial Organization in India*, George Allen and Unwin, 1935

Nilmoni Mukherjee, *The Ryotwari System in Madras 1792-1827*, 1962

Rajat K. Ray (ed) *Entrepreneurship and Industry in India, 1800-1947*, OUP, 1994.

Rothermund, D. *Asian Trade and European Expansion in the Age of Mercantilism*, Manohar, 1981.

-----, *An Economic History of India*, Croom Helm, 1988

-----, *The Global Impact of the Great Depression*, Routledge, 1996

-----, *Indian Economy and other Essays*, Manohar, 1983

PART – B (12)

PROJECT

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

Department of Library and Information Science

Ph.D. Course Work Syllabus (2017-18 ONWARDS)

S.No	Name of the Course
	CORE PAPER
1.	Research Methodology
	ELECTIVE PAPERS (ANY TWO from Group A or B or C)
	Group – A
2	Informetrics and Scientometrics
3	User Studies in Digital Era
4	Information Literacy
	Group – B
5	Electronic Resources Management
6	Library Automation and Digitization
7	Digital Libraries
	Group – C
8	E-Learning and Content Development
9	Public and Academic Library System
10	Marketing of Information Products and Services
	MINI PROJECT
11	Mini Project

Core Paper

Title: RESEARCH METHODOLOGY

Objectives

1. To understand the role and importance of research in Library and Information Science
2. To introduce different methods and techniques of research
3. To familiarize in the use of statistical tools of research and to develop research report skills.

Unit – I

Research: Concept, Characteristics and Types- Pure, Applied, Action and Inter Disciplinary Research – Logic and Scientific method.

Unit - II

Research Problem-Identification, Selection and Formulation of a Research Problem; Research design; Literature Search and Review of Literature; Hypothesis-definition, Types and Characteristics.

Unit – III

Research Methods- Survey – Historical – Case study – Experimental etc; Sampling – Definition, Types and Relevance -Data Collection: Data Sources – Field data and Secondary data; Data collection Methods – Questionnaire / Schedule, Observation etc.

Unit – IV

Data Analysis: Analysis and Interpretation – Statistical Tools and Techniques- Measure of Central Tendency, Frequency Distribution, Regression and Correlation; SPSS.

Unit – V

Research Report Writing – Structure and Presentation – Article, Thesis and Dissertation, Project Report – Style Manuals – APA, MLA – Application IT in Research.

Reference

Flick,Uwe.(2015). Introducing Research methodology: a beginner’s guide to doing a research project. Sage

Kothari, C.R.(2017). Research Methodology: Methods and Techniques. Reprint.New Age International

Kumar, PSG. (2016). Research and Statistical Techniques, BR Publishing

Group-A

Title: INFORMETRICS AND SCIENTOMETRICS

Objectives

1. To learn the concept, use, theories, laws and parameters of bibliometrics.
2. To understand citation analysis and operation research
3. To teach the students the application of bibliometrics to study the literature in different subjects.

Unit -I

Informetrics – Evaluation – Concept, Librametrics, Bibliometrics, Scientometrics, Webometrics.

Unit –II

Theory and Laws - Zipf's law, Lotka's Law, Bradford's Law. Price Theory.

Unit – III

Quantitative and Qualitative techniques: Types, Multidimensional scaling, Cluster analysis, Correspondence analysis, Co-word analysis, media and audience analysis.

Unit –IV

Citation Theory and Analysis; Definition, Theory of citing, different forms of citations, Age of citation – citation counts , Self –citation – Citation Index - Impact Factor – H Index.

Unit – V

Bibliometrics and Scientometric Analysis using Statistical Software packages

(Hits cite, Bib excel and VoS - Viewer).

Reference

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Dolrov, G.H and Korennoi, A.A. The informational basis of scientometrics: on theoretical problems of informetrics. *F.I.D.435.1969*. pp.165-191.

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Group-A

Title: USER STUDIES In DIGITAL ERA

UNIT I

Information users and their information needs: Categories of information users, Information needs- definition and models, Information seeking behavior.

UNIT II

Information need - Definitional and conceptual problems. Distinction between needs, - wants, demands and requirements; Levels of information need Taylor's model, Lancaster's four levels, - Cronin's three levels; - Koikela's two levels of information need.

UNIT III

User studies: Concept of user studies, Importance of user studies, Types of user studies, Methods and techniques of user studies: Questionnaire, interview, observation and diary.

UNIT IV

Library Surveys Techniques of library and information centres survey, Proforma method, Interview method, Record analysis method.

UNIT V

Planning a library or user survey, User - Understanding the psychology of information user.

Reference

Mai, J.E.(2016) .Looking for Information: A Survey of research on information Seeking, needs and behavior. Emerald Publishing.

Osborne,Larry N. and Nakamura, Margaret. System for Librarians and Information Professionals. 2nd ed. Engewook: Libraries unlimited, 2014

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Kumar, PSG. Library and Users: Theory and Practice. BR Publications, New Delhi, 2016

Ravichandra Rao (2016): Quantitative Methods in Library and Information Science. Delhi: Wiley Eastern, 2016.

Sridhar, MS. Library Use and User Research. Concept Publishing Co.,New Delhi;

Group- A

Title: INFORMATION LITERACY

Objective:

- To know the concept of Information Literacy
- Understand the application of Information Literacy in Library
- To know the trend in Information Literacy

Unit I

Fundamentals of Information Literacy – Concept, Need and Objectives – Areas of Information Literacy – standards in Information Literacy – Role of Institution in Information Literacy

Unit II

Information Literacy programmes – Scope of Information Literacy Programme – National Programmes in Information Literacy – International Programmes in Information Literacy – various information Literacy models – Rubrics, ALA, ACRL, CILs, SCONUL, ICDLs..

Unit III

Methodology of information Literacy – Information Literacy Products : Library Brochure, Database Brochure, Web-Based Access Instructions, Information Bulletin – Designing of Information Literacy Programme – Implementation of Information Literacy Programmes

Unit IV

Application of Information Literacy in Library and information centres – Information Literacy for Users – Information Literacy for Professionals – IL for Science and Technology – IL for Social Science – IL for Research and development.

Unit V

Trends in Information Literacy Web based Information Literacy system – OPAC Information Literacy System – Lifelong learning system

Reference

Alagaran II, Jose Reuben Q (2015). Explore, Engage, Empower Model: Integrating Media and Information Literacy for Sustainable Development in Communication Education Curriculum; in Media Information Literacy for the Sustainable Development Goals; Jagtar Singh, Alton Grizzle, Sin Joan Yee and Sherri Hope Cuiver edited; MILID Yearbook 2015; International Clearinghouse on Children, Youth and Media; NORDICOM; University of Gothenburg.

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Martens, Hans (2010). Evaluating Media Literacy Education: Concepts, Theories and Future Directions; in the *Journal of Media Literacy Education* 2:1 (2010) 1-22; The National Association for Media Literacy Education.

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Group –B
Title: Electronic Resources Management

Objectives

- To familiarize with the various Electronic resources available in libraries
- To Know categories of E- resources according to their forms
- To understand the different formats of E- resources and their capacity in terms of memory
- To know the preservation methods of various types of media resources.

Unit I

Introduction to Electronic Resources - Types of Electronic Resources - Primary Sources -Online Databases -Reference Sources-Libraries and Subject Gateways - e-books, ejournals,e-databases .

Unit II

Building and Management of e-resources - Multimedia basede-resources - Commercial Vendors -Meta Resources -Electronic Books -Advantages of Internet Resources - Evaluation of Internet Resources

Unit – III

Role of Internet in Information Transfer - Subject gateways - Commercial database services COMPENDEX, EiTech, SCOPPLTS, Emerald - Database Searchware SCIRUS" Google Scholar, EBSCO.

Unit IV

Types of Media Resources -Paper (Print) -Care, Handling and Storage - Film – Filmstrips- Slides -Cinefilm -Microforms -Care, Handling and Storage - Magnetic - Audio Tape - Video Tape - Storage Disks - Care, Handling and Storage - Plastic - Transparent Plastics - Vinyl Discs - Optical Storage Systems - Care, Handling and Storage

Unit V

Types of Equipment -Filmstrip Projectors - Slide Projectors - Cine Projectors - Microform Readers - Magnetic Tape Recorders - Overhead Projector - Record Player - CD-Player - Criteria for Selecting Equipment - Maintenance of Equipment - Problems with Equipment

Reference

- American Library Association. Scholarly communication tool kit.
(<http://www.ala.org/ala/acrl/acrlissues/scholarlycomm/scholarlycommunicationtoolkit/toolkit.cfm>)
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<http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html>
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Group- B

Title: LIBRARY AUTOMATION AND DIGITILIZATION

Objective

1. To get familiarized with the various library software.
2. To know the process of Digitalization.

Unit – I

Library Automation: Historical Perspectives, Need and Purpose, Approaches to Library Automation – Hardware and Software requirements – Commercial Software and Open Source Library automation Software - Automated Housekeeping Operations: Acquisition, Serials Control, Circulation, OPAC and Administration. Management of Library Automation: Planning, Data, Formats and Standards – ISO 2709, MARC21, Z39.50 - Retrospective Conversion, Implementation and Evaluation.

Unit – II

Computerized Information Services: Alerting Services, Bibliographic Services, Document Delivery Services and Reference Services. ICT Infrastructures – Systems – Configuration. Networks Types Routers Reprography Machine –Barcode Scanner – RFID

Unit – III

Library / Bibliographic application software, Koha, SOUL, over view of other packages, Boolean Search - Evaluation of Library automation software.

Digitization: Basics - Definition - Need for Digitization, Tools of Digitization: Scanners, Scanning Software, Digital Library Software.

Unit – IV

Selection of Materials for Digitization: Steps in the Process of Digitization, Scanning, Indexing, Storing and Retrieving. Digitization: Input and Output Options - Scanning as Image Only, Optical Character Recognition (OCR) and Retaining Page Layout, Retaining Page Layout using Acrobat Capture and Re-keying.

Unit – V

Technology of Digitization : Bit Depth or Dynamic Range, Resolution- Threshold - Image Enhancement -Compression - Lossless Compression - Lossy Compression - Compression Protocols, File Formats and Media Types, Formats and Encoding used for Text. Planning and Implementation: Feasibility - Planning the Project - Purchase of Hardware and Software, Selection of Material for Digitization and ‘Born Digital’- Placement and Training of Manpower - Content Creation and Execution of the Project.

Reference

Guha, B., A report on feasibility study on Automation and Networking of Library (DLNET).NISSAT, DSIR, New Delhi.

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Group –B

Title: DIGITAL LIBRARIES

Objective

1. To get familiarized with the various digital libraries
2. To know about different types of content and technology
3. To know about the collection development and infrastructure

Unit I

Introduction-Traditional Library- Information Retrieval System and Digital Library
Electronic, Virtual, Hybrid and Digital Libraries Characteristics of Digital Libraries
World Wide Web (WWW) V/s Digital Library

Unit II

Digital Library: Towards a Definition Why Digital Library? Some Important Digital
Libraries New Zealand Digital Library
(<http://www.nzld.org/NetworkedComputerScienceTechnicalReferenceLibrary>) (<http://www.ncstrl.org>)
ArXiv.org(<http://www.arxiv.org/>) ScienceDirect
(<http://www.sciencedirect.com/>)

Unit III

Digital Storage Technology -Magnetic Storage Media -Optical Storage Media -Flash
Memory Devices or USB Drives -Online Databases and Information Retrieval System
(IRS) -Computer-based Information Storage and Retrieval System- Digital Imaging
Technology -Institutional Repositories -Internet Technology and its Services
Development of Web Browsers -Hyperlinks and Development of World Wide Web -
Electronic Resources

Unit IV

Collections Infrastructure -Digital Knowledge Organization -Access Infrastructure:
Browse, Search and Navigation Interfaces of Digital Library Search, Browsing and
Navigational Interfaces-Network and Computing Infrastructure-Intellectual Property
Rights (IPR) and Digital Rights Management- Intellectual Property Rights (IPR) Digital
Rights Management and Access Control in Digital Library-User Authentication -User
Authorization Technology of Access Control and Access Tracking in Digital Library -
Digital Library Services

Unit V

Collection Development -Digital Collection -Identification of Digitization-Benefits of
Digitization-Selection of Electronic Resources -Selection Criteria and Evaluation of
Electronic Resources Content -Functionality and Reliability -Technical Support-Vendor
support-Pricing Model-Print + E Model-Electronic Only-Full-time Equivalent Models -
Concurrent-Users Model -Perpetual Access V/s Annual Lease-Back-file Access -
Document Delivery and Pay-Per-View Models-Licensing Consideration -Access Concern
Copy Right and Fair Use-Flexibility and Enhancement- Legal Issue

Reference

Arms, William Y. (2000). *Digital Libraries*. The MIT Press: Cambridge, MA.

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Group –C

Title: E-learning and content Development

Objective:

- To explain the concepts such as content development and collaborative content development
- To discuss content development tools and the various formats of content
- To explain the different types of content management system
- To highlight the best practices for collaborative content development

Unit I

Content:An Overview - Concept - Content Tools (Media-wise) - Content Formats - Introduction to Collaboration - Tools for Collaboration on the Web - Features of Collaboration Tools - Collaborative Content Development - Content Management System: Models and Best Practices - Web Content Management System - E-learning Content Management System - Collaborative Content Development System.

Unit II

Digital Research Repository System - Best Practices for Collaborative Content Development - Web Content Life Cycle Framework 12.5.1 Life Cycle Management - Issues and Challenges: Quality, Validity and Authentication - Implications for Libraries

Unit III

Web-based Products and Services - Web 2.0: Characteristics - Web 2.0 Tools - Some Popular Web-based Services - Wikis - Blogs - Social Bookmarking - Social Networking - Use of Web-based Services in Libraries - Web-based Library Services - Lib 2.0 or Library 2.0 - Web-based Learning and Education - AnswerTips - Campusbug - Elgg – Moodle

Unit IV

World Wide Web - Conceptual Framework of WWW - Communication Architecture - Protocols - Markup Languages - Definition and Need - Types of Markup Languages - Web 2.0 - Definition and Need -Features of Web 2.0 Applications - Web 2.0 Applications - Impact of Web 2.0 Tools Over WWW and Semantic Web

Unit V

Distributed Service - Web Directory - Bulletin Board - Mailing List and Discussion Lists - Resource Sharing - Online Document Repositories - Web Portals - Email - Online Storage and Searching - E-publishing - Webcasting - Interactive Distributed Services - Interactive Learning - Interactive Business and Trading - Remote Computing and File Transfer - Interactive Communication - Interactive Search Agent and Document Delivery - Interactive Bookmarking - Interactive Translation Service

Reference

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(http://radar.oreilly.com/archives/2005/10/web_20_compact_definition.html)

O'Reilly, Tim. What Is Web 2.0? O'Reilly.net. Posted September 30,

2005. (<http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>)

Group- C

Title: PUBLIC AND ACADEMIC LIBRARY SYSTEM

Objectives

1. To define the basic objectives of academic libraries
2. To know the various sources of finance to strengthen the academic library system
3. To encourage students to evaluate the user studies using new techniques

Unit – I

Public Libraries and their Development: Objectives and Functions- History and Development of Libraries with Special Reference to India - Role of Public Libraries in Society - Agencies and their Role in Promotion and Development of Public Libraries in India. Collection Development and Management: Periodicals, Conference Literature, Grey Literature and Government Publications - Non-Book Materials – Electronic Sources and Online Databases

Unit – II

Library Organization and Administration: Organizational Structure - Staff Manual, Library Surveys, Statistics and Standards, etc. Information Services: CAS, SDI, Abstracting and Indexing Services - Library Bulletin, Newspaper Clipping Services - Computerized Services - Resource Sharing and Networking

Unit – III

Financial and Human Resource Management: Determination of Finance, Sources of Finance - Types of Budget - Nature, Size, Selection, Recruitment, Qualification and Training - Responsibilities and Duties - Competency Development.

Unit-IV

Academic Library: Objectives, Functions and Services – Role of Academic Library in Higher Education – Academic Library Services – Academic Library Management – Role of UGC for Academic Library Development. Resource Development: Physical Resources including ICT infrastructure – Human Resource Development – Financial Resource Development: Sources of Library Finance in University and College Libraries, Library Expenditure, Budget and its Kinds, Financial Estimation.

Unit-V

Collection Development: Collection Development, Write-off and Weeding out policy – Problems in Collection Development – Role of Library Committee in Collection Development.

Reference

Agarwal, J. N. "Libraries in Ancient India." *Indian Librarian* 8.4 (1954): 141.

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Group- C

Title: MARKETING OF INFORMATION PRODUCT AND SERVICES

Objectives

1. To familiarize the students about the changing philosophy of Library and Information Services from free to fee based information services.
2. To understand the Economic value of information.
3. To impart knowledge in product planning, product pricing and also to understand the market behaviour

Unit -I

Information as a commodity and resource – information products – nature and types – tangible and intangible, Information Commons, Information Ecology.

Unit-II

Marketing of information- concept – need and purpose – marketable products and services – approaches- corporate strategy.

Unit - III

Market segmentation – Targeting – geographic – Demographic –Behavioral – Psychographical segmentation – user behaviour – adoption, marketing plan – Marketing Strategies.

Unit -IV

Marketing mix: Designing – communication – product mix strategy – Kotlers Four C's Mccarthy's Four P's – competition analysis – pricing policy and methods.

Unit -V

Marketing research; definition, functions, types and scope – applications – Technique's – marketing information system – components-functions

Reference

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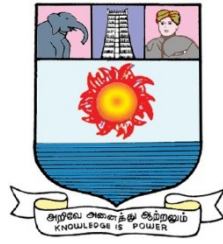
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**MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI-627 012, TAMILNADU, INDIA**

CENTRE FOR INFORMATION TECHNOLOGY AND ENGINEERING

Board of Studies Meeting

**Ph.D. Information Technology
(CBCS-University Department)**

**Regulations, Scheme and Syllabus
For those who joined from the academic year 2016-2017 onwards**

**Submitted by
Chairman, BOS and Head,
Centre for Information Technology and Engineering,**

to

**The Registrar
Manonmaniam Sundaranar University
Tirunelveli - 12**

MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI-627 012, TAMILNADU, INDIA
Centre for Information Technology and Engineering
Ph.D Course Work
(CBCS-University Department)

B. SCHEME FOR PH.D COURSE WORK

(For those who joined from the academic year 2016-2017 onwards)

Title of the Subject	Hrs/ week	Credits
RESEARCH AND TEACHING METHODOLOGY	4	4
DATA SCIENCES AND BIG DATA ANALYTICS	4	4
ADVANCED DIGITAL SIGNAL AND IMAGE PROCESSNG	4	4
MODERN COMMUNICATION SYSTEMS	4	4
PERVASIVE, GRID AND CLOUD COMPUTING	4	4
ENGINEERING RESEARCH METHODOLOGY	4	4
PATTERN RECOGNITION AND IMAGE ANALYSIS	4	4
CLOUD COMPUTING	4	4
COMPUTING FOR DATA ANALYTICS	4	4
BIG DATA ANALYTICS	4	4
FOUNDATIONS OF INFORMATION SECURITY	4	4
INTRODUCTION TO DIGITAL FORENSICS	4	4
ADVANCED INFORMATION SECURITY	4	4
COMPUTING TECHNIQUES FOR CANCER ANALYTICS	4	4
REMOTE SENSING AND IMAGE	4	4

INTERPRETATION		
INTRODUCTION TO MICROWAVE ANTENNA AND RADAR SIGNAL PROCESSING	4	4
AN INTRODUCTION TO DATA ANALYTICS	4	4
STATISTICAL LEARNING FOR DATA ANALYTICS	4	4
MACHINE LEARNING ALGORITHMS FOR DATA ANALYTICS	4	4
DESCRIPTIVE AND DISCOVERY ANALYTICS	4	4
ADVANCED INTERNET OF THINGS	4	4
CRYPTOGRAPHY AND NETWORK SECURITY	4	4
ADVANCED DEEP LEARNING FOR MALWARE ANALYSIS	4	4
FOUNDATIONS OF MALWARE ANALYSIS	4	4
STUDY OF MALWARE ANALYSIS TOOLS AND DATASET	4	4
MINI PROJECT	4	4

RESEARCH AND TEACHING METHODOLOGY	L	T	P	C
	4			4

Unit I: BASIC RESEARCH PROCESS:

Objectives and Motivations - Distinct Approaches and Significance of Research - Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs Experimental Researches - The significance of research - Research Methodology vs Research Methods - Research Process - Finding a Research Topic and Beginning Research - Directed Study - Research Problem Formulation - Extensive Literature Survey and Choosing an Idea - Measures of Good Research; UNDERSTANDING SCIENCE AND SCIENTIFIC RESEARCH: Goal and Process - Definitions by Contrast - Scientific Methods - Criteria to Evaluate Theories - Knowledge and Abstraction - The Origins of Knowledge - The Role of Science in Knowledge Creation - Knowledge and Objectivity - Perception and —Direct Observation - Science and Truth - Critical Thinking - Logical Arguments - Deduction and Induction. (12L)

Unit II: RESEARCH METHODOLOGY FOR SCIENCE AND ENGINEERING:

What is known as Science? - Fusion of Science, Research, Engineering & Technology - Distinctions between Science and Technology - Pseudoscience - Science And Ethics - Science vs Engineering - Distinct perspectives of goals and Importance of Knowing How Engineering Research is done - Stages in Research Execution Process; FORMULATING AND EXECUTING A RESEARCH:PROBLEM: Understanding and Formulating a Research Problem - Issues with Choosing the Research Problem - Need for Defining the Research Problem - Various steps involved in Defining the Research Problem - Designing Research Plan for Science and Engineering - Components and Key Parameters of a Good Research Plan - Types of Research Plan - Developing an Experimental Plan for Research - RESEARCH METHODS FOR SCIENCE AND ENGINEERING: - Legacy of Ideas in Computing - Computing Research - The Evolution - An Overview of Scientific Research Methods - Theoretical vs. empirical methods in Computing - Theoretical Problems and Models in Computing - An Overview Statistical Research Methods for Science and Engineering - The Classical four steps of the Scientific Method - Test of hypotheses - Applying the Scientific Method - Likely Mistakes and Errors - Science and Experimental Errors - Control of Measurement Errors in Scientific Experiments - Hypotheses, Models, Theories and Laws - Circumstances where Scientific Methods are not applicable. (12L)

Unit III: STATISTICAL RESEARCH METHODS FOR SCIENCE AND ENGINEERING:

Role of Statistics in Scientific Experiments - Link between Probability and Statistics - Branches of Statistics for Research - Descriptive and Inferential Statistics - Statistical Parameters Commonly Encountered in Research - Variables that are Not Parameters - Statistical Data Sets - Statistical Treatment Of Data - Raw Data Processing - Statistical Outliers - Statistical Analysis - Statistical Measurement Scales - Variables and Statistics - Qualitative to Quantitative Conversion - Practical Cases of Discrete Variables in Statistics - Discrete vs. Continuous Variables - Inferential Statistics - Experimental Probability - Bayesian Probability - Confidence Interval - Significance of Significance Test - Statistical Significance and Sample Size - Margin of Error - Experimental Error - Random Error - Systematic Error - Data Dredging - Data Snooping - Data Fishing - Statistical Power Analysis - Ethics in Statistics - Philosophy of Statistics - Statistical Validity and Reliability. Deductive Methods in Computing - Ordinary Mathematical Proofs - Inference systems and their applications - Inductive Methods in

Computing - Mathematical Induction - Recursive definitions and proofs by induction - Induction Vs Deduction, Hypothetico-Deductive Method - Repetitions, Patterns, Identity - Causality And Determinism - Limitations in Formal Logical Systems - Fuzzy Logic and its Applications. (12L)

Unit IV: ACQUIRING AND DISEMINATING RESEARCH IN DIGITAL ERA:

Searching for Research Papers - Identifying and Developing Research Topic - Finding Background Information - Use Encyclopedias and Dictionaries - Exploit Bibliographies - Using Catalogs to Find Books and Media - Using Indexes to Find Periodical Articles - Finding Internet Resources - Categories of Search Tools Available - Beginning Point on the Web - The Five-Step Search Strategy - Search Strategies NOT Recommended for Finding Web Documents - Search Engines Suitable for Search Needs - Three Types of Search Tools - MetaSearch Engines and Gateway Pages - Recommended Search Engines - Common Features, Notable Differences and Working Mechanism of the Search Engines - Features that make Google the best Web Search Engine 2018/2019 - Finding Subject-Focused Directories for a Specific Topic or Field - Finding the Invisible Web or the Deep Web - Method of Evaluating Web Pages - Reasons for Evaluating What is Found on the Web - Citation Styles, Style Guides, and Avoiding Plagiarism - Citing Sources - A Standard Academic Practice - Web and Internet Terminologies for Researchers - Evaluating the Information Sources; Writing and Presentation of a Research Paper for a Conference and a Journal; Writing a good thesis: Research report writing - The art of minimizing the pain of thesis writing - Thesis - To whom is it written? - How should it be written? - Master's vs. PhD Thesis - Quantum of Detail to be Provided - Thesis outline - Presenting Progress of Research Work to Doctoral Committee - Getting into the Real Business of Writing Thesis - The Ten Commandments for Thesis Writing - What One Should Learn from the Thesis Writing Exercise - Definitions and Terminology - Terms and Phrases to Avoid and Language Aspects - Focusing on Results - Key Parameters for the Thesis - References to Extant Work - Concept Vs. Instance - Terminology for Concepts and Abstractions - Knowledge Vs. Data - Cause and Effect - Drawing Only Warranted Conclusions - Canonical Organization - Suggested Order For Writing - A Suggested Ph.D. Thesis Structure - Model; Suggested M.Sc./M.E./M.Tech./M.Phil. Thesis Structure; Preparations Suggested for surviving a Thesis Defense; Converting your research thesis into a monograph. (14L)

Unit V: METHODOLOGY OF TEACHING:

Teaching - Objectives of Teaching, Phases of Teaching -Teaching Methods Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project Method, Seminar- Integrating ICT in Teaching: Individualized Instruction, Ways for Effective Presentation with Power Point- Documentation - Evaluation: Formative, Summative& Continuous and Comprehensive Evaluation - Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development- Teaching Later Adolescents. (10L)

TOTAL (60L)

TEXT BOOK:

1. Dr.Krishnan Nallaperumal, "Research Methodology for Science and Engineering", Publication Division, Manonmaniam Sundaranar University, Tirunveli, 2018.

REFERENCES BOOKS:

1. "Thesis & Assignment Writing" By Anderson, Berny H. Dujrston, H. Pode, Wiley Eastern Ltd., New Delhi.
2. "Research Methodology" R. Panneerselvam, PHI, New Delhi 2005
3. C. R. Kothari – Research Methodology Methods and Techniques – Wishwa Prakashan Publishers – Second Edition.
4. Dr. Rajammal, P. Devadas – A Handbook on Methodology of Research – Sri Ramakrishna Mission Vidyalaya College of Rural Higher Education.
5. Scientific Social Surveys and Research - Young Pauline. V.
6. Sampath.K., Panneerselvem, A. & Santhanam,S. (1984) Introduction to educational technolog.(2nd revised ed.), New Delhi: Sterling Publisher.
7. Sharma,S.R.(2003). Effective classroom teaching modern methods, tools & techniques. Jaipur: Mangal Deep.
8. Vedanayagam, E.G. (1989). Teaching technology for college teachers New York: Sterling Publisher.

DATA SCIENCES AND BIG DATA ANALYTICS	L	T	P	C
	4			4

Unit I Introduction to Data Science : Data science process – roles, stages in data science project – working with data from files – working with relational databases – exploring data – managing data – cleaning and sampling for modeling and validation – introduction to NoSQL. (12L)

Unit II – Modeling Methods and Introduction to R : Choosing and evaluating models – mapping problems to machine learning, evaluating clustering models, validating models – cluster analysis – K-means algorithm, Naïve Bayes – Memorization Methods – Linear and logistic regression – unsupervised methods - Reading and getting data into R – ordered and unordered factors – arrays and matrices – lists and data frames – reading data from files – probability distributions – statistical models in R - manipulating objects – data distribution. (14L)

Unit III – Introduction to Big Data: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce. (12L)

Unit IV – Introduction Hadoop : Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization. (10L)

Unit- V Hadoop Architecture : Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance. (12L)

TOTAL (60L)

REFERENCES

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications, 2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley & Sons, Inc., 2012. 4. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”, 2013.
4. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “Practical Data Science Cookbook”, Packt Publishing Ltd., 2014.
5. Nathan Yau, “Visualize This: The FlowingData Guide to Design, Visualization, and Statistics”, Wiley, 2011.

6. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
7. http://www.johndcook.com/R_language_for_programmers.html
8. <http://bigdatauniversity.com/>
9. <http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction>.
10. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.
11. Chris Eaton, Dirk deroos et al. , "Understanding Big data ", McGraw Hill, 2012.
12. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.
13. Vignesh Prajapati, "Big Data Analytics with R and Haoop", Packet Publishing 2013.
14. Tom Plunkett, Brian Macdonald et al, "Oracle Big Data Handbook", Oracle Press, 2014.
15. <http://www.bigdatauniversity.com/>
16. Jy Liebowitz, "Big Data and Business analytics",CRC press, 2013.

ADVANCED DIGITAL SIGNAL AND IMAGE PROCESSING	L	T	P	C
	4			4

UNIT I

Signals and signal Processing, characterization & classification of signals, typical Signal Processing operations, example of typical Signals, typical Signals Processing applications. Time Domain Representation of Signals & Systems- Discrete Time Signals, Operations on Sequences, Linear shift-invariant systems, Stability and Causality, Linear constant coefficient difference equations, Frequency domain representation of discrete-time systems, symmetry properties of the Fourier transform, Sampling of continuous-time systems. Z-transforms, Discrete Fourier Transform (DFT) & its properties, computation of the DFT of real sequences (13L)

UNIT II

Digital Image Fundamentals: Fundamental steps in Image Processing –Components of Image Processing System-Image Sampling and Quantization-Basic Relationships between Pixels. Image Enhancement in Spatial Domain: Basic Gray level Transformations-Histogram Processing- Enhancements using Arithmetic/logic Operations-Basics of Special Filtering-Smoothing Filters-Sharpener Filters. (12L)

UNIT III

Image Enhancements in the Frequency domain : Smoothing Filters-Sharpener Filters-Homomorphic Filters - Image Restoration: Degradation model –Noise Models-Restoration in the presence of Noise- Wiener Filter. Color Image Processing : Color Fundamentals-Color Models-Basics of full Color image Processing-Color Transformations. (12L)

UNIT IV

Wavelets and Multi-resolution Processing: Image Pyramids and Sub band Coding – Wavelet Transform in one dimension- FWT. Image Compressions: Fundamentals – Image Compression models – Elements of Information Theory – Error – Free Compression – Lossy compression – Image Compression standards. (11L)

UNIT V

Image segmentation: Detection of discontinuities – Edge linking and Boundary detection – Thresholding – Region Orientation Segmentation – use of motion in segmentation. Morphological Image Processing: Basic Binary morphological Operations. Basic grayscale morphological Operations. Representation and Description: Representation-Boundary Descriptors. (12L)

TOTAL (60L)

References:

1. Refael C. Gonzalez & Richard E. Woods - Digital Image Processing, Addison Wesley publication corporation, 2008
2. Image Processing Analysis, and Machine Vision, Milan Sonka,

3. Alan V. Oppenheim & Ronald W. Schafer, “ Digital Signal Processing” PHI, 2002
4. Sanjit K. Mitra, “ Digital Signal Processing: A computer based approach” TMH, Second Edition, 2003.

MODERN COMMUNICATION SYSTEMS	L	T	P	C
	4			4

UNIT-I: Network Evolution – The ISDN – The Basic Rate ISDN customer’s Interface: The customer’s Installation layer 1, 2, 3. Primary rate ISDN access: background – signaling – evaluation of PABX signaling – International standards for inter –PABX signaling. (10L)

UNIT-II: Frame mode services: Store and Forward Switching – Data grams and Virtual Circuits - Flow and Congestion Control – New ISDN Frame mode Services – Frame Format. ISDN Customer premises Equipment and Applications: High quality speech – Music coding FACSIMILE – Photographs Video tex – Video – Audio Visual services and Embedded – Customer premises Equipment. (12L)

UNIT-III: ATM Network concepts and Architecture: ATM’s position in the OSI Reference Model – B-ISDN protocol reference model – ATM functions and layers – ATM signaling principles – The ATM layer – ATM switching principles. (12L)

UNIT-IV: Modern Communication: Fundamentals of Information Handling – Information media as viewed from the Human Interface – Various facets of modern Communication systems – Composition of Modern Communication systems. (12L)

UNIT-V: Components of modern Communication systems: Home systems – Home system image – Home systems and their service Trends – Access systems for Home systems. Business Communications: Basic structure of the Office system in a single office / Plant – Basic Structure of the Office system connected to WAN’s. The general structure of the office system – Actual Composition of CAN and WAN. Mobile Communication in the information society- Technical Background of Mobile Communication various Mobile Communications services – Positioning of VAN – Classification by service operation mode – Classification of VAN purpose – Classification of specific Industry service type VAN’s from the added value viewpoint – New Electronic Media. Construction of Global Infrastructure: Satellite Communications systems – TV Broadcasting – Approaches to meeting new goals – Possibilities of new Broadcasting forms – Information service center systems – Automatic Interpretation telephone systems – Teleconferencing systems. (14L)

TOTAL (60L)

TEXT BOOKS:

1. “ISDN Explained” John M.Griffiths 2nd Edition March 1995
John Willey & sons.
2. “Introduction to ATM Networking” Walter J. Goralski J. McGraw Hill Inc
3. “Computers and communications” Koji Kobayashi the MID Press 1986. (A version of c and C).

PERVASIVE, GRID AND CLOUD COMPUTING	L	T	P	C
	4			4

UNIT-I:

Pervasive Computing Infrastructure-Applications-Device Technology- Hardware, Human-Machine Interfaces, Biometrics, And Operating Systems- Device Connectivity-Protocols, Security , And Device Management-Pervasive Web Application Architecture-Access From PCs And PDAs- Access Via WAP (12L)

UNIT-II:

Grids and Grid Technologies, Programming models - A Look at a Grid Enabled Server and Parallelization Techniques – Grid applications- Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids (12L)

UNIT – III:

Grid Management systems, security, Grid Grid-Enabling software and Grid enabling network services, Data Grid - Virtualization Services for Data Grids, Peer-to-Peer Grids - Peer-to-Peer Grid Databases for Web Service Discovery and application execution. (10L)

UNIT-IV:

Introduction to Cloud Computing- Definition, Characteristics, Components- Cloud provider-Administering & Monitoring cloud services-benefits and limitations- Deploy application over cloud- Introduction to Cloud Technologies: SOAP, Webservices, AJAX and mashups, Virtualization Technology, Multitenant software. (12L)

UNIT-V:

Cloud Relational databases- Cloud file systems- Cloud computing security architecture- Cloud computing security challenges- Issues in cloud computing- Cloud Middleware- Mobile Cloud Computing- Inter Cloud issues. (14L)

TOTAL (60 L)

TEXT BOOK:

1. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition),2010
2. Enterprise Cloud Computing by GautamShroff, Cambridge,2010.
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India,2010
4. Jochen Burkhardt, pervasive computing: Technology and Architecture of Mobile Internet Applications, Addison-Wesley Professional; 3rd edition, 2007

REFERENCES:

1. Fran Berman, Geoffrey Fox, Anthony Hey J.G., "Grid Computing: Making the Global Infrastructure a Reality", Wiley, USA, 2003.
2. Joshy Joseph, Craig Fallenstein, "Grid Computing", Pearson Education, New Delhi, 2004.
3. Ian Foster, Carl Kesselman, "The Grid2: Blueprint for a New Computing Infrastructure". Morgan Kaufman, New Delhi, 2004.
4. Ahmar Abbas, "Grid Computing: Practical Guide to Technology and Applications", Delmar Thomson Learning, USA, 2004.

ENGINEERING RESEARCH METHODOLOGY	L	T	P	C
	4			4

UNIT I:

Basic research methodology: Objectives and Motivation in Research - Types of Research - Approaches and Significance of Research - Research Methodology versus Research Methods- Research Process-Finding a Research Advisor/Guide, What to Look for in a Potential Research Advisor/Guide, How to Find an Advisor/Guide, The Advisor-Advisee Relationship; Finding a Topic and Beginning Research, Getting Research Ideas, How to be an Active Reader and Listener, Getting Exposed to Research, Directed Study; Formulating the Research Problem: Develop the Nucleus of an Idea, Extensive Literature Survey: A Trap to Avoid, Choosing an Idea, Stay Active - Measure of Good Research - Common Problems for Researchers

(10L)

UNIT II:

Overview of the Theory of Science and history of scientific research - Overview of Research Methodology for Engineering Research - Science versus Engineering - Distinct perspectives of goals Research methodology for circuit branches: Formulating the Research Problem -Research Design - Evolution of Computing Research.

(11L)

UNIT III:

Research Methods for Engineering Research - History of ideas in computing – Measurements based research methods in computer engineering - Measurements based research methods in Signal and Image Processing, Graphics, Vision and Pattern Recognition - Deductive Methods in Computing Science.

(12L)

UNIT IV:

Deductive Methods in Signal and Image Processing, Graphics, Vision and Pattern Recognition - Inductive Methods in Computing Science - Inductive Methods in Signal and Image Processing, Graphics, Vision and Pattern Recognition - Building Models – Simulation.

(13L)

UNIT V:

Searching for scientific papers - Writing and presentation of a research paper for a conference or journal - Review and opposition of engineering/scientific research papers - Writing a good thesis: Research report writing - Converting your research thesis into a monograph – Research education, the research society and research policy

(14L)

TOTAL (60L)

TEXT AND REFERENCE:

1. Lecture Notes by Prof. Dr. Krishnan Nallaperumal on “Engineering Research Methodology - A Computer Science and Engineering and Information Technology Perspective.

PATTERN RECOGNITION AND IMAGE ANALYSIS	L	T	P	C
	4			4

UNIT I Introduction (12L)

Introduction: Machine perception, pattern recognition example, pattern Recognition systems, the design cycle, learning and adaptation. Bayesian Decision Theory: Introduction, continuous features – two categories classifications, minimum error-rate classification-zero-one loss function, classifiers, discriminant functions, and decision surfaces.

UNIT II 4K Normal density (12L)

Normal density: Univariate and multivariate density, discriminant functions for the normal density-different cases, Bayes decision theory – discrete features, compound Bayesian decision theory and context Maximum likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation–Gaussian case.

UNIT III UN- supervised (12L)

Un- supervised learning and clustering: Introduction, mixture densities and identifiability, maximum likelihood estimates, application to normal mixtures, K-means clustering. Data description and clustering – similarity measures, criteria function for clustering Pattern recognition using discrete hidden Markov models: Discrete-time Markov process, Extensions to hidden Markov models, three basic problems of HMMs, types of HMMs.

UNIT IV Continuous hidden Markov models (12L)

Continuous hidden Markov models: Continuous observation densities, multiple mixtures per state, speech recognition applications. Digital image models, sampling and quantization, basic relationships between pixels, image geometry. Image enhancement: Back ground, enhancement by point processing histogram processing, spatial filtering, introduction to image transforms, image enhancement in frequency domain.

UNIT V Image Segmentation (12L)

Image Segmentation and Edge Detection: Region Operations, Crack Edge Detection, Edge Following, Gradient operators, Compass and Laplace operators. Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection, image morphology, image security.

Total (60 L)

TEXT BOOKS:

1. Richard O. Duda, Peter E. Hart, David G. Stroke, Pattern Classifications, Wiley, 2012
2. Lawrence Rabiner, Biing – Hwang Juang Fundamentals of Speech Recognition, Pearson, 1993.
3. Gonzalez R.C & Woods R.E., Digital Image Processing, Addison Wesley, 2009.

REFERENCES:

1. Jain A.K., Fundamentals of Digital Image Processing, Prentice Hall of India,2001.

2. Reddy M.Anji, Digital Image Processing, BS Publications.

CLOUD COMPUTING	L	T	P	C
	4			4

UNIT I CLOUD COMPUTING BASICS

Cloud computing components- Infrastructure-services- storage applications-database services – Deployment models of Cloud- Services offered by Cloud- Benefits and Limitations of Cloud Computing – Issues in Cloud security- Cloud security services and design principles.

(12L)

UNIT II VIRTUALIZATION FUNDAMENTALS

Virtualization – Enabling technology for cloud computing- Types of Virtualization- Server Virtualization- Desktop Virtualization – Memory Virtualization – Application and Storage Virtualization- Tools and Products available for Virtualization.

(13L)

UNIT III SaaS and PaaS

Getting started with SaaS- Understanding the multitenant nature of SaaS solutions- Understanding OpenSaaS Solutions- Understanding Service Oriented Architecture- PaaS- Benefits and Limitations of PaaS.

(11L)

UNIT IV IaaS AND CLOUD DATA STORAGE

Understanding IaaS- Improving performance through Load balancing- Server Types within IaaS solutions- Utilizing cloud based NAS devices – Understanding Cloud based data storage- Cloud based backup devices- Cloud based database solutions- Cloud based block storage.

(12L)

UNIT V CLOUD APPLICATION DEVELOPMENT

Client Server Distributed Architecture for cloud – Traditional apps vs. Cloud apps – Client side programming model: Web clients. Mobile clients- Server Side Programming Technologies: AJAX, JSON, Web Services (RPC, REST)- MVC Design Patterns for Cloud Application Development.

(12L)

(TOTAL: 60L)

REFERENCES BOOK:

1. Anthony T .Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw Hill Edition, Fourth Reprint, 2010.
2. Kris Jamsa, “Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more”, Jones & Bartlett Learning Company LLC, 2013.
3. Ronald L.Krutz, Russell vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley Publishing Inc., 2010.

COMPUTING FOR DATA ANALYTICS	L	T	P	C
	4			4

UNIT I DATA ANALYTICS LIFE CYCLE

Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.

(12L)

UNIT – II STATISTICS

Sampling Techniques - Data classification, Tabulation, Frequency and Graphic representation - Measures of central value - Arithmetic mean, Geometric mean, Harmonic mean, Mode, Median, Quartiles, Deciles, Percentile - Measures of variation – Range, IQR, Quartile deviation, Mean deviation, standard deviation, coefficient variance, skewness, Moments & Kurtosis.

(13L)

UNIT – III PROBABILITY AND HYPOTHESIS TESTING

Random variable, distributions, two dimensional R.V, joint probability function, marginal density function. Random vectors - Some special probability distribution - Binomial, Poison, Geometric, uniform, exponential, normal, gamma and Erlang. Multivariate normal distribution - Sampling distribution – Estimation - point, confidence - Test of significance, 1& 2 tailed test, uses of distribution, F-distribution, χ^2 distribution.

(13L)

UNIT – IV PREDICTIVE ANALYTICS

Predictive modeling and Analysis - Regression Analysis, Multicollinearity, Correlation analysis, Rank correlation coefficient, Multiple correlation, Least square, Curve fitting and good ness of fit.

(10L)

UNIT – V TIME SERIES FORECASTING AND DESIGN OF EXPERIMENTS

Forecasting Models for Time series : MA, SES, TS with trend, season - Design of Experiments, one way classification, two way classification, ANOVA, Latin square, Factorial Design.

(12L)

(TOTAL: 60L)

REFERENCES:

1. Chris Eaton, Dirk Deroos, Tom Deutsch et al., “Understanding Big Data”, McGrawHill, 2012.
2. Alberto Cordoba, “Understanding the Predictive Analytics Lifecycle”, Wiley, 2014.
3. Eric Siegel, Thomas H. Davenport, “Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die”, Wiley, 2013.
4. James R Evans, “Business Analytics – Methods, Models and Decisions”, Pearson 2013.
5. R. N. Prasad, Seema Acharya, “Fundamentals of Business Analytics”, Wiley, 2015.
6. S M Ross, “Introduction to Probability and Statistics for Engineers and Scientists”, Academic Foundation, 2011.

7. David Hand, Heiki Mannila, Padhria Smyth, “Principles of Data Mining”, PHI 2013.
8. Spyros Makridakis, Steven C Wheelwright, Rob J Hyndman, “Forecasting methods and applications”, Wiley 2013(Reprint).
9. David Hand, Heikki Mannila, Padhraic Smyth, “Principles of Data mining”, PHI 2013.
10. <http://cran.r-project.org/doc/manuals/R-intro.html>
11. W.N. Venables, D.M Smith, “An introduction to R”,
12. R in Nutshell, O Reilly, 2012

BIG DATA ANALYTICS	L	T	P	C
	4			4

UNIT I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.

(12L)

UNIT II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.

(11L)

UNIT- III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., Name Node, Secondary Name Node, and Data Node, Hadoop Map Reduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.

(13L)

UNIT-IV

HADOOP ECOSYSTEM AND YARN : Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New Features Name Node High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.

(12L)

UNIT-V HIVE AND HIVEQL, HBASE : Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase concepts Advanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.

(12L)

(TOTAL: 60 L)

REFERENCES:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al., “Understanding Big data”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012. 6 IT2015 SRM (E&T)
4. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
5. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
6. <http://www.bigdatauniversity.com/>
7. Jy Liebowitz, “Big Data and Business analytics”,CRC press, 2013.

FOUNDATIONS OF INFORMATION SECURITY	L	T	P	C
	4			4

UNIT 1: CONCEPTUAL FOUNDATION OF INFORMATION SECURITY

Information as an asset to be protected – the CIA triad – threats to information assets: loss, copying, altering, denial of service, malware injection, natural threats like fire, flood, etc. – intangibility of information as an asset – Policies and procedures to protect information assets – the AAA paradigm (11L)

UNIT – 2: RISK MANAGEMENT

Introduction to information risk management – threat horizon – vulnerabilities – CVE databases - attack path – probability of occurrence of risky events – impact of risky events – risk appetite – risk treatment plans – quantitative and qualitative risk assessment (12L)

UNIT – 3: INFORMATION CLASSIFICATION AND VALUATION

Rationale for asset classification – approaches to classification – Benefits of classification – Determining the value of information – Data retention – Disposal of information assets – owners and custodians of information – roles, responsibilities and liabilities of owners and custodians of information – De-classification of information – reclassification of information (13L)

UNIT-4: ACCESS CONTROLS

Concept of restricted and regulate access to information assets – physical vs. logical access controls – user identity and access management – provision and escalation of privileges of access – single sign on – access to networks, databases, applications and operating systems – Access monitoring and review process – event logging – providing access to data at rest and in transit (14L)

UNIT-5: PERIMETER SECURITY

Defining physical and logical perimeters of information assets - Integrating physical and logical security - Physical assets as repositories of information assets – choke points on perimeter – physical security standards as applied to data centers (10L)

TOTAL (60L)

REFERENCES:

1. CISSP All-in-One Exam Guide by Shon Harris and Fernando Maymi, 7th Edition, McGraw-Hill Education, 1 June 2016
2. The CISSP Prep Guide: Gold Edition by Ronald L. Krutz, Russel Dean Vines, Gold Edition, Wiley Publication, 31 Oct 2002
3. ISO/ IEC 27002: 2005, First Edition

INTRODUCTION TO DIGITAL FORENSICS	L	T	P	C
	4			4

UNIT-1: DIGITAL FORENSIC INVESTIGATION

Evolution of investigative process of compute crimes – Terminologies and definitions used in digital forensic investigations – the investigation life cycle – digital evidence under common law systems – chain of custody – presentation in court (10L)

UNIT-2: UNDERSTANDING DIGITAL DATA

Systems of storage of data in digital format – character codes, record structure, file formats and file signatures – storage of graphic files – recognition of file formats and intern storage architecture – extraction from forensic artifacts – retrieval of deleted data (11L)

UNIT-3: FORENSIC PRINCIPLES APPLIED TO DIGITAL SPACE

Applying common principles of forensic science to digital space – various core principles of forensic sciences eg., principles propounded by Frye, Coppelino, Marx and Daubert – best practices in evidence gathering – best operational practices in forensic sciences ported to digital forensics (12L)

UNIT-4: COLLECTING DIGITAL EVIDENCE

Identifying evidence of probative value – obstacles in collection of digital evidence – volatility of digital evidence – live vs dead forensic process – collection, storage, backup and archiving of evidence – controlling contamination – copying vs. bit mapping of data – analysis of evidence on site or at remote location – challenges due to commingled data on evidence computers (14L)

UNIT-5: STANDARDS AND BEST PRACTICE GUIDELINES

Handling the Digital Crime Scene - Digital Evidence Examination Guidelines – ACPO – IOCE – SWGDE – DFRWS - ISO 27037 (13L)

TOTAL (60L)

REFERENCES:

1. Computer Forensics, Computer Crime Investigation by John.R.Vacca, 2002, Firewall Media
2. Computer Intrusion Forensics by George Mohay et al, 2003, Artech House
3. Handbook of Digital Forensics by Eoghan Casey, 2010, Elsevier
4. NIST guidelines on digital forensic processes

ADVANCED INFORMATION SECURITY	L	T	P	C
	4			4

UNIT-1: CRYPTOLOGY

Cryptography and cryptanalysis – Asymmetric and Symmetric crypto systems – evolution of crypto systems – uses and limitations of symmetric and asymmetric crypto systems – confidentiality using crypto systems – DES, 3-DES, AES and Rijndael crypto systems – FIPS tests for crypto strength – work factor – RSA, ECC and Quantum crypto systems – TTP services in PKI, X.509 protocols for PKI infrastructure – Digital signature and digital envelopes – PKCS implementation – Digital signature applications - Key management life cycle

(14L)

UNIT-2: APPLICATION SECURITY

SDLC concepts – Testing for security: types, methods and issues - Program coding and security to be built into it - Software maintenance and change control processes - Configuration management - Software Capability Maturity model (CMM) - DBMS concepts & terms: types, with focus on Relational model - Data dictionary – Interfaces to databases (ODBC, ADOJDBC, XML) - Database security features - User access rights – Database auditing features and logs.

(13L)

UNIT-3: IPSEC COMMUNICATION PROTOCOLS

IPSec, - Introduction to IPSec - IPSec building blocks - Security Associations (SAs) - Security Parameter Index (SPI) - IPSec Architecture - IPSec Protocols - Authentication Header (AH) - Encapsulation Security Payload (ESP) - Tunneling and Transport Mode - Internet Key Exchange (IKE) – ISAKMP

(12L)

UNIT-4: COMMON AUTHENTICATION PROTOCOLS

Various authentication protocols - Password Authentication Protocol (PAP) - Challenge Handshake Authentication Protocol (CHAP) - Extensible Authentication Protocols - Remote Access with RADIUS and DIAMETER - TACACS and TACACS Plus - Single Sign on – Kerberos, SEASAME – Authentication in Wireless networks

(11L)

UNIT-5: DIGITAL RIGHTS MANAGEMENT

Meaning of Digital Rights Management (DRM) - Need for DRM and preventing illegal file sharing on the Internet - DRM schemes - Microsoft DRM 2.0, and Content Scrambling System - Reasons why DRM schemes have been unsuccessful so far - Requirements for a good DRM scheme - secure hardware, secure software, and an efficient legal system

(10L)

TOTAL (60L)

REFERENCES:

1. CISSP All-in-One Exam Guide by Shon Harris and Fernando Maymi, 7th Edition, McGraw-Hill Education, 1 June 2016
2. Information Security Management handbook, 6th Edition, Harold F Tipton, Micki Krause, Auerbach Publications, 5 April 2012
3. The World Beyond Digital Rights Management by Jude Umeh, 1st edition, BCS - The Chartered Institute for IT, 2009
4. Cryptography and Network Security by Dr. William Stallings, 6th Edition, Pearson Education Publication, 01 Jan 2013
5. The CISSP Prep Guide: Gold Edition by Ronald L. Krutz, Russel Dean Vines, Gold Edition, Wiley Publication, 31 Oct 2002
6. Certified Information Systems Security Professional, Study Guide by Ed Tittel, Mike Chapple, James Michael Stewart, 6th Edition, Sybex Publication, 06 July 2012

COMPUTING TECHNIQUES FOR CANCER ANALYTICS	L	T	P	C
	4			4

Unit – I Introduction to Genetics

Basic genetics – Cell growth and division – Structure and composition of Genes Chromosomes – DNA – Mutations – Types of mutation. (10L)

Unit – II Introduction to Breast Cancer Biology

Breast Cancer – Oncogenes – Tumor Suppressor Genes – Apoptosis – Angiogenesis – Metastasis – Inherited Gene Mutation – BRCA1, BRCA2 genes – Risk factors and causes of Breast Cancer – Prevention and Detection –Diagnosis and staging – Treatment. (13L)

Unit – III Data Mining

Data Mining – History – Definitions – Data Mining Functionalities – Classifications of Data Mining Systems – Major Issues in Data Mining – Data warehouse and OLAP Technology – Multidimensional Data Model – Data warehouse Architecture – Data Warehouse Implementation. (12L)

Unit – IV Data Mining Techniques

Data Processing – Data Cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept of Hierarchy Generation – Concept Description – characterization and comparison. Association Rule Mining – Mining Single Dimension – Multilevel Association Rules – Mining for correlation Analysis – Classification and Prediction (12L)

Unit – V Machine Learning and Analytical Techniques

Models based on Summarization: Bayes Theorem - Chi squared Statistics Regression - Decision Tree - Neural Networks - Multilayer perceptron (MLP) - Radial basis functions -Genetic Algorithms - Cluster Analysis – Outlier - Cluster Vs Classification - Clustering Issues - Impact of Outliers on clustering- Classification and regression trees (CART) Clustering problems - Clustering Approaches. (13L)

TOTAL (60L)

References:

1. QuickFACTS: Breast CANCER What You Need to Know—NOW From the Experts at the American Cancer Society
2. Hejmadi.M., Introduction to Cancer Biology, Momna Hejmadi & Ventus Publishing, 2009.
3. <http://learn.genetics.utah.edu/content/basics/>
4. <https://www.cancer.org/cancer/cancer-basics.html>
5. Pieter Adriaans, Dolf Zantinge, Data Mining, Addison Wesley 1996.
6. Daniel T. Larose (2006): Data Mining Methods and Models, John Wiley & Sons.
7. Molecular Biology of Cancer Jesse D. Martinez, Michele Taylor Parker, Kimberly E. Fultz Natalia A. Ignatenko, Eugene W. Gerner, John Wiley & Sons, Inc, 2003.

REMOTE SENSING AND IMAGE INTERPRETATION	L	T	P	C
	4			4

UNIT I

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels - color models. (12L)

UNIT II

Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering–Smoothing and Sharpening Spatial Filtering – Frequency Domain: Introduction to Fourier Transform – Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters (12L)

Unit III

Electromagnetic energy resources, electromagnetic radiation (EMR) spectrum, EMR energy – frequency – wavelength relationship, Boltzman law, Wien Law, (11L)

Unit IV

Characteristics of aerial photographs and satellite imagery – false colour composites, photo-elemental characters, reflectance and emittance- Geosynchronous and sunsynchronous orbits, location of a satellite in space, world referencing system. (12L)

Unit V

Remote sensing plate forms - Characteristics of different remote sensing satellites and sensors, resolution, analysis and interpretations of aerial photographs and satellites imagery. Satellite remote sensing digital data products, data format and storage, preprocessing – atmospheric, geometric and radiometric correction, image rectification and registration. (13L)

TOTAL (60L)

Text Book :

1. P.K.Guha,Remote sensing for Beginner – EWP, New Delhi,2003.

Reference Book:

1. Sabino.F.F. Remote sensing principles and interpretation, Freeman, San Francisco, 1978

INTRODUCTION TO MICROWAVE ANTENNA AND RADAR SIGNAL PROCESSING	L	T	P	C
	4			4

UNIT I Fundamentals Of Radiation Systems (12L)

Definition of Antenna Parameters: Gain, Directivity, Effective aperture, Radiation Resistance, Radiation Pattern, Band width, Beam width, Input impedance, Efficiency, Antenna noise temperature, Polarization.

LF Antenna: Monopole – Half wave – Folded dipole - Reciprocity theorem.

UNIT II Advanced Radiation System (11L)

Antenna Array: Broad side – End fire – Binomial – Pattern Multiplication.

Radiating Elements: Horn – Reflector – Slot – Yagi Uda – Log Periodic – Microstrip – Radiation pattern of HF antennas.

UNIT III Mic And Microwave Network Theory (13L)

Review of Low Frequency Parameters: Impedance – Admittance – Hybrid – ABCD.

Microwave Network Theory: Different types of interconnection of two port networks – High frequency parameters – formulation of S parameters – Properties of S parameters – Reciprocal – lossless networks – Mismatched load – Transmission Matrix – Introduction to MIC.

UNIT IV Microwave Devices And Measurements (10L)

Microwave Devices: Waveguide – Bend – Twist – Corners – Terminations – Attenuators – Phase shifters – Tee junction – Isolator – Circulator – Coupler – formulation with S matrix.

Measurements: VSWR, Power, Impedance, Frequency, Attenuation, Q factor.

UNIT V Radar Signal Processing (14L)

Introduction – Basic Radar – Function of Radar – Radar Frequencies – Noise – Noise figure – Noise factor – Detection of signals in noise – Signal to Noise ratio – Probabilities of Detection and False Alarm – Radar Cross section – System losses – Doppler Radar – Pulse Doppler Radar – MTI Radar – Digital MTI Processing – AMTI – Limitations to MTI Performance – ADT – Applications of Radar.

TOTAL: (60L)

TEXT BOOKS:

1. John D Kraus, “Antennas for all Applications”, 3rd Edition, TMH, 2005.
2. Constantine A Balanis, “Antenna Theory Analysis and Design”, John Wiley and Sons Ltd., 1982.
3. Annapurna Das and Sisir K Das, “Microwave Engineering”, TMH, 2005.
4. Merrill I Skolnik, “Introduction to Radar Systems”, 3rd Edition, TMH, 2003.

REFERENCES:

1. J C Toomay, “Principles of Radar”, 2nd Edition, PHI, 2004.
2. Robert E Collin, “Foundations for Microwave Engineering”, John Wiley & Sons Inc, 2005.

3. Robert E Collin, “Antennas and Radio wave Propagation”, TMH, 1985

AN INTRODUCTION TO DATA ANALYTICS	L	T	P	C
	4			4

UNIT I Data Analytics and Big Data:

Data Analytics- Definition, Launch, Importance of Data Analytics, Big Data-, Definition, Sources, Characteristics, Data Analytics Applications-Biomedical, Mobile Advertising, Sentimental Analysis, Disaster Management, Recommendation Engines, Smart Cities. (12L)

UNIT II Architectural Elements for Data Analytics:

Hardware Architecture for Data Analytics, Characteristics, Requirements, Distributed File System for Big Data- Commodity Cluster for Big Data, Storage and Programming Model of Hadoop for Big Data, Data in Warehouse and Data in Hadoop- a comparison, Data Analytics on Cloud. (12L)

UNIT III Stages of Data Analytics and Data Analytics Project Life Cycle:

Stages of Data Analytics-Descriptive Analytics, Discovery Analytics, Prescriptive Analytics, Predictive Analytics. Data Analytics Project Life Cycle-Background, Phase 1: Discovery, Phase 2- Data Preparation, Phase 3: Model Planning, Phase 4: Model Building, Phase 5: Communicating Results, Phase 6: Operationalize, Roles of Data Scientist. (14L)

UNIT IV Analytics Applications :

Data Analytics in Health Care-Personalized Treatment, Business-Targeted advertising, Introducing a new Product, Fraud Prediction, Data Analytics in Sports, Disaster Management, Data Analytics for Smart Cities, Requirements for being successful with Big Data Analytics. (12L)

UNIT V Data Analytics Projects- Case Studies:

Big Data Analytics in: Commonwealth Bank of Australia for Risk Analysis, Aetna Innovation Labs Analytics for Improving Health, Walmart’s analytics to improve online shopping, Jio and Data Analytics. (10hrs)

Total (60L)

Books:

1. “A Guide to Big Data Analytics”, Datameer.com.
2. Vignesh Prajapati, “Big Data Analytics with R and Hadoop”, Packt Publications.
3. D. Dietrich, B.Heller, B.Yang, “Data Science and Big Data Analytics”, EMC Education Services.
4. “Big Data Now”, O’Reily Inc.
5. DeWitt, S. Madden, and M. Stonebraker, “A Comparison of Approaches to Large-Scale Data Analysis”, SIGMOD Conference 2009.
6. Steven Cooper, “Data Science from Scratch”, Data Science.

7. www.mercerindustries.com/wp-content/uploads/2015/02/Watson-Tutorial-Big-Data-Business-Analytics
8. www.researchgate.net/publication/273961581_Big_Data_analytics_with_applications
9. <http://cs.ulb.ac.be/conferences>
10. www.businessesgrow.com/2016/12/06/big-data-case-studies
11. Eiman Al Nuaimi, Hind Al Neyadi, Nader Mohamed , ‘Applications of big data to smart cities’, Journal of Internet Services and Applications.
12. Samiya Khan1 , Kashish Ara Shakil and Mansaf Alam, ‘Cloud-based Big Data Analytics – A Survey of Current Research and Future Directions
13. Bogdan Ionescu, Dan Ionescu, Cristian Gadea, Bogdan Solomon, and Mircea Trifan, “An Architecture and Methods for Big Data Analysis”

STATISTICAL LEARNING FOR DATA ANALYTICS	L	T	P	C
	4			4

UNIT I Descriptive Statistics:

Data Sets, Describing Discrete Data, Continuous Data, Statistics for Continuous Data, Outliers and Box Plots, Comparing Data Sets, Measures of Central Tendency, Measures of Scale, Relationship between Variables- Linear Model, Residual Analysis, Measures of Relationships, (12L)

UNIT II Inferential Statistics:

Examples of Prediction Problems, Probability, Determination of Probability-Tree Diagram, Examples, Conditional Probability, Random Variables. Parameters, Discrete Probability Models- Binomial Probability Model, Poisson Probability Model, Continuous Probability Models- Uniform Probability Model, Parameters, Normal Distribution, Normal Quantiles. (10L)

UNIT III Bayesian Statistics:

Bayesian Statistics, Using Bayesian analysis to estimate a Proportion, Specifying a Prior for a Proportion, Calculating the Likelihood for a Proportion, Calculating the Posterior Distribution for a Proportion, Exercises in R. (11L)

UNIT IV Concepts of Hypothesis Testing:

Central Limit Theorem, Confidence Intervals, Testing Procedure, The Wilcoxon, Alternatives, Estimation and Confidence Interval based on Wilcoxon, Estimation and Confidence Interval based on Wilcoxon, Difference between Proportions. (13L)

UNIT V Design of Experiments and Regression: Completely Randomized Designs, Randomized Pair Designs, Regression Experimental Design, Example, Observational Studies, Linear Regression and Applications. (14L)

Total (60L)

Books:

1. A.Abebe, J.Daniels, J.W.Macean, "Statistics and Data Analytics", Statistical Computation Lab, Western Michigan University, Kalamazoo.
2. Avril Coghlan, "A little Book for R using Bayesian Statistics", Wellcome Trust Sanger Institute, U.K.
3. "Kickstarting R"- cran.r-project.org/doc/contrib/Lemon-kickstart.
4. "Introduction to R" -cran.r-project.org/doc/manuals/R-intro.html.
5. "Bayesian Statistics" (product code M249/04) by the Open University, available from the Open University Shop.
6. Jim Albert, "Bayesian Computation with R".
7. Trevor Hasti, Robert Tibshirani, Jerome Friedman, "Data Mining, Inference and Statistics", 2nd Edition, Springer Series in Statistics.

MACHINE LEARNING ALGORITHMS FOR DATA ANALYTICS	L	T	P	C
	4			4

Unit:I Introduction

Basic definitions, Applications, Problems, Designing a Learning system, types of learning, hypothesis space and inductive bias, evaluation, cross-validation, (14L)

Unit II Regression and Decision Trees

Linear regression, Logistic Regression, Decision trees, overfitting, Instance based learning, Feature reduction, Collaborative filtering based recommendation, (12L)

Unit: III Probability

Probability and Bayes learning, Support Vector Machine, Kernel function and Kernel SVM (10L)

Unit: IV Neural network

Perceptron, multilayer network, backpropagation, introduction to deep neural network, Computational learning theory, PAC learning model, Sample complexity, VC Dimension, Ensemble learning (14L)

Unit: V Clustering

k-means, adaptive hierarchical clustering, Gaussian mixture model. (10L)

Total (60L)

References:

1. Machine Learning. Tom Mitchell. First Edition, McGraw- Hill, 1997.
2. Introduction to Machine Learning Edition 2, by Ethem Alpaydin

URLS:

1. A Course in Machine Learning - http://ciml.info/dl/v0_8/ciml-v0_8-all.pdf
2. <http://alex.smola.org/drafts/thebook.pdf>
3. <https://www.cs.ubbcluj.ro/~gabis/ml/ml-books/McGrawHill%20-%20Machine%20Learning%20-Tom%20Mitchell.pdf>
4. <https://www.analyticsvidhya.com/blog/2017/09/common-machine-learning-algorithms/>
5. <https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/understanding-machine-learning-theory-algorithms.pdf>
6. <https://www.analyticsvidhya.com/blog/2016/04/complete-tutorial-tree-based-modeling-scratch-in-python/#one>
7. <https://doc.lagout.org/Others/Data%20Mining/Data%20Mining%20and%20Predictive%20Analytics%20%5BLarose%20%26%20Larose%202015-03-16%5D.pdf>
8. <http://auapps.american.edu/alberto/www/analytics/ISLRLectures.html>

DESCRIPTIVE AND DISCOVERY ANALYTICS	L	T	P	C
	4			4

Unit 1 - Introduction to Descriptive Analytics

Introduction to Descriptive Analytics – Examples - The Role of Descriptive Analytics in Future Data Analysis – An industry Applications - Descriptive Data Collection: Survey Overview - Descriptive Data Collection: Net Promoter Score and Self-Reports - Descriptive Data Collection: Survey Design - Passive Data Collection - Media Planning- Causal Data Collection and Summary. (14L)

Unit 2 – Empowering data analysis with pandas

Packages- The data structure of pandas- Inserting and Exporting Data- Data Cleansing- Checking and Filling Missing Data- String Operations- Merging Data- Aggregation operations - Joins – Case Study. (10L)

Unit 3 – Basics of Discovery Analytics

Comparing two groups - Drawing inferences - Independent groups - Dependent groups - Independent groups - Categorical association - Chi-squared test for association - The Chi-squared test - Interpreting the Chi-squared test - Chi-squared test for goodness of fit - An alternative to the Chi-squared test- Case Study. (12L)

Unit 4 - Simple and Multiple Regressions

Simple regression - Describing quantitative association - Simple regression - Drawing inferences - Pitfalls in regression - Testing the model - Checking assumptions - Simple regression - Exponential regression - Multiple regression – Model- Tests - Overall test - Individual tests - Checking assumptions. (13L)

Unit 5 - Parametric Tests and Non-parametric Tests

Basics and One-way ANOVA - Assumptions and F-test - Post-hoc t-tests - Factorial ANOVA - Assumptions and tests - ANOVA and regression - Non-parametric tests - The basics - Comparing groups with respect to mean rank - Several samples - Kruskal-Wallis test.

References:

1. <https://www.coursera.org/learn/wharton-customer-analytics>
2. <http://www.dataversity.net/fundamentals-descriptive-analytics>
3. Samir Madhavan, “Mastering Python for Data Science”, Packt, 2015.
4. <https://www.coursera.org/learn/inferential-statistics>

ADVANCED INTERNET OF THINGS	L	T	P	C
	4			4

Unit 1: The IoT Networking Core : Technologies involved in IoT Development; Internet/Web and Networking Basics OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing; IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards; Network Fundamentals: Overview and working principle of Wired Networking equipment's – Router, Switches, Overview and working principle of Wireless Networking equipment's – Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions. (16L)

Unit 2: IoT Architecture: History of IoT, M2M – Machine to Machine, Web of Things, IoT protocols; Applications: Remote Monitoring & Sensing, Remote Controlling, Performance Analysis;The Architecture: The Layering concepts, IoT Communication Pattern, IoT protocol Architecture, The 6LoWPAN; Security aspects in IoT. (10L)

Unit 3: Building IOT with Raspberry PI : Network & Communication aspects Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services. (12L)

Unit 4: Building IOT With Galileo/Arduino : Intel Galileo Gen2 with Arduino - Interfaces - Arduino IDE – Programming - APIs and Hacks- Design challenges, Development challenges, Security challenges-Other challenges. (10L)

Unit 5: Case Study & advanced IoT Applications :IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT, Industry 4.0 concepts. Sensors and sensor Node and interfacing using any Embedded target boards (Raspberry Pi / Intel Galileo/ARM Cortex/ Arduino). (12L)

TOTAL (60L)

Text Books:

1. 6LoWPAN: The Wireless Embedded Internet, Zach Shelby, Carsten Bormann, Wiley
2. Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, Dr. Ovidiu Vermesan, Dr. Peter Friess, River Publishers.
3. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

Reference Books:

1. Arshdeep Bahga, Vijay Madiseti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Manoel Carlos Ramon, “Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers”, Apress, 2014.
3. Marco Schwartz, “Internet of Things with the Arduino Yun”, Packt Publishing, 2014
4. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally
5. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning.
6. Walteneus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice".
7. The Internet of Things: From RFID to the Next-Generation Pervasive Networked Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning
8. F. Adelstein and S.K.S. Gupta, “Fundamentals of Mobile and Pervasive Computing,” McGraw Hill, 2009
9. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India, 2010.

CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
	4			4

Unit 1: Security in Computing Environment: Need for Security; Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks); Security Services – Confidentiality, Integrity, Availability; Information Security; Methods of Protection. Basics of Cryptography: Terminologies used in Cryptography; Substitution Techniques – The Caesar Cipher, One-Time Pads, The Vernam Cipher, Book Cipher; Transposition Techniques – Encipherment/Decipherment Complexity, Digrams, Trigrams, and Other Patterns. **(16L)**

Unit 2: Mathematical Background: Shannon’s Theory, Computational Complexity, Finite Fields, Number Theory. **(8L)**

Unit 3: Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4. Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm. **(12L)**

Unit 4: Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure. **(14L)**

Unit 5: Web Security: Web Security Requirements; Secure Socket Layer (SSL) – SSL Architecture, SSL Protocol; Transport Layer Security (TLS); Secure Electronic Transaction (SET) – Features, Components, Dual Signature, Purchase Request. **(10L)**

TOTAL (60)

Text Books:

1. Cryptography and Network Security – Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition.
2. Cryptography and Network Security : Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning

P1	MINI PROJECT	L	T	P	C
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ADVANCED DEEP LEARNING FOR MALWARE ANALYSIS

L	T	P	C
4			4

Unit 1: *Introduction to Malware analysis:* Why Malware analysis?, Types of malware analysis, Setting up the lab environment, Lab requirements, Malware sources. Static analysis-Determining file type, Identifying the obfuscation technique used to threat analysis, Classifying and comparing the malware samples, Dynamic analysis – Dynamic analysis Tools and their features, steps involved in dynamic analysis, Monitoring the Malware activity and understanding its behaviour.

(16L)

Unit 2: *Artificial Intelligence & Machine Learning:* Artificial Intelligence - Introduction, Application of Artificial Intelligence, Why Machine Learning and security?, Classification and Clustering – Machine Learning: Problems and Approaches, Training Algorithms to Learn, Supervised classification algorithms, Practical consideration in classification, Clustering Algorithms, Adversarial Machine Learning, Transfer Learning.

(12L)

Unit 3: *History of deep learning:* Thresholding Logic, Perceptron Learning algorithm, Multilayer Perceptrons, Representation Power of MLPs, Sigmoid Neurons, Gradient Descent, Feed Forward Neural Networks, Representation power of Feed Forward Neural Networks.

(10L)

Unit 4: *Back propogation:* LeNet, AlexNet, ZFNet, VGGNet, GoogLeNet, ResNet, Visualizing Convolutional Neural Networks, Guided BackPropogation, Deep Dream, Deep Art, Convolutional Neural Networks, Long Short Term Memory Networks, Recurrent Neural Networks, Backpropogation through time (BPTT), Vanishing and Exploding Gradients.

(10L)

Unit 5: *Recent Trends in Deep learning architecture:* Truncated BPTT, GRU, Generative Adversarial Networks(GANs, Radial Basis Function Networks(RBFNs), Self Organizing Maps (SOMs), Deep Belief Networks (DBNs), Restricted Boltzmann Machines(RBMs), Encoder Decoder Models, Autoencoder, Attention Mechanism, Attention over images.

(12L)

TOTAL(60L)

Text Books:

1. “Learning Malware analysis”, Monnappa K A, Packt Publishing.
2. “Machine Learning & Security”, Clarence Cheo and David Freeman, O’Reilly Media.
3. “Deep Learning” , Ian Goodfellow and YoshuaBengio and Aaron Courville, An MIT Press book.

Reference Books:

1. “Neural Networks A Systematic Introduction”, Raul Rojas, Springer.
2. “Neural Networks and Deep Learning”, Charu. C. Agarwal, Springer.
3. “Understanding Machine Learning From Theory to Algorithms”, Shai-Shalev, Shwartz and Shai Ben-David.

FOUNDATIONS OF MALWARE ANALYSIS

L	T	P	C
4			4

Unit 1: *Fundamental Theory* - Basic concepts, Assembly languages, Becoming familiar with x86, Basics of MIPS, Working with SPARC, Moving from assembly to High level programming language.

(16L)

Unit 2: *Diving Deep into Windows Malware* - Basic static and dynamic analysis for x86, Dynamic analysis with OllyDbg/Immunity Debugger, Debugging malicious services, unpacking, Decryption and Deobfuscation.

(10L)

Unit 3: *Inspecting process injection and API Hooking* - Understanding process injection, DLL injection, Working with process injection, Dynamic analysis of code injection, Memory Forensic techniques for Process Injection, Understanding API Hooking, Working with API Hooking.

(12L)

Unit 4: *Bypassing Anti-reverse Engineering Techniques* – Exploring debugger detection, Handling debugger breakpoints evasion, Escaping the debugger, obfuscation and anti-disassemblers, detecting sandboxes and virtual machines

(10L)

Unit 5: *Understanding Kernel-Mode Rootkits* - Kernel mode versus user mode, Windows Internals, Rootkits and device drivers, Hooking Mechanism, DKOM, Process Injection in Kernel-Mode, KPP in x64 systems, Static and dynamic analysis in Kernel-Mode.

(12L)

TOTAL(60L)

Text Books:

1. “Mastering Malware analysis”, Alexey Kleymenov, AmrThabet, Packt Publishing Ltd

Reference Books:

4. “Learning Malware analysis”, Monnappa K A, Packt Publishing.
5. “Automatic Malware Analysis: An Emulator Based Approach”, Heng Yin, Dawn Song, Springer.
6. “Rootkits for Dummies”, Larry Stevenson and Nancy Altholz, Wiley.

STUDY OF MALWARE ANALYSIS TOOLS AND DATASET

L	T	P	C
4			4

Unit 1: *Basic static malware analysis:* Dynamic analysis, Identifying attack campaigns using Malware Networks- Bipartite networks, Visualizing Malware Networks, Network visualization with Graphviz.

(16L)

Unit 2: *Dataset and its Features:* Microsoft Malware Classification Challenge (BIG 2015)- Lollipop, Vundo, Ramnit, Simda, UCI Dataset Repository – Detect Malware Types Data Set, Detect Malicious Executable (Antivirus) Data set, Malware static and dynamic features VxHeaven and Virus Total Data Set, Kaggle- Microsoft Malware Prediction – MachineIdentifier, HasDetections.

(12L)

Unit 3: *Malware Functionalities and Persistence methods:* Malware functionalities- Downloader, Dropper, Keylogger, Malware Persistence methods – Run Registry Key, Scheduled Tasks, Startup folder, AppInit-DLLs, DLL search order Hijacking, Malware obfuscation, Detecting API Hooks, Kernel Mode Rootkits .

(10L)

Unit 4: *Graphical Processing unit:* What the GPU does, Types of GPUs, CPU VS GPU, Computational Functions - GPU accelerated video decoding and encoding, Video decoding processes that can be accelerate, Application of GPU, GPU forms – Terminology, Dedicated graphics cards, Integrated graphics processing unit, Hybrid graphics processing, Stream processing and general purpose GPUs , External GPU.

(10L)

Unit 5: *Google Colab:* What is Google Colab?, Your First Colab Notebook, Documenting Your code, Google Colab- Saving Your work, Sharing your Notebook, Invoking System commands, Executing External Python Files, Google Colab – Graphical Outputs, Code Editing Help, Magics, Adding Forms, Installing ML Libraries, Using Free GPUs, Conclusion.

(12L)

TOTAL(60L)

Text Books:

1. “Malware Datascience, Joshua Saxe, Hillary Sanders, No Starch Press.
2. “Learning Malware analysis”, Monnappa K A, Packt Publishing.
3. “Colab Tutorialspoint Simply Easy Learning”, Tutorialspoint.

Reference Books:

1. “Hands on GPU computing with Python”, Avimanyu Bandyopadhy, Packt Publishing.
2. “Mastering Malware analysis”, Alexey Kleymenov, AmrThabet, Packt Publishing Ltd.
3. “Multicore and GPU Programming An integrated Approach”, Gerassimos Barlas, Elsevier.

1. RESEARCH AND TEACHING METHODOLOGY

COURSE OBJECTIVE:

To improve the research acumen and the teaching ability of the students and help them to probe business issues scientifically.

UNIT I:

RESEARCH – Definition, Objectives, Scope, Scientific, Ethics, Process. Research in Social Sciences – Classification. Need for Research – identification of an issue, formulation of a problem. HYPOTHESIS – Sources, Types, Characteristics. RESEARCH DESIGN - Review of Literature - Primary and Secondary Sources. Measurement – Function, Characteristic, Construction of Measurement Tool. Research Plan. DATA – Meaning, Importance, Sources, applicability. Sources of secondary data. Sources of Primary data. Methods of Collection - Observation, Experimentation, Survey (Types)

UNIT II:

SAMPLING – Definition, Objectives, Characteristics. Sample design - Universe, Sample Unit, Sample Size (Determination), errors (sampling and non sampling) Sampling Techniques (Probability and Non Probability), Advantages and Limitations of each Sampling technique. TOOLS FOR DATA COLLECTION -Choice on Methods of data collection - Nature of Fieldwork, Sampling Frame and Sample Selection. Schedule and Questionnaire – Construction, types of questions, Measurement Scale and Indices, Pilot Study and Pre-test.– Field Operation. DATA PROCESSING -Editing, coding, transcription, Classification and Tabulation of data. Data analysis – meaning, methods, quantitative and qualitative analysis, introduction to uses of Statistics and its limitation, introduction to parametric and non-parametric tests, graphic presentation.

UNIT III:

DATA STATISTICS – measures of central tendency, measures of dispersion, Uni-variate, Bi-variate, Multivariate, Contingent Table, Measure of Association / Relationship. HYPOTHESIS – Formulation, Testing. DATA ANALYSIS (Uni and Bi-variate) – Percentage, Weighted Average, Garret Ranking, correlation and regression, T- test, Z – Test, Run Test, F – Test, One Way ANOVA, Two Way ANOVA, Chi Square Test. MULTIVARIATE ANALYSIS - Multi Dimensional Scaling, Factor Analysis, Conjoint Analysis, MANOVA, Cluster analysis, Discriminate analysis.

UNIT IV:

REPORT WRITING – Types, Different stages in research Report. Layout of the research report. Precautions for writing Research Reports. Problems of Inference in Non-experimental Sciences. Uses of footnotes, References and Bibliography. Software Packages for Statistical Tools.

UNIT V: METHODOLOGY OF TEACHING

Teaching - Objectives of Teaching, Phases of Teaching - Teaching Methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project Method, Seminar - Integrating ICT in Teaching: Individualized Instruction, Ways for Effective Presentation with PowerPoint - Documentation - Evaluation: Formative, Summative & Continuous and Comprehensive Evaluation - Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development - Teaching Later Adolescents.

COURSE OUTCOME:

After studying this course, the student will be able to improve the research acumen and develop a passion for teaching.

REFERENCES:

1. Research Methodology, Methods and Techniques - C.R. Kothari
2. Methodology of Research in social Sciences - O.R. Krishnaswami
3. Business Research Methods - Donald R. Cooper, Pamela S. Schindler
4. Statistics for Management-Richard I.Levin&David S.Rubin
5. Statistical Methods-S.P.Gupta
6. Statistics for Business and Economics- R.P Hooda-Mac Millan India Ltd.
7. Sampath, K., Panneerselvam, A & Santhanam S(1984), Introduction to Educational Technology, (2nd Revised Edition), New Delhi: Sterling Publishers.
8. Sharma, S. R. (2003), Effective Classroom Teaching Modern Methods, Tools and Techniques, Jaipur: Mangaldeep
9. Vedanayagam, E. G (1989), Teaching Technology for College Teachers, New York: Sterling Publishers.

2. COMPETENCIES FOR EXCELLENCE

COURSE OBJECTIVES:

This course will enable the students to

- i. develop an understanding on competency framework, assessment and development of competency.
- ii. inculcate critical thinking process to analyze and solve the problems.
- iii. understand the power of team dynamics.
- iv. learn the value of time and art of managing time.
- v. create an awareness on cause and consequence of stress and to develop strategies to manage stress

UNIT I: COMPETENCY DEVELOPMENT

Meaning-Importance-Framework-Measuring Competency-Developing Competency

UNIT II: PROBLEM SOLVING AND DECISION MAKING

Identifying, Defining and Solving the Problems-Creative Thinking-Group Decision making-Negotiation Skill

UNIT III: TEAM BUILDING

Significance-Understanding role of teams-Strategies and Tools for Team Building-Leadership Skill-Conflict Resolution.

UNIT IV: TIME MANAGEMENT

Significance-Assessment of Time Management- Strategies and Tools.

UNIT V STRESS MANAGEMENT:

Significance-Causes for Stress-Symptoms of Stress- Strategies for Managing and Overcoming Stress

COURSE OUTCOME

On completion of this course, the students will be able to-

- i. critically think on a particular problem and evolve workable solutions to solve the problem.
- ii. understand the dynamics of the team and effectively use them for productive result.
- iii. understand the importance of time, prioritize and schedule the time.
- iv. understand the significance and strategies of managing stress for the wellbeing of both individual and organization

REFERENCES:

1. *Barun K Mitra*, Personality Development and Soft Skill, Oxford Publishers.
2. *Alex,K*.Soft Skills: Know Yourself & Know the World,S. Chand & Co
3. *Kalyana*,Soft Skill for Managers,Wiley Publishing Ltd.
4. *Shalini Verma*, Development of Life Skills and Professional Practice,Sultan Chand & Co

WEBSITES

www.mindtools.com

www.free-management-ebooks.com

3. CONTEMPORARY ISSUES IN FINANCE

UNIT I

Finance - Concept, scope, objectives. Profit maximization vs. Wealth maximization; Functions of Finance Manager in Modern Age; Financial decision areas, Time value of money, risk and return analysis

UNIT II

Long-term finance - sources, equity shares, preference shares, debentures and bonds. Working Capital Financing - Sources, Role of commercial bank, Commercial paper, Factoring and other tools. Capital Structure – Concept, Approaches; NI, NOI, Traditional and Modigliani Miller Approach. Cost of Capital - equity share, preference share, debentures.

UNIT-III

Working Capital – Concept, Approaches to Working Capital Management, Factors affecting working capital requirement, Management of cash, inventory and receivables. Dividend Decision: Concept of retained earnings and plough back of profits, relevancy and irrelevancy theory of dividend decision; Walter's model; Gordon's Model and Modigliani Miller model; Factor affecting dividend decision.

UNIT-IV

Investment decision – Appraisal, Capital budgeting, Profitability Index, Capital Rationing, Risk and Uncertainty. Leverage analysis (financing, operating, combined leverage), EBIT, EPS analysis, EVA. Credit rating. Institutional Investors. Mutual Funds. Speculation and Investment. Portfolio Analysis, Venture Capital.

UNIT-V

Activity Based Costing. Insurance as an Investment. Derivatives. Venture Capital. International Financial Institutions - BoP, Foreign Exchange Rate. Corporate sickness - Turn around strategies. EXIM bank, International Monetary Fund (IMF), Asian Development Bank (ADB), Export Credit Guarantee Corporation (ECGC), World Bank, International Development Association, Bank for International Settlement and such other International financial Institutions.

REFERENCES:

1. Financial Management - I M Pandey
2. Financial Management and Policy - James C Varnhorne
3. Financial Management - Theory and practice - Prasanna Chandra
4. Financial Management Principles and Practice - S.N. Maheswari
5. Corporate Finance Theory and Practice - Aswat Damodaran
6. Security Analysis and Portfolio Management – Fischer and Jordan
7. Investments – Sharpe, Bailey and Alexander.
8. Foreign Exchange and Risk Management – C. Jeevanandam
9. Capital Market Management - VA Avadhani
10. Financial Services – MY Khan
11. Project Planning Analysis, Selection and Implementation – Prasanna Chandra.

4. CONTEMPORARY ISSUES IN MANAGING HUMAN RESOURCES

UNIT - I

Human Resource – Philosophy, Changing environments. Organization of HR departments. Line and staff functions. Role of HR Managers. Job analysis – Methods, Purpose, Job Description, Job Specification. Man power planning. Recruitment and Selection. Socialization.

UNIT - II

Performance appraisal - 360 degrees appraisal. Job evaluation and merit rating. Computerized evaluation. Training and Development. Employee compensation and rewards. Mentoring. Discipline administration. Trade unions. Grievance handling. Exit Interview.

UNIT - III

Labour Welfare: Employees safety and Health. Benefits and services: Statutory benefits – non-statutory (voluntary) benefits Using HRM to attain competitive advantage. HR Audit. Human Information System. Industrial relations. Industrial Disputes.

UNIT - IV

Understanding Individual – Personality, Perception, Attitude, Values. Development of Individual – Motivation, Leadership, Group dynamics, Transactional analysis, Creativity, Assertiveness training, Team Building. Organisational Climate and Culture. Career management. Organizational development. Managing Self – Mediation for peace – Yoga for Life.

UNIT –V

Knowledge Management. Employee engagement. Competency Mapping. Retention strategies – Outplacement, Quality of work life, Flexi timing. Stress, Crisis & Conflict Management. Workers participation. Collective bargaining. Counseling – Strategies, Behavior Modification.

REFERENCES:

1. Personnel Management & Industrial Relations - P.C. Tripathi.
2. Dynamics of Personnel Management - C.B. Mamoria
3. Human Resource Management - N.G. Nair, Latha Nair.
4. Essential of Human Resource Management and Industrial Relations - P. Subbarao
5. Managerial effectiveness and Quality of Work life: Indian Insights - Chakraborty
6. Managing Human Resource - Wayne Cascio
7. Organization development - Wendell I. French and H. Bell, Jr.
8. Managing Stress - Jeff Davidson
9. Eternal Values for a changing society - Swami Ranganathananda
10. Management Development and Training Hand Book - Taylor and Lippitt
11. Management Development and Training Hand Book - L.W. Humble
12. Explorations in Management Development - Lynton & Pareek
13. Total Career Management - Frances A. Clark
14. Successful Negotiation - Rao, S.L.

5. CONTEMPORARY ISSUES IN MARKETING

UNIT I

Marketing – Evolution, Concepts, Purpose, Process, Types, Indian Environment, International Environment. Marketing Mix – Definition, Decision on Components.

UNIT II

Product – Definition, Differentiation, New product development, Product Life cycle, Product mix, Branding. Pricing – Definition, Concepts, Methods. Packaging. Promotion – Definition, Techniques. Promotion mix – Components, Advertising, Sales promotion, Personal selling, Publicity, Public relations. Physical distribution – Definition, Types of channels, Levels, Strategies, Direct marketing

UNIT III

Segmenting – Nature, Characteristics, Process, Bases. Targeting – Bases, Decisions on segments, analyzing consumer behavior, selecting segments. Positioning – Definition, Strategies.

UNIT IV

Customer Relationship Management. Perceptual mapping. Brand building. Rural Marketing. E-Marketing - Online and Web marketing. Marketing ethics. Expanding the Horizon. Multi Level Marketing. Consumerism. Marketing to non-profit organizations. Green Marketing. Consumer research

UNIT V

Marketing Information system. Marketing Intelligence. Scope for Research in Marketing.

References:

1. Marketing Research - Rajendra Nargundkar
2. Marketing Research - Harper W Boyd, Ralph Westfall, Stanley F Stasch
3. Strategic Brand Management - Kevin Lane Keller
4. Rural Marketing Environment, Problem and Strategies - T.P.Gopaldaswamy
5. Marketing Management, Planning Implementing and Control, An Indian Context – V.S.Ramasamy & Namakumari
6. Advertising & Promotion - George E.Belch & Michael E.Belch
7. Retail Management - Chetan Bajaj, Tuli , Srivastava
8. Retailing - Burman, Evans
9. International Marketing - Philip R. Cateora
10. Hand book of Relationship Marketing - Jagadish N.Sheth and Atul Parvatiyar
11. Key Customer Relationship Management - Ken Burnett
12. Consumer Behavior - Leon G Schiffman, Leslie Lazar Kanuk
13. Marketing management (Millenium edidtion) - Philip Kortler
14. Essential of Marketing Research - Aakar Day, Kumar

6. BUSINESS ANALYTICS

Course Objective:

To enable the scholars to understand the need and importance of Business Analytics in solving business problems. To educate the scholars on different tools of Business Analytics. To understand the opportunities for Business Analytic professionals.

Unit 1:

Introduction and Definition of Business Analytics – Application of Business Analytics in operations, marketing, finance, and strategic planning

Unit 2:

Data – Sources of Data – Collecting Data – Data Accuracy – Issues with Missing Data – Data Classification –Methods for Data Analysis – Deciding appropriate method and tool for analysis – Effective Interpretation

Unit 3:

Introduction to data Mining – Process of Data Mining – Predictive Analysis – Lending Analytics – Recommendation Analytics –Healthcare Analytics – Financial Analytics – Sports Analytics.

Unit 4:

Prescriptive Analytics – Testing – Simulating the Future – Optimising complex decisions -

Unit 5:

Basics on Software requirement for business analytics – Decision support Systems – Implementation strategy of the prescriptions.

References:

1. Data Science for Business, Provost and Fawcett: O'Reilly
2. Data Mining for Business Intelligence, Concepts, Techniques and Applications, Shmueli, Patel, and Bruce: Wiley
3. Management Science: The Art of Modeling with Spreadsheets, Powell and Baker: Wiley

7. ENTREPRENEURSHIP ECOSYSTEM

Unit I:

Basic of Entrepreneurship: Definition- Importance of entrepreneurship- Characteristics of entrepreneurship, Entrepreneurship and economic development- Entrepreneurship process, Challenges in entrepreneurship and its sustainability.

Unit II:

The fundamental of starting a business, Developing a business plan, Protecting the ideas-IPR-Testing the idea, Operating a business - Financing a business, Market identification and communication, Management of the business

Unit III:

Entrepreneurship Ecosystem: Elements of the entrepreneurship ecosystem, Frame work of entrepreneurial ecosystems. Environment perspectives for nurturing entrepreneurship, Entrepreneurial support systems such as government policy, services available to entrepreneurs, entrepreneurial culture, infrastructure, promoting institutions.

Unit IV:

Start up Ecosystem: Individual interest, entrepreneurial behavior - The startup and associated challenges. Basics of starting a business- legal and tax considerations- different types of business structures

Unit V:

Business clusters-Types of Business Clusters - Cluster effect – Cluster and Entrepreneurship-Famous entrepreneurial clusters - Silicon valley, Digital Media City, Foot wear cluster of Kolkatta, Garments cluster of Tiruppur.

References:

1. Entrepreneurship Development by Sharma - PHI
2. Entrepreneurial Development by Khanka S.S.- Sultan Chand
3. Global Entrepreneurship: Environment and Strategy by Nir Kshetri
4. Entrepreneurship Development by K Ramachandran
5. Entrepreneurship Development by S Anil Kumar
6. Entrepreneurship Development and Small Business Enterprises, by Charantimath
7. Small scale Enterprises And Entrepreneurship Ecosystem by Dr. Vasant Desai

8. CORPORATE FINANCIAL ANALYSIS

COURSE OBJECTIVE : TO ENRICH THE PH.D LEVEL SCHOLARS WITH SOME HIGHLIGHTING CORPORATE LEVEL FINANCIAL ANALYSIS CONCEPTS AND TOOLS

Unit .1.

Company accounts – kinds of joint stock companies---- Shares, and share capital --- different types of shares---different types of share capital --- Debentures—different types of debentures --- Acquisition of Business --- profit prior to incorporation --- Underwriting.

Unit . 2.

Horizontal form of company Balance sheet – Vertical form Of Balance sheet – contents as per Companies Act --- Form and contents of Profit and Loss Account.

Unit . 3.

Financial Statements --- Nature – Analysis and Interpretation—Different accounting Ratios, their nature, application, uses, and their limitations.

Unit .4 .

Fund flow statement --- theory – construction—sources of funds—uses of funds---- Usefulness of fund flow statements to the society and to the Company.----Cash flow statement--- its construction ----uses

Unit . 5.

Case study: Relating to the use of ratios, fund flow statements, cash flow statements and peer analysis to assess earning dynamics and asset efficiency of companies.--- application of all the tools of financial analysis to a company to make a balanced assessment of its operational performance and funding structure

9. INVESTMENT AVENUES AND INVESTORS BEHAVIOUR

OBJECTIVE:

The objective of this course is to impart knowledge to students regarding the theory and practice of investors' behaviour towards the various investment alternatives.

UNIT – I

Definition, Micro & macroeconomic concepts relating to investment, Investment objective, Investment process, Investment constraints, Investment strategy, Investment v/s Speculation, Arbitrage, Gambling, Types of investors.

UNIT – II

Investment goals, Liquidity, Investment horizons and taxation, Alternatives for investment, Equity market, Mutual funds, Pension funds, Endowment funds, Insurance (life and nonlife), Banks, Money market, T-bills, Commercial paper, Certificates of deposit, Repos and reverses, Bond market, Treasury notes (T-notes) and T-bonds, bonds, Fixed income securities, Time value of money, Interest rates, Bond pricing bond yields, Coupon yield.

UNIT – III

Risk and Return, Historical and Expected return, Measurement, Risk and its measurement, Systematic and Unsystematic risk, Types, Measurement and significance of Beta.

UNIT – IV

History of Behavioural Finance, Psychology: Concept, Nature, Importance, The psychology of financial markets, The psychology of investor behaviour, Behavioural Finance Market Strategies, Prospect Theory, Loss aversion theory under Prospect Theory & mental accounting, Investors Disposition effect .

UNIT – V

External factors and investor behaviour: Fear & Greed in Financial Market, Emotions and financial markets: Geomagnetic storm, Statistical methodology for capturing the effects of external influence onto stock market returns.

OUTCOME:

To gain knowledge about various investment alternatives and to identify persistent or systematic behavioural factors that influence investment behaviour.

Reference Books:

1. Donald E.Fischer & Ronald J.Jordan, Security Analysis & Portfolio Management, PHI Learning., New Delhi, 8th edition, 2011.
2. Prasannachandra, Investment analysis and Portfolio Management, Tata McGraw Hill, 2012.
3. Reilly & Brown, Investment Analysis and Portfolio Management, Cengage Learning, 9th Edition, 2011.
4. S. Kevin, Securities Analysis and Portfolio Management, PHI Learning, 2015, Second Edition .
5. V.A.Avadhani, Securities Analysis and Portfolio Management, Himalaya Publishing House, 2016.
6. V.K.Bhalla, Investment Management, S.Chand & Company Ltd., 2012.
7. Bisen,pandey-Learning Behavioural Finance(Excel Books).
8. Forbes- Behavioural Finance (Wiley India).
9. The Little Book of Behavioral Investing James (Montier) 2010.

10. RISK MANAGEMENT TECHNIQUES

OBJECTIVE:

The objective of this course is to provide in depth knowledge of risk management.

UNIT – I

Introduction to risk management, Definition, Objectives of risk management and tools, Need for a risk management, Types of risk, Sources of risk, Risk identification.

UNIT – II

Management of risk, Risk management process, Risk management policies, Value of risk management, Risk management v/s Risk avoidance, Risk retention, Risk transfer, Risk immunization strategies, Measurement and control of risk, Measurement and controlling risk.

UNIT – III

Foreign Exchange Markets, Spot Prices and Forward Prices, Exchange control, Fixation of exchange rate, The effects of Exchange rates in Foreign Trade, Factors influencing Exchange rates, Exchange control in India, Tools for hedging against Exchange rate variations, Forward, Futures and Currency options, FEMA, Determination of Foreign Exchange rate and Forecasting.

UNIT – IV

Trading, Futures trading system, Entities in the trading system, Commodity futures trading cycle, Order types and trading, Margins for trading in futures, Charges, Clearing, Settlement, Risk management, Margining at NCDEX and Standard Portfolio Analysis of Risk (SPAN).

UNIT – V

Evolution of Derivatives Market in India, Regulations, Framework, Trading at NSE and BSE Regulations of financial derivatives, Futures Vs. Forward contracts, Hedging strategy using futures Stock index futures, Interest rate futures, Hedge ratio, Stock index futures and Indian stock market.

OUTCOME:

To gain knowledge about different types of risks.

Reference Books:

1. Jeevanandam, C, Risk Management, Sultan Chand and Sons, 2005.
2. Emmett J. Vaughan, Risk Management, John Wiley & Sons, Inc.
3. Jeevanandham C.Foreign Exchange & Risk management, Sultan chand & sons.
4. Stephens, John. (2001), Managing Commodity Risk, John Wiley & Sons.
5. S.L.Gupta, Financial Derivaties- Theory, Concepts and Practice, Prentice Hall Of India, 2017, Second Edition.
6. Stulz, Risk Management and Derivaties, Cengage Learning, 2nd Edition, 2011.

11. HUMAN RESOURCE DYNAMICS

Unit-I

Cognitive Processes: Thinking and Problems Solving – Thinking – Concept – Theoretical Perspectives; Types – Convergent – Divergent Lateral – Reasoning – Decision Making Process – Approaches – People Focused & Product focused – Strategies employed – Creating Positive Mindsets Problem Solving – Concept – Approaches in Managerial Perspectives – Brain Storming, Sensitivity Training – T Groups – Encounter Groups. Emotional Intelligence – Concept – Nature – E.Q. for Improving Emotional Intelligence.

Unit-II

Personality: Concept, Theoretical perspective- Trait & Type Approach (Brief); Self Concept, Meaning & Nature, Self Growth Movement, Type A, B, C, Personality, Healthy Personality (All port's Mature), Jungs Personality Indicators.

Unit-III

Mental Health: Concept Principles of Deviance and Disability, Act; Stigma, National Mental Health Act Provision for the Attitude Job Satisfaction and Mental Health & Work Ethics; Parameters of Positive Mental Health; National Services for the Mentally ill.

Unit IV

Stress: Concept Types, Physiological Arousal as Base Reactions and Coping (Task Oriented, Ego Defense Mechanism), and Managing Stress – Time Management Skills Relaxation Exercises Handling External Toxins. Behavioral Change: Concept Significance Self Awareness, Methods and Techniques of Self Development.

Unit IV:

Intergroup Dynamics-Intergroup behavior – Working in group – Task types & group performance – Task interdependence – Goal differences – Difference in time horizons – Perceptual differences – Emphasis on loyalty – Managing intergroup conflict (Conflict – resolution grid) – Group influence [Conformity, Social Pressure, Compliance& Underlying principles] – Pro social Behavior – Groups affecting Task performance – Social facilitation effect & Social loafing – Cooperation and group impact – Coalitions – Resistances to change.

Recommended books:

1. Arnold, John, Robertson, Iran T. and Cooper, Cary L., Work Psychology- Understanding Human Behaviour in the Work Place.
2. Mac Millan Baron, Robert A. and Greenberg, Jerald, Behaviour in Organizations, Prentice Hall International.
3. McConnel, James V., Understanding Human Behaviour, Holt Rinehart and Winston.
4. Spencer, Christopher and Scelt, Peter, Psychology : A Contemporary Introduction, Black Well.
5. Tiffin, J. and McGormick, B.J., Industrial Psychology, Prentice Hall of India .
6. C.S. Venkata Ratnam, Globalization And Labour-Management Relations-Dynamics Of Change, Response Books,2001.
7. E;ezmol A : The Dynamics of Inter-personnel Behaviour, John Wiley & Sons., Inc., New York, 1969.
8. Mamoria CB, Mamoria, Gankar-Dynamics of Industrial Relations (Himalayan Publication, 2003)

12. PERSPECTIVES ON KNOWLEDGE MANAGEMENT

DIGITAL MARKETING

Course Objective:

Unit I

To enable the scholars to understand issues in online Marketing and the strategies adopted by different companies. To educate knowledge management- variations in Digital Marketing Field. To understand and analyse the opportunities and challenges in Knowledge Management.

Unit 1: Principles of digital marketing – E-Commerce Marketing – E-Mail Marketing – Mobile

Unit II

Marketing – Affiliate marketing – Infographic Content Marketing
Types of Knowledge – Procedural vs. Declarative Knowledge - Tacit vs. Explicit Knowledge - General vs. Specific Knowledge - Technically vs. Contextually specific Knowledge - Facebook Marketing – Google Marketing – Specific Marketing Knowledge – The Mark of Knowledge - Characteristics of Knowledge Strategy

Unit 3: Social Shopping and Opinions – Social Events and Wikis – Social News and Social Book

Unit III

Marking – Blogging and Micro Blogging - Posting on Forums, Guestbooks, and free Classified Knowledge Management Systems Life Cycle - Challenges in KM Systems Development - Conventional Vs Unit 4: Website development – Search Engine Optimisation– Optimising for Google, Yahoo, and KM Systems Life Cycle (KMSLC) - Key Differences - Key Similarities - KMSLC Approaches - Technologies to Bing – Keyword research And Analysis – basics of SEO friendly web design – Website Marriage Knowledge - Advantage and disadvantage of Knowledge Based Systems.

Architecture Analysis – Web Master tool–Directory Submission on Web – Google Analytics –

Google algorithms – Google Adwords – Google Adsense – Google Sandbox Effect – Search Knowledge Search & Knowledge Architecture - Nonaka's Model of Knowledge Creation &

Transformation - Knowledge Architecture - Acquiring the KM System - Capturing the Tacit Knowledge -

Unit 5: Digital Marketing Strategy - Competitor analysis - ESI (Content Semantic Indexing) - Expert Evaluation - Developing Relationship with Experts - Fuzzy Reasoning & Quality of Knowledge Online reputation management – Advanced Link Building and Concept of Link Popularity– App Capture - Interviewing as a Tacit Knowledge Capture Tool.

Store Optimisation – Career Opportunities in Digital Marketing

References:

Unit V

1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan

2. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, Ian Dodson

3. Digital Marketing Strategy: An Integrated Approach to Online Marketing, Simon Kingsnorth.

13. DIGITAL MARKETING

Course Objective:

To enable the scholars to understand issues in online Marketing and the strategies adopted by different companies. To educate the scholars on the dynamics in Digital Marketing Field. To understand and analyse the opportunities and their attractiveness for professionals.

Unit 1:

Principles of digital marketing – E-Commerce Marketing – E-Mail Marketing – Mobile Marketing – Affiliate marketing – Infographic Content Marketing

Unit 2:

Social Media Marketing - Social Media Optimisation – Facebook Marketing – Google + Marketing – Twitter Marketing- LinkedIn Marketing – Video Marketing – Social Media Strategy

Unit 3:

Social Shopping and Opinions – Social Events and Wikis – Social News and Social Book Marking – Blogging and Micro Blogging - Posting on Forums, Guestbooks, and free Classified

Unit 4:

Website development – Search Engine Optimisation– Optimising for Google, Yahoo, and Bing –Keyword research And Analysis – basics of SEO friendly web design – Website Architecture Analysis – Web Master tool–Directory Submission on Web – Google Analytics – Google algorithms – Google Adwords – Google Adsense – Google Sandbox Effect – Search Engine Spam

Unit 5:

Digital Marketing Strategy – Competitor analysis – LSI (Latent Semantic Indexing) – Online reputation management – Advanced Link Building and Concept of Link Popularity– App Store Optimisation – Career Opportunities in Digital Marketing

References:

1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Damian Ryan
2. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, Ian Dodson
3. Digital Marketing Strategy: An Integrated Approach to Online Marketing, Simon Kingsnorth.

14. RURAL MARKETING STRATEGIES

OBJECTIVES: The objective of this course is to make the doctoral students understand the basic theories and functions of Rural Marketing with regard to the rural business in the current economic scenario.

UNIT I

Introduction to Rural market – Definition – Rural Marketing – Scope and Limitations – Rural Market in India - Characteristics of Indian rural market environment – Demographic details – Marketing challenges and opportunities under rural setting

UNIT II

Rural buyers – understanding Rural buyer behavior – Rural Demand and Consumption pattern Purchase decision making process – Influencing factors – changes in behavioral pattern

UNIT III

Relevance of Marketing mix for rural market – Product types in rural market setting – Product strategies – Nature of Rural market competition – Packing and Packaging strategies

UNIT IV

Pricing objectives and strategies - Market segmentation – Targeting – Positioning products in rural market - Rural market channels – Haats – Mandis – Society – PDS – strategies and current trends in rural distribution – Channel management - Examples

UNIT V

Communication to rural market – Communication objectives – strategies – challenges Advertising strategy for rural buyers –Rural media - Personalised communication - Mass media - Conventional media and its types - sales promotion under rural setting – conduct of marketing research in rural markets

OUTCOMES: After undergoing this course the scholars could able to understand the problems with regard to the subject and formulate objectives for further research.

References

1. *T P Gopalsamy*, Rural Marketing Environment, Problem and Strategies -, Vikas Publishing House, Pvt. Ltd.
2. *Dogra and Ghuman*, Rural Marketing TATA McGraw Hill
3. *U C Mathu*, Rural Marketing, Excel Books
4. Badi & Badi, Rural Marketing
5. *Krishnamacharyalu and Ramkrishnan*, Rural Marketing, Pearson Education
6. *Sukhpal Singh*, Rural Marketing, Vikas Publishing House, Pvt. Ltd.
7. Rajagopal – Managing Rural Business

15. SERVICES AND LOGISTICS PRACTICES

OBJECTIVES: The objective of this course is to make the doctoral students understand the basic theories and practices of Services marketing and Logistics management in modern and liberalized business dynamics.

UNIT I

Introduction to Services in recent economy- Classification of services - Meaning – Nature of services – Types and importance – Relationship Marketing – Services market segmentation

UNIT II

Customer loyalty – Positioning of services – Planning and Branding of service deliveries – New Service development – Service pricing objectives – Price mix - GAPS Model of service quality – Consumer behaviour in services – Consumer expectations in services – Consumer perceptions in services – understanding customer requirements - CRM

UNIT III

Service recovery - Delivery of service – Services promotion strategies – Role of intermediaries – marketing strategy formulation – Managing Demand – Marketing of Non- profit organisations, Financial Services, Hospitality Services, Leisure Services

UNIT IV

Logistics - definition – objectives - importance – Scope - Functions - need for planning
Logistics - Role of logistics in SCM – Functional Applications of Logistics – Logistics organisation Activities of Logistics – 3PL – 4PL – Reverse Logistics - Packaging -Principles, Functions – Types – Concepts - Materials and Cost - Consumer and Industrial Packaging - Infrastructure - Customs Issue - Service utilization Models. Logistics Costs –Concept - Identification of Costs - Accounting methods - Logistics Audit

UNIT V

Transporting system - Infrastructure and Networks - Freight Management -Route Planning – Containerization - Inter-modal Operators and Transport Economies - Transportation model - Transshipment model - Traveling Sales man technique Logistics Information Systems – Needs - Characteristics – Design - E-Logistics – Structure and Operation. Logistics Resource Management - Global Logistics - Operational and Strategic Issues, Strategic Logistics Planning – Role of government in domestic and international logistics - challenges

OUTCOMES: After studying this course the doctoral students could able to understand the basic principles of practices of the subject in current scenario for development of research problems and for further discussions.

References

1. *S.M.Jha, Services Marketing, Himalaya Publishing Company.*
2. *Cristopher Lovelock, Services Marketing, Prentice Hall.*
3. *Valarie A Zeitmanl and Mary Jo Bitmer, Services Marketing, Tata Mc Graw Hill.*
4. *Apte, Services Marketing, Oxford*
5. *Rao, Services Marketing, Pearson Education*
6. *Stock & Lambert Strategic Logistics Management*
7. *Raghuram & Rangraj Logistics & Supply chain management; cases & concepts*
8. *Bowersox, Closs& Cooper Supply Chain Logistics Management*

16. Mini Project



MANONMANIAM SUNDARANAR UNIVERSITY
Syllabus for Ph.D. Course Works in Mathematics



(For Affiliated Colleges and University Department)

PH.D COURSE WORKS (2016-17) ONWARDS

THE FOLLOWING ARE THE LIST OF 14 COURSE WORKS AVAILABLE FOR SELECTION ACCORDING TO THEIR REQUIREMENTS FOR PH.D. CANDIDATES IN MATHEMATICS AND EACH OF THEM CARRIES 4 CREDITS.

- Course 1. **Commutative algebra**
- Course 2. **Advanced analysis**
- Course 3. **Banach algebra and spectral theory**
- Course 4. **Advanced graph theory**
- Course 5. **Harmonic analysis**
- Course 6. **Stochastic modeling**
- Course 7. **Wavelets**
- Course 8. **Theory of near-rings**
- Course 9. **Advanced calculus**
- Course 10. **Algebraic graph theory**
- Course 11. **Combinatorial theory**
- Course 12. **Advanced domination theory in graphs**
- Course 13. **Graph reconstruction theory**
- Course 14. **Algebraic topology**

The equivalence of these course works with courses in M.Phil / M.Sc are given in **Annexure I**.

Detailed Syllabus

Course 1. COMMUTATIVE ALGEBRA (60 hours)

Preamble: It is the study of commutative rings. The objective of the paper is to introduce algebraic structure through the modules and different types of modules and its algebraic application. A pass in PG level algebra course is the prerequisite for this paper. Outcome of this paper is to motivate students to do research in diverse fields such as homological algebra, algebraic number theory, algebraic geometry, finite fields and computational algebra.

Unit I: Rings and Ideals – Modules (12 hours)

Unit II: Rings and Modules fractions – Primary Decomposition (12 hours)

Unit III: Integral Dependence and valuations – Chain conditions (12 hours)

Unit IV: Noetherian Rings – Artin Rings (12 hours)

Unit V: Discrete valuation rings and Dedekind domains (12 hours)

Text Book: Content and Treatment as in Atiyah and Macdonald, Introduction to Commutative Algebra, Chapters 1 to 9.

Course 2. ADVANCED ANALYSIS

(60 hours)

Preamble : The objective of this course is to understand borel measure in real and complex field. Prerequisite of this course is good knowledge of calculus, real and complex analysis, topology and measure theory. Motivation is to prepare scholars with an excellence in L^p spaces for the study of analysis. The out come of this course is to help the students to undertake further research in Fourier analysis, Harmonic analysis and Functional analysis.

Unit I : Abstract Integration : The concept of measurability – Simple functions – Elementary properties of measures – Arithmetic in $[0, \infty]$ - Integration of positive functions – Integration of complex functions – The role played by sets of measure zero(12 hours).

Unit II :Positive Borel Measures : Topological preliminaries – The Riesz representation theorem – Regularity properties of Borel measures – Lebesgue measure – Continuity properties of measurable functions(12 hours).

Unit III :Complex Measures : Total variation – Absolute continuity – Consequences of the Radon-Nikodym theorem – Bounded linear functions on L^p - The Riesz representation theorem(12 hours).

Unit IV : H^p - Spaces : Sub-harmonic functions – The spaces H^p and N - The theorem of F. and M. Reisz – Factorization theorems – The shift operator – Conjugate functions(12 hours).

Unit V : Fourier Transforms : Formal properties – The inversion theorem – The Plancherel theorem – The Banach algebra L^1 .

Holomorphic Fourier Transforms : Two theorems of Paley and Wiener – Quasi-analytic classes – The Denjoy- Careman theorem(12 hours).

Text Book : Content and Treatment as in Walter Rudin, Real and Complex Analysis, Third Edition, Chapters 1, 2, 6, 9, 17 and 19.

Course3. BANACH ALGEBRA AND SPECTRAL THEORY (60 hours)

Preamble: This syllabus is designed to introduce the students to the topics of Banach algebra and Hilbert spaces. Knowledge expected is to be aware of the background concepts in algebra. The students are expected to know about functionals. This will motivate the students to learn about various operators and their characteristics.

Unit I: Banach algebras – Complex Homomorphisms – Basic properties of Spectra – Symbolic Calculus(12 hours).

Unit II: Differentiation - Group of invertible elements – Commutative Banach algebra – Ideals and Homomorphisms – Gelfand transforms(12 hours).

Unit III: Involutions – Applications to non commutative algebra – Positive Linear Functional (12 hours).

Unit IV: Bounded Operators on Hilbert spaces – Bounded Operators – A commutativity theorem – Resolution of the Identity – Spectral theorem(12 hours).

Unit V: Eigen values of normal operators – Positive operators and square roots – Group of invertible operators – Characterization of V^* algebra(12 hours).

Text Book: Content and Treatment as in Rudin, Functional Analysis, Tata McGraw Hill, Chapters 10,11 & 12.

Course 4. ADVANCED GRAPH THEORY (60 hours)

Preamble: This course aims to introduce the learner some topics for his research in graph theory. It provides several conjectures and open problems to widen the scope of research. The pre-requisite for the course is a sound knowledge in graph theory at the post- graduate level. The outcome of the course is identification area and problems for research in graph theory.

Unit I: Dominating sets in graphs - Bounds on the domination number: in terms of order, degree, size, degree, diameter and girth(12 hours).

Unit II: Product graphs and Vizing's conjecture – Domatic number - Nordhaus-Gaddum type theorems - dominating functions(12 hours).

Unit III: Decompositions and colorings of a graph – Generalizations of graph decompositions(12 hours).

Unit IV: Necessary conditions for the existence of a G-decomposition of a graph- cycle decompositions, Vertex labelings and graceful graphs(12 hours).

Unit V: Perfect graphs: The perfect graph theorem – p-critical and partitionable graphs – A polyhedral characterization of perfect graphs and p-critical graphs – The strong perfect graph conjecture (and recent theorem)(12 hours).

Text Books: Content and Treatment as in

- 1) Teresa W. Haynes, Stephen T. Hedetniemi and Peter J. Slater, Fundamentals of Domination in graphs, Marcel Decker (1998), Section 1.2, 2.1to2.4 (For Unit I) Sections 2.6, 8.3, 9.1 and 10.1 to10.3 (for Unit II).
- 2) Juraj Bosak, Decompositions of graphs , Kluwar Academic Publishers, Chapters 2, 3 4, 6 and 7. (for Units III and IV).
- 3) Martin Charles Golumbic, Algorithmic graph theory, Academic Press, Chapter 3 (for Unit V).

Course 5. HARMONIC ANALYSIS(60 hours)

Preamble: Periodic functions play a vital role in solving many problems in Mathematics and Physics. Fourier analysis is the study of various aspects of periodicity of functions. Harmonic Analysis is a natural generalization of Fourier analysis and is significant for its mathematical aspect. The pre requisite for this course is a basic knowledge of Real and Complex analysis covered in a post graduate programme in Mathematics. The outcome of the course is to help researchers in both pure and applied mathematical fields.

Unit I: Fourier series and integrals – Definitions and easy results – The Fourier transform – Convolution – Approximate identities – Fejer’s theorem – Unicity theorem – Parseval relation – Fourier Stieltjes Coefficients – The classical kernels(**12 hours**).

Unit II: Summability – Metric theorems – Pointwise summability – Positive definite sequences – Herglotz’s theorem – The inequality of Hausdorff and Young(**12 hours**).

Unit III: The Fourier integral – Kernels on \mathbb{R} . The Plancherel theorem – Another convergence theorem – Poisson summation formula – Bachner’s theorem – Continuity theorem(**12 hours**).

Unit IV: Characters of discrete groups and compact groups – Bochners’ theorem– Minkowski’s theorem(**12 hours**).

Unit V: Hardy spaces- Invariant subspaces – Factoring F and M . Rieza theorem – Theorems of Szego and Beuoling(**12 hours**).

Text Book: Content and Treatment as in Henry Helson, Harmonic Analysis, Hindustan Book Agency, Chapters 1.1 to 1.9, 2.1 to 3.5 and 4.1 to 4.3.

Course 6. STOCHASTIC MODELING(60 hours)

Recap : Basics of Probability space random variable – Discrete distributions and Continuous distributions – Expectation – Conditional Expectation – Moment Generating Function – Probability Generating Function – Laplace Transform – Joint Distributions – Functions of random variables and random vectors.

Unit I : Markov chains : Transition probability matrix of a Markov chain – First step Analysis – Functional of Random walks and successive runs – classification of states – Basic Limit Theorem of Markov Chain(**12 hours**).

Unit II : Continuous time Markov Chains : Poisson distribution and Poisson process – Distributions associated with Poisson process – Pure Birth Process – Pure Death process – Birth and Death Process – Limiting behavior of Birth and Death Process – Birth and Death Process with absorbing states(**12 hours**).

Unit III : Renewal Phenomena : Renewal process and Related concepts – Poisson process viewed a Renewal Process – Asymptotic behavior of Renewal process(**12 hours**).

Unit IV : Branching Process and Population Growth : Branching process – branching process and generating functions – Geometrically distributed offspring – variation on Branching process – Stochastic models of Plasmid Reproduction and Plasmid copy Number partition(**12 hours**).

Unit V : Queueing Systems : Queueing Processes – Poisson Arrival and exponentially distributed service times – The M/G/I and M/G/8 systems – variations and extensions(**12 hours**).

Text Book : Content and Treatment as in Howard M. Taylor and Samuel Karlin, An Introduction to Stochastic Modeling (Revised Version), Academic Press, New York, 1984.

Course7. WAVELETS (60 hours)

Preamble: Wavelet analysis has drawn much attention from both mathematicians and engineers alike. The emphasis of the course is on spline wavelets and time-frequency analysis. The only pre-requisite is a basic knowledge of function theory and real analysis. The outcome of the course is to enable the learner to apply the pure mathematics in signal processing and image analysis.

Unit I :An Overview : Fourier to Wavelets – Integral Wavelets Transform and Time frequency analysis – Inversion formulas and duals – Classification of Wavelets – Multi-resolution analysis – Spines and Wavelets.

Fourier Analysis : Fourier and Inverse Fourier Transformation – Continuous Time Convolution – The delta function – Fourier Transformation of square integrable functions(**12 hours**).

Unit II : Fourier Analysis (contd): Fourier Series – Basic Convergence Theory – Poisson Summation Formula.

Wavelet Transforms and Time Frequency Analysis : The Gabor Transforms – Short time Fourier Transforms and the uncertainty principle – The integral Wavelet Transform – Dyadic Wavelets – Inversion – Frames – Wavelet Series(**12 hours**).

Unit III :Cardinal Spline Analysis : Cardinal Spline spaces – B-splines and their basic properties – The time scale relation and an interpolating graphical display algorithm – B-Net representations and computation of cardinal splines – Constructions of cardinal splines – constructions of spline application formulas – Construction of Spline interpolation formulas(**12 hours**).

Unit IV :Scaling functions and Wavelets : Multi-resolution analysis – Scaling functions with finite two scale relation – Direction sum Decompositions of $L^2(R)$ - Wavelets and their duals(**12 hours**).

Unit V :Cardinal Splines Wavelets : Interpolating splines wavelets – Compactly supported spline – Wavelets – Computation of Cardinal spline Wavelets – Euler – Frebenious Polynomials(**12 hours**).

Orthogonal Wavelets : Examples of orthogonal Wavelets – Identification of orthogonal two scale symbols – Construction of compactly supported orthogonal wavelets(**12 hours**).

Text Book : Content and Treatment as in Charles K. Chui, An introduction to Wavelets, Academic Press, New York, 1992.

Reference Books :

1. Chui C. K. (ed) Approximation theory and Fourier Analysis, Academic Press Boston, 1991.
2. Daribeckies. I. Wavelets, CBMS-NSF Series in Appl, SIAM Philadelphia, 1992.
3. Schurnaker, L. L. Spline Functions : Basic Theory, Wiley, New York, 1981.
4. Nurnberger, G. Applications to Spline Functions, Springer Verlag, New York, 1989.

Course8. THEORY OF NEAR-RINGS(60 hours)

Preamble: The main objective of this course is to provide the knowledge about the generalized ring structures. In fact, near-ring is a natural generalization of rings in the sense that the set of all endomorphisms of a group form a ring, where the set of all mappings of a group form a near-ring. The structure of near-rings is useful in project geometry to deal about generalized field conditions.

Unit I: The elements of theory of near-rings(12 hours).

Unit II: Ideal theory(12 hours)

Unit III: Elements of structure theory(12 hours)

Unit IV: Near-fields(12 hours)

Unit V: More classes of near-rings(12 hours).

Text Book: Content and Treatment as in G. Pilz, Theory of Near-rings, North Holland, Chapters 1,2,3, 8(a), 9(a) and 9(b).

Course9. ADVANCED CALCULUS(60 hours)

Preamble:The Calculus of several variables involves many branches of Mathematics such as Partial Differential Equations, Optimization, Statistics etc. The main objective of this course is to give a thorough understanding of differentiation and integration of functions of several variables. The prerequisite is a precise knowledge of Calculus of single variable. The outcome of the course is the ability to solve problems involving several variables.

Unit I : Differentiation – Basic theorems – Partial derivatives – Derivatives – Inverse Functions(**12 hours**).

Unit II : Implicit functions – Integration – Measure zero and Content zero – Integrable Functions(**12 hours**).

Unit III : Fubini's theorem – Partitions of Unity – Change of Variables(**12 hours**).

Unit IV : Integration on chains – Algebraic preliminaries – Fields and Forms –Geometric preliminaries – The fundamental theorem of Calculus(**12 hours**).

Unit V : Manifolds – Fields and Forms on Manifolds – Stokes' theorem on Manifolds - The Volume element – The Classical theorems(**12 hours**).

Text book :

Calculus on Manifolds by Michael Spivak, The Benjamin / CummingsPublishing Company

References :

- (1) Mathematical Analysis by Tom M. Apostol, Narosa Publishing Company.
- (2) Advanced Calculus by Gerald B.Folland, Pearson Publishing Company.

Course10. ALGEBRAIC GRAPH THEORY (60 hours)

Preamble: This course aims to improve the knowledge of the learner to apply algebra in graph theory. It is framed to give adequate exposure about algebraic approach to graph theory. The beginner of this course is expected to have sound understanding of graph theory and algebra at PG level. The outcome of the course is to enable the student to do qualitative research in algebraic graph theory.

Unit 1: Linear Algebra in graph theory: The spectrum of a graph – Regular graphs and line graphs - The homology of graphs(**12 hours**).

Unit 2: Spanning trees and associated structures – Complexity – Determinant expansions(**12 hours**).

Unit 3: Symmetry and regularity of graphs: General properties of graph automorphisms – Vertex-transitive graphs – Symmetric graphs – Trivalent symmetric graphs(**12 hours**).

Unit 4: The Covering - graph construction – Distance-transitive graphs - The feasibility of intersection arrays(**12 hours**).

Unit 5: The Laplacian of a graph: The Laplacian matrix – trees – representations – energy and eigenvalues – connectivity – the generalized Laplacian – Multiplicities – embedding(**12 hours**).

Text Books:

- 1) **Norman Biggs**, Algebraic Graph Theory, Cambridge University Press, London, 1974. Chapters 2, 3 and 4 for Unit I, 5, 6 and 7 for Unit II, C 15, 16, 17 and 18 for Unit III, 19, 20 and 21 for Unit IV.
- 2) **Chris Godsil, Gordon Royle**, Algebraic Graph Theory, Springer-Verlag, New York, 2006. Chapter 13 (Sections 13.1 to 13.6, 13.9 to 13.11) for Unit V.

Course11. COMBINATORIAL THEORY(60 hours)

Preamble: This objective of this course is to develop skillsto apply the techniques of combinations and permutations for counting the number of certain configurations. The prerequisite are the basic ideas on classical algebra and trigonometry. After completing this course, the student will be able to solve problems involving the distributions of objects into cells, partitions of integers, generating functions, permutations with restrictions on relative positions, rook polynomials and Polya's theory.

Unit I: Permutations and Combinations - rule of sum and product – distributions of distinct objects – Distributions of non-distinct objects(**12 hours**).

Unit II - Generating functions for combinations – Enumerators for permutations – Distributions of distinct objects into non-distinct cells – partitions of integers – Ferrers graph – elementary relations(**12 hours**).

Unit III: Recurrence relations – Linear recurrence relations with constant co-efficients – solution by the technique of generating functions – a special class of non-linear difference equation - recurrence relations with two indices(**12 hours**).

Unit IV: The principle of inclusion and exclusion – general formula – derangements – rook polynomials – permutations with forbidden positions(**12 hours**).

Unit V: Polya's theory of counting Equivalence classes under a permutation groups – Equivalence classes of functions – Weights and inventories of functions – Polya's fundamental theorem – Generalization of Polya's theorem(**12 hours**).

Text Book: Introduction to Combinatorial Mathematics by C.L. Liu, Chapters 1 to 5.

Course12. ADVANCED DOMINATION THEORY IN GRAPHS(60 hours)

Preamble: Domination theory in graphs is a potential area of research with many open problems. The objective of this course is to introduce various branches and recent developments in domination theory. The course is designed so that each unit introduces a new aspect of domination theory. Knowledge of a post graduate course in graph theory is a prerequisite. It helps the candidate to identify an interested area with wide scope for research.

Unit I : Dominating functions in graphs: Minus domination in graphs – signed domination in graphs – real and integer domination(**12 hours**).

Unit II :Domination parameters of a graph:Connected domination – strong and weak domination and domination balance – the least domination number – dominating strength and weakness – set and global set domination – point-set and global point-set domination – neighbourhood numbers – neighbourhood number variations – mixed domination(**12 hours**).

Unit III :Global domination:Some early results – global interpretations of other domination invariants – applications – concerning a characterization – sub problems(**12 hours**).

Unit IV :Distance domination in graphs :The distance domination number – the total distance domination number – independent distance domination – the distance irredundance number – relations involving distance domination parameters(**12 hours**).

Unit V :Topics on domination in directed graphs:Definitions – motivation – kernels in digraphs – kernels and Grundy functions – solutions in digraphs – domination in digraphs – applications in game theory(**12 hours**).

Text book : Teresa W. Haynes , Stephen T. Hedetniemi and Peter J. Slater, Domination in graphs – Advanced Topics, **Chapters : 2, 10, 11, 12 and 15.**

Course13. GRAPH RECONSTRUCTION THEORY(60 hours)

Preamble: Reconstruction Conjecture is one of the foremost and famous unsolved problems in Graph Theory. It requires deep knowledge of graph theory at PG level. The learners are expected to know some interesting classes of reconstructible graphs, some reconstructible parameters of graphs, an innovative technique used in counting lemma and the current status of the Conjecture. The outcome of the course is to enable the scholars to prove more new classes of graphs and new parameters of graphs to be reconstructible.

Unit I: Reconstruction Problem : Reconstruction Conjecture – Kelly’s lemma – Counting lemma(12 hours)

Unit II: Edge Reconstruction Problem : Edge Reconstruction Conjecture –Greenwell theorem – Maximal Planar Graphs -Edge-recognizable domination numbers(12 hours).

Unit III: Diameter of Graphs : Recognizability of graphs of Diameter two –Reconstruction of edge minimal graphs of diameter two(12 hours).

Unit IV: Graph Reconstruction: Graphs with at least $n-1$ cards isomorphic - Unicyclic graphs – Graphs of diameter two or three – Reduction using diameter – Vertex switching Reconstruction(12 hours)

Unit V: Reconstruction of Bipartite Graphs – Reconstruction of Geodesic graphs(12 hours).

Text Books / Published Papers:

1. Graphs and digraphs by Mehdi Behzad, Gary Chartrand and Linda Lesniak Foster, Wadsworth International Group, 1979.
Unit I : Chapter 10 – Sections 10.2 to 10.15
2. Topics in graph Automorphisms and Reconstruction by Josef Lauri and Raffaele Scapellato. Cambridge University Press, 2003.
Unit II : Chapter 8 – Section 8.6 to 8.13
3. S.K. Gupta , Pankaj Mangal , Vineet paliwal , Some work towards the proof of reconstruction conjecture, Discrete Mathematics 272 (2003) 291-296.
4. R. D. Duttona, R. C. Brighamb, C. Guia, Edge-recognizable domination numbers, Discrete Mathematics 272 (2003) 47 – 51.
Unit III
5. Recent Advances in Graph Reconstruction by S. Monikandan and J. Balakumar, Lambert Academic Publishing, Germany, 2014.
Unit IV : Chapter 1
Unit V : Chapter 2 and 4.

Course14. ALGEBRAIC TOPOLOGY(60 hours)

Preamble: Algebraic topology is concerned with the construction of algebraic invariants associated to topological spaces which serve to distinguish between them. Most of these invariants are *homotopy* invariants. This course elaborates topological spaces and continuous maps between them. It demonstrates the power of topological methods in dealing with problems involving shape and position of objects and continuous mappings, and shows how topology can be applied to many areas, including geometry, analysis, group theory and physics. The outcome of the course is to the ability to pursue further studies in this and related areas of the candidate.

Unit I : The Fundamental Group : Homotopy of Paths- The Fundamental Group- Covering spaces – The Fundamental Group of the circle- Retraction and Fixed points(12 hours).

Unit II : The Fundamental theorem of Algebra – The Borsuk – Ulam theorem- Deformation - Retracts and Homotopy Type – The Fundamental Group of S^n - Fundamental Group of some surfaces(12 hours).

Unit III : Separation Theorem in the plane: The Jordan Separation Theorem – invariance of domain - The Jordan curve Theorem- imbedding Graphs in the plane(12 hours).

Unit IV: The Selfert – van Kampen Theorem: Direct sums of abelian groups- Free product of groups- Free groups – The Selfert –van kampen Theorem – The Fundamental Group of a Wedge of circles(12 hours).

Unit V: Classification of surfaces: Fundamental Groups of surfaces – Homology of surfaces – Cutting and pasting – The Classification theorem – Constructing compact surfaces(12 hours).

Text Book: Treatment as in : J.R.Munkres, Topology, Second Edition, New Deihi, 2006.

Unit I: Chapter 9 (Sec 5.1-5.5), Unit II: Chapter 9 (Sec 5.6-6.0), Unit III: Chapter 10 (Sec 6.1-6.4), Unit IV: Chapter 11 (Sec 6.7-7.1), Unit V: Chapter 12 (Sec 7.4-7.8)

References:

1. Dugundji, Topology, Allyn and Bacon, Boston, 1966.
2. W.S. Massey, Algebraic Topology – An Introduction, Springer Verlag, New York, 1975

Annexure I

EQUIVALENCE OF Ph.D. COURSE WORKS

with Courses in M.Phil / M.Sc Programmes

Sl.No	Ph.D. Course Work	Affiliated College	University Department
1.	Commutative Algebra	Research Methodology – Commutative Algebra	Research Methodology – Commutative Algebra (DTMAC1)
2.	Advanced Analysis	Same title	-----
3.	Banach Algebra and Spectral Theory	Same title	Same Title (DTMAC2)
4.	Advanced Graph Theory	Same title	Same title (DTMAE1)
5.	Harmonic Analysis	Same title	Same title (DTMAE2)
6.	Stochastic Modeling	Same title	-----
7.	Wavelets	Same title	-----
8.	Theory of Near-rings	Same title	Same title (DTMAE4)
9.	Advanced Calculus	Same title	Same Title (DTMAE5)
10.	Algebraic Graph Theory	Same title	Same title (DTMAE6)
11.	Combinatorial Theory	---	M.Sc (Mathematics) IV Semester (LMAEF)

DEPARTMENT OF MATHEMATICS

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

Ph.D. Course Work Papers

(Addition of two more Papers)

Paper	Name of the Course	Credit
1	Research and Teaching Methodology	4
2	Mini Project	4

Paper:I RESEARCH AND TEACHING METHODOLOGY (60 hours)

Preamble: *The objective of the course is to study basic concepts of research and teaching methodology and its implication in the area of commutative algebra. A pass in PG level algebra course is the prerequisite for this course. Out come of this course is to qualify the students to do research in diverse fields such as homological algebra, algebraic number theory, algebraic geometry, finite fields and computational algebra.*

Unit I: Research Methodology : An introduction - Meaning of Research Objectives of Research - Motivation in Research - Types of Research -Research Approaches - Significance of Research - Research Methods versus Methodology – Research and Scientific Method - Importance of Knowing How Research is Done - Research Process - Criteria of Good Research - Problems Encountered by Researchers in India. Defining research problem - What is a Research Problem? - Selecting the Problem - Necessity of Defining the Problem Technique Involved in Defining a Problem - An Illustration. **(10 hours)**

Unit II: Commutative algebra - Modules - Rings and Modules of fractions - Primary Decomposition **(15 hours)**

Unit III: Integral Dependence and valuations - Chain conditions' **(15 hours)**

Unit IV: Noetherian Rings - Artin Rings **(10 hours)**

Unit V: Methodology of Teaching : Teaching - Objectives of Teaching, Phases of Teaching - Teaching Method' Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project method, Seminar - Integrating ICT in Teaching: individualised Instruction, Ways for Effective presentation with Power point - Documentation - Evaluation: Formative Summative & Continuous and Comprehensive Evaluation - Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development - Teaching Later Adolescents . **(10 hours)**

Text Book:

1. C.R Kothari, *Research Methodology - Methods and Techniques*, Second revised Edition, New Age International Publishers, 2004, Chapters 1&2 for Unit I
2. Content and Treatment as in Atiyah and Macdonald, *Introduction to Commutative Algebra*, Addison – Wesley Publishers Company (1969) Chapters 2 to 8. (For Units 2 to 4)
- 3) References for Unit V
 - i) Sampath, K., Panneerselvam, A. & Santhanam, S. (1984). *Introduction to Educational Technology* (2nd revised ed.), New Delhi : Sterling Publishers.
 - ii) Sharma, S.R. (2003). *Effective classroom teaching modern methods, tools & techniques*. Jaipur: Mangal Deep
 - iii) Vedanayam, E. G. (1989) *Teaching Technology for College Teachers* New York: Sterling Publishers.

DEPARTMENT OF MATHEMATICS

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

Ph.D. Course Work Papers

(Addition of two more Papers)

Paper	Name of the Course	Credit
1	Fixed Point Theory and Its Applications	4
2	Graphs From Algebraic Structures	4

Fixed Point Theory and Its Applications (60 hours)

Preamble: Solving an operator equation $T(x) = y$ is an important issue in all branches of Mathematics. In some situations, the operator equation $T(x) = y$ is equivalently expressed as a fixed point equation $f(x) = x$, for some suitable mapping f so that each solution of $f(x) = x$ contributes at least one solution to $T(x) = y$. Fixed point theory is a tool to solve the fixed point equation. In this course, we study necessary and sufficient conditions to be made on the operator f and its domain to ensure at least one fixed point for the mapping f , with applications of fixed point theory. Prerequisite: Topology, Functional Analysis

Unit I : Fixed point theory of contraction and contractive type mappings - generalization and its applications (12 hours)

Unit II : Fixed point theory for nonexpansive mappings (12 hours)

Unit III: Multivalued fixed point theory and applications to Game theory (12 hours)

Unit V : Brouwer's and Schauder's theorem and its applications (12 hours)

Unit V : Development of Fixed Point Theory : Best approximation theorems and Best proximity point theory (12 hours)

Text Books

1. P.V.Subrahmanyam, *Elementary Fixed Point Theorems*, Springer, 2019
2. Vasile I. Istratescu, *Fixed Point Theory : An Introduction*, Reidel Publishing Company, 1981

GRAPHS FROM ALGEBRAIC STRUCTURES (60 hours)

Preamble: *Graphs from algebraic structures started by means of the construction of Cayley graphs from finite groups. Through graphs constructed from algebraic structures, the interplay between algebra and graph theory is explored well. In this course, it is aimed to introduce zero divisor graphs, total graphs and Cayley graphs from commutative rings. Also some recent developments in this research area are also exposed. On successful completion of this course, the students can pursue their research in this topic.*

Unit I: Graphs from finite groups: an overview (12 hours)

Unit II: The zero-divisor graph of commutative rings: A survey (12 hours)

Unit III: Recent results on the annihilator graph of commutative rings (12 hours)

Unit IV: Total graph of commutative rings and generalizations (12 hours)

Unit V: Domination in graphs from commutative rings (12 hours)

Text Books:

Yusuf F. Zakariya, *Graphs from Finite Groups: An Overview*, Proceedings of Annual National Conference, Nigeria, 2017, for Unit I

Marco Fontana, Salah-Eddine Kabbaj, Bruce Olberding, Irena Swanson, *Commutative Algebra: Noetherian and Non-Noetherian Perspectives*, Springer, London (2010), (Chapter 2), for Unit II

K. S. Prasad, K. B. Srinivas, P. Harikrishnan, B. Satyanarayan, *Near rings, Near fields related topics*, World Scientific (Chapter 17), for Unit III

Marco Fontana, Sophie Frisch and Sarah Glaz, *Commutative Algebra: Recent Advances in Commutative Rings, Integer-Valued Polynomials and Polynomial functions*, Springer, London (2014), (Chapter 3), for Unit IV.

Syed Tariq Rizvi, Asma Ali, Vincenzo De Filippis, *Algebra and its Applications*, Springer, (2014), (Chapter 23), for Unit V.

DEPARTMENT OF MATHEMATICS

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

Ph.D. Course Work Papers

(Addition of two more Papers)

Paper	Name of the Course	Credit
1	Research Topics in Graph Theory	4

RESEARCH TOPICS IN GRAPH THEORY (60 hours)

Preamble: This course aims to introduce the learner some topics for his research in graph theory. It provides several conjectures and open problems to widen the scope of research. The pre-requisite for the course is a sound knowledge in graph theory at the post-graduate level. The outcome of the course is identification area and problems for research in graph theory.

Unit I : Dominating sets in graphs - Bounds on the domination number- Bounds in terms of order, degree, and packing - Bounds in terms of order and size.- Grid graphs.
(12 hours)

Unit II : Dominating functions - γ -valued parameters - Minus and signed domination - Vizing's Conjecture-Efficiency - Complementarity.
(12 hours)

Unit III: The Reconstruction Conjectures - some basic results - maximal planar graphs
(12 hours)

Unit IV: Factorizations and Decompositions of graphs, Labelings of graphs
(12 hours)

Unit V: Ramsey Theory- Classical Ramsey numbers - Generalized Ramsey theory.
(12 hours)

Text Books: Content and Treatment as in

- 1) Teresa W. Haynes, Stephen T. Hedetniemi and Peter J. Slater, *Fundamentals of Domination in graphs*, Marcel Decker (1998),
Unit I : Chapters 1 and 2 , Unit II : Chapter 10
- 2) Josef Lauri and Raffaele Scapellato, *Topics in graph Automorphisms and Reconstruction*, Cambridge University Press, Second Edition, 2016.
Unit III : Chapter 8
- 3). Chartrand and L. Lesniak, *Graphs and Digraphs*, Chapman & Hall/CRC, (Third edition) 2000.
Unit IV: Chapter 9 (Sections 9.2 and 9.3 only)
Unit V: Chapter 12 (Sections 12.1 and 12.2 only)

DEPARTMENT OF MATHEMATICS
MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI-12

Ph.D. Course Work Papers

(ADDITION OF 6 More PAPERS)

Sl. No.	Name of the course	Credit
1.	Advanced Operations Research and Fuzzy Sets	4
2.	Centrality and Convexity in Graphs	4
3.	Extensions in Pebbling in Graphs	4
4.	Labeling Techniques in Graphs	4
5.	Pebbling in Graphs	4
6.	Queueing and Inventory Models	4

ADVANCED OPERATIONS RESEARCH AND FUZZY SETS

HOURS - 4

CREDITS - 4

Course Outcomes:

- ❖ To study what is Simulation and Markov decision process.
- ❖ To understand the concept of Fuzzy sets and its algebra, logical aspects and relations.

Unit I

Simulation Modeling: Monte Carlo Simulation – Types of Simulation – Elements of Discrete Event Simulation – Generation of Random Numbers – Mechanics of Discrete Simulation – Methods for Gathering Statistical Observations .

(Textbook 1-Chapter:18 (except section 18.7))

Unit II

Markovian Decision Process: Scope of the Markovian Decision Problem – The Gardner Problem – Finite Stage Dynamic Programming Model – Infinite Stage Model - Linear Programming Solution –Review of Markov chains.

(Textbook 1-Chapter:19)

Unit III

The Concept of Fuzziness: Examples - Mathematical Modelling - Some Operations on Fuzzy Sets- Fuzziness as Uncertainty. **Some Algebra of Fuzzy Sets:** Boolean Algebras And Lattices – Equivalence Relations and Partitions - Composing Mappings - Isomorphisms and Homomorphisms- Alpha Cuts – Images Of Alpha Level Sets.

(Textbook 2 - Chapter 1 and 2)

Unit IV

Fuzzy Quantities: Fuzzy Quantities - Fuzzy Numbers- Fuzzy Intervals. **Logical Aspects of Fuzzy Sets:** Classical Two Valued Logic - A Three Valued Logic- Fuzzy Logic - Fuzzy And Lukasiewicz Logics - Interval Valued Fuzzy Logic - Canonical Forms - Notes Of Probabilistic Logic.

(Textbook 2 - Chapter 3 and 4)

Unit V

Fuzzy Relations: Definitions And Examples - Binary Fuzzy Relations - Operation On Fuzzy Relation - Fuzzy Partitions - Fuzzy Relations As Chu Spaces - Approximate Reasoning – Approximate Reasoning In Expert Systems - A Simple Form Of Generalized Modus Ponens - The Compositional Rule Of Inference

(Textbook 2 - Chapter 7)

Text Books:

1. Hamdy A. Taha, *Operations Research: An Introduction*, Prentice Hall Of India Pvt. Ltd., 7th Edition, 2005.
2. Hung T. Nguyen and Elbert A. Walker, *A First Course In Fuzzy Logic*, Chapman And Hall/CRC Publication, 3rd Edition, 2006.

CENTRALITY AND CONVEXITY IN GRAPHS

HOURS - 4

CREDITS - 4

Course Outcomes:

- ❖ To provide an indepth knowledge of central concepts in graphs
- ❖ To explore the various applications of convexity of graphs
- ❖ To motivate the students to do research in facility location problems

UNIT- I:

Distance: Eccentricity – Center – Periphery – **Detour Distance:** Detour Distance - Detour Eccentricity – Detour Center – Detour Periphery

Text Book 1: Chapter 12

UNIT - II:

Distance: The Centroid - The median – Self Median - The Path Center – The Path Centroid- Core and Pits

Text Book 2: Chapter 2

UNIT - III:

Monophonic Distance: Monophonic Distance – Detour Monophonic Number – Upper Detour Monophonic Number – Forcing Detour Monophonic Number

Text Book 3: Chapter 6

UNIT - IV:

Triangle Free Detour Distance: Vertex-to-Vertex Triangle Free Detour Distance - Vertex-to-Clique Triangle Free Detour Distance – Algorithms to find Vertex-to-Clique Triangle Free Detour Distance.

Text Book 4: Chapter 5

UNIT - V:

Triangle Free Detour Distance: Clique-to-Vertex Triangle Free Detour Distance -- Algorithms to find Clique-to-Vertex Triangle Free Detour Distance - Clique-to-Clique Triangle Free Detour Distance

Text Book 4: Chapter 5

Text Book:

1. Introduction to Graph Theory, Gary Chartrand and Ping Zhang, (Edition 2006), Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Buckley F, Harary F, Distance In Graphs, Redwood City, Addison Wesley, 1990
3. Beril Sirmacek, Graph Theory – Advanced Algorithms and Applications, InTech, 2018
4. Keerthi Asir I, Athisayanathan S, Distance In Graphs, 2018

EXTENSIONS IN PEBBLING IN GRAPHS

HOURS - 4

CREDITS – 4

Course Outcome:

- ❖ To know the way of determining the pebbling numbers of various types of graphs
- ❖ To study the domination cover pebbling number.

Unit I :

Pebbling number of some graphs– 2-Pebbling Property – Diameter d Graphs.

Unit II:

t -Pebbling Number of some graphs , - t -Pebbling Number of Square of Paths - t -Pebbling Number of Squares of Cycles – $2t$ - pebbling property.

Unit III:

Transfer Lemma - Graham's Conjecture on product of graphs – t -Pebbling Conjecture on product of graphs – Herscovici's Conjecture on product of graphs.

Unit IV:

Domination Cover Pebbling Number for Squares of Paths – Domination Cover Pebbling Number for Squares of Cycles – Domination Cover Pebbling Number for Some Unicycles – Domination Cover Pebbling Number for Cycle(Even and Odd) Lollipop

Unit V:

Covering cover Pebbling Number - Covering Cover Pebbling Number for Square of Paths – Covering Cover Pebbling Number for Square of Cycles - Covering Cover Pebbling Number for Some Cyclic and Acyclic

Text & Reference Materials:

1. F.R.K. Chung, Pebbling in hypercubes, SIAM J. Disc. Math., 2 (4) (1989), 467-472.
2. J. A. Foster and H. S. Snevily, The 2-pebbling property and a conjecture of Graham's, Graphs and Combin. 16 (2000), 231-244.
3. T. A. Clarke, R. A. Hochberg, & G. H. Hurlbert, Pebbling in diameter two graphs and products of Paths, J. Graph Theory, 25(1997), 119-128.
4. A. Lourdusamy, C. Muthulakshmi@Sasikala and T. Mathivanan, The pebbling number of the square of an odd cycle, Scientia Acta Xaveriana Vol. 3 (2) (2012), 21-38.
5. A. Lourdusamy, and T. Mathivanan, The t -pebbling number of the Jahangir graph $J_{3,m}$, Proyecciones Journal of Mathematics, Vol 34 (2), June 2015, 161-174.

LABELING TECHNIQUES IN GRAPHS

HOURS - 4

CREDITS - 4

Unit I:

Definitions of Graph labeling, Definitions and Examples of different types of graph labeling: graceful labeling, harmonious labeling, magic labeling, antimagic labeling, mean labeling, prime labeling, SD-prime labeling, binary labeling, cordial labeling, prime cordial labeling, difference cordial labeling, product cordial labeling, divisor cordial labeling, SD-prime cordial labeling.

Unit II:

Vertex equitable labeling: path, bistar, comb graph, cycle, quadrilateral snake, $K_2 + MK_1$, $K_{1,n}$, $K_{1,n+k}$ for $1 \leq k \leq 3$, ladder, $K_{1,n}$ for $N \geq 4$, any Eulerian graph with N edges, wheel, complete graph, triangular cactus. Vertex equitable labeling of subdivision and super subdivision of graphs: comb graph, bistar graph, ladder graph, arbitrary super division of any path, arbitrary super division of cycle, quadrilateral snake.

Unit III:

Vertex equitable labeling of transformed trees: transformed tree

T_p -tree, $T \odot \bar{K}_n$, $T \odot P_n$, $T \odot 2P_n$, $T \odot C_n$, $T \odot \bar{C}_n$.

Unit IV:

Vertex equitable labeling of snake related graphs: quadrilateral snake, double triangular snake, double quadrilateral snake, double alternative triangular snake, double alternative quadrilateral snake.

Unit V

Vertex equitable labeling of cycle related graphs: crown, armed crown, KC_4 -snakes, the graph obtained by duplicating an arbitrary vertex of a cycle, the graph obtained by duplicating an arbitrary edge of a cycle. Vertex equitable labeling of identification of graphs.

Text Materials and References:

1. J. Gallian, A dynamic survey of graph labeling, *Electronic J. Combin.*, 19, #DS6(2016).
2. P. Jeyanthi and A. Maheswari, Some Results on Vertex Equitable Labeling, *Open Journal of Discrete Mathematics*, 2(2) (2012), 51-57.
3. P. Jeyanthi and A. Maheswari, Vertex Equitable Labeling of Transformed Trees, *Journal of Algorithms and Computation*, 44(1) (2013), 9-20.
4. P. Jeyanthi and A. Maheswari, Vertex equitable labeling of cyclic snakes and bistar graphs, *J. Sci. Res.*, 6(1) (2014), 79-85.
5. P. Jeyanthi, A. Maheswari and M. Vijayalakshmi, Vertex Equitable Labeling of Cycle and Star Related Graphs, *Journal of Scientific Research*, 7(3) (2015), 33-42.
6. P. Jeyanthi, A. Maheswari and M. Vijayalakshmi, Vertex Equitable Labeling of Double Alternate Snake Graphs, *Journal of Algorithms and Computation*, 45(2015), 27-34.
7. P. Jeyanthi and A. Maheswari, Vertex equitable labeling of cycle and path related graphs, *Util. Math.*, 98, (2015), 215-226.
8. P. Jeyanthi, A. Maheswari and M. Vijayalakshmi, Vertex equitable labeling of double alternate snake graphs, *J. Algorithms Comput.*, 46 (2015) 27-34.
9. A. Lourdasamy and M. Seenivasan, Vertex equitable labeling of graphs, *Journal of Discrete Mathematical Sciences and Cryptography*, 11(6) (2008), 727-735.

PEBBLING IN GRAPHS

HOURS - 4

CREDITS - 4

Unit I :

Graph Pebbling – Distribution – Solvability – Unsolvability - Pebbling On Some

Standard Graphs As Complete Graphs, Path, Cycle, etc. 2-Pebbling Property.

Unit II:

t-Pebbling On Some Standard Graphs As Complete Graphs, Path, Cycle,.etc.-
2t- Pebbling Property-Lemke Graphs- Demonic Graphs - Pebbling On $C_5 * C_5$.

Unit III:

Transfer Lemma – Grahams Conjecture On Product Of Graphs $G * H$ –
Grahams Conjecture On Product Of Cycles – Grahams Conjecture On $G * H$ (H
Satisfies the 2- Pebbling Property).

Unit IV:

Lourdusamy's Conjecture On Product Of Graphs $G * H$ – Lourdusamy's Conjecture
On Product Of Cycles – Lourdusamy's Conjecture On $G * H$ (H Satisfies the 2-
Pebbling Property).

Unit V:

Herscovici's Conjecture On Product Of Graphs $G * H$ - Herscovici's Conjecture On
Product of throne graph and complete graph– Optimal Pebbling On Graphs.

Text & Reference Materials:

1. F.R.K. Chung, *Pebbling in hypercubes*, SIAM J. Disc. Math., 2 (4) (1989), 467-472.
2. J. A. Foster and H. S. Snevily, The 2-pebbling property and a conjecture of Graham's, *Graphs and Combin.* 16 (2000), 231-244.
3. D.S. Herscovici and A.W. Higgins, The pebbling number of $C_5 * C_5$, *Discrete Math.*, 187(1998), 123-135.
4. A. Lourdusamy and S. Somasundaram, The t-pebbling number of graphs, *South East Asian Bulletin of Mathematics*, 30 (2006), 907-914.
5. D. Herscovici, Graham's pebbling conjecture on products of cycles, *J. Graph Theory* 42 (2003), 141-154.
6. S. Wang, Pebbling and Graham's conjecture, *Disc. Math.*, 226(3) (2001), 6 431-438.
7. A. Lourdusamy, t-pebbling the product of graphs, *Acta Ciencia Indica*, XXXII (M.No.1) (2006), 171-176.
8. A. Lourdusamy, S.S. Jeyaseelan and A.P. Tharani, t-pebbling the product of fan graphs and the product of wheel graphs, *International Mathematical Forum*, 32 (2009), 1573 - 1585.
9. Dong-Lin Hao, Ze-Tu Gao, Jian-Hua Yin, Herscovici's Conjecture on the Product of the Thorn Graphs of the Complete Graphs, *J. Oper. Res. Soc. China* (2014) 2:263–269
10. Friedman, T.,Wyels, C.: Optimal pebbling of paths and cycles. *Mathematics*. arXiv:math.CO/0506076.

QUEUEING AND INVENTORY MODELS

HOURS - 4

CREDITS - 4

Objective:

- To understand the concept of Queueing theory in terms of stochastic process.
- To study the behavior of Inventory Models.

Unit I

Queueing Systems: General Concepts: Introduction - Queueing Processes – Notation – Transient and Steady State Behavior – Limitations of the Steady State Distribution - Some General Relationships in Queueing Theory – Poisson Arrival Process and Its Characteristics.

(Textbook 1-Chapter: 2)

Unit II

Birth and Death Queueing Systems: Exponential Models: Introduction – The Simple M/M/1 Queue – System with Limited Waiting Space: The M/M/1/K Model – Birth and Death Processes: Exponential Models – The M/M/∞ Model: Exponential Model with an Infinite Number of Servers – The Model M/M/c – The M/M/c System: Erlang Loss Model.

(Textbook 1 - Chapter: 3 (3.1-3.7))

Unit III

Non-Birth and Death Queueing Systems: Markovian Models: Introduction – Bulk Queues – Queueing Models with Bulk (Batch) Service – M/M(a,b)/1: Transient State Distribution – Two Server Model: M/M(a,b)/2 – The M/M(1,b)/c Model. **Network of Queues:** Network of Markovian Queues – Channels in Series or Tandem Queues – Jackson Network – Closed Markovian Network – Cyclic Queue – BCMP Networks.

(Textbook 1- Chapter: 4 and 5)

Unit IV

Inventory Theory: Components of Inventory Models – Deterministic Continuous Review Models – A Deterministic Periodic Review Model.

(Textbook 2 - Chapter: 19 (19.2-19.4))

Unit V

A Stochastic Continuous Review Model – A Stochastic Single Period Model for Perishable Products – Stochastic Periodic Review Models.

(Textbook 2 - Chapter: 19 (19.5-19.7))

Text Book:

- 1) Medhi J, *Stochastic Models in Queueing Theory*, Academic Press, Second Edition, 2003.
- 2) Frederick S. Hillier, Gerald J. Lieberman., *Introduction to Operations Research*, McGraw-Hill Higher Education, Seventh Edition, 2001.

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

Ph.D. course work study papers in Marine Biotechnology

Ph.D. Marine Biotechnology

(With effect from the academic year 2018-19 onwards)

Details for Course Work Papers

Sl. No.	Subject Title
1	Nanoscience and Nanobiotechnology
2	Marine Biofouling
3	Marine Natural Products
4	Bioethics and Biosafety
5	Extremophiles
6	Animal Cell Culture Technology
7	Marine Pharmacology
8	Research Methodology
9	Marine Toxicology
10	Marine Genomics & Proteomics
11	Marine Planktology
12	Mini Project

NANOSCIENCE AND NANOBIO TECHNOLOGY

L T P C

4 0 0 4

Objectives:

The objective of this course is to be familiar with the synthesis and preparation of nano-structured materials and to understand the chemical background involved in the chemical reactions, their characterization.

Unit I: Classification of Nanomaterials and Synthesis: Nanomaterials as nano particles and 1D, 2D, 3D nanomaterials. Concept of bulk versus nanomaterials and dependence of properties on size. Introduction to 'Top down' vs. 'Bottom up' approach of synthesis. Nano synthesis techniques based on liquid and vapour phase as the starting material. The study of wet chemical method like sol-gel method, micro emulsion technique, reduction of metal salts, decomposition of organometallic precursors, organic block copolymers, cryochemical synthesis. Study of rapid solidification route, electro and electroless deposition etc. (12 h)

Unit II: Protein and DNA Based Nanostructures: Introduction to nanolithography and self-assembly routes. Preparation of quantum dots, nano wires and films, preparation of single-walled and multi-walled nanotubes; Nanocircuitry – S-layer proteins: structure, chemistry and assembly – lipid chips – S – layers as templates – engineered nanopores – DNA - Protein nanostructures DNA-based metallic nanowires and networks, DNA - Gold - Nanoparticle conjugates. (12 h)

Unit III: Nanostructured Materials Characterization Techniques: Techniques on characterization of size of nano powders/ particles using BET method and laser diffraction. X-ray diffraction (XRD), SEM, EDAX, TEM, Elemental mapping, FTIR, UV-Visible spectrophotometer, Laser Raman Spectroscopy, Nanomechanical Characterization using Nanoindentation, Differential Scanning Calorimeter (DSC), Differential Thermal Analyzer (DTA), Thermo gravimetric Analysis (TGA), TEM, X-ray Photoelectron Spectroscopy (XPS), Electrochemical Characterization measurements. (12 h)

Unit IV: Nanobiomaterials and Biocompatibility: Surface and bulk properties of biomaterials – Nanobiomaterials –Nanoceramics – Nanopolymers – Nano silica – Hydroxy apatite – Carbon based nanomaterials surface modification – Textured and porous materials – Surface immobilized biomolecules – Cell-biomaterial interactions – immune response – *In vitro* and *in vivo* assessment of tissue compatibility. (12 h)

Unit V: Nanotechnology in Agriculture and Food Technology: Nanotechnology in agriculture - Precision farming, Smart delivery system – Nanofertilizers: Nanourea and mixed fertilizers, Nanofertigation - Nanopesticides, Nanoseed science. Nanotechnology in Food industry – Nanopackaging for enhanced shelf life - Smart/Intelligent packaging - Food processing and food safety and bio-security – Electrochemical sensors for food analysis and contaminant detection. (12 h)

Total 60 h

References

1. Nanomaterials Chemistry by C.N. Rao, A. Muller, A.K. Cheetham, Wiley VCH, 2007.
2. Nanoscale Materials in Chemistry by Kenneth J. Klabunde, Wiley Interscience Publications, 2001.
3. Nanochemistry by G.B. Sergeev, Elsevier Publication, 2006.
4. Nanomaterials – Handbook by Yury Gogotsi, CRC Press, Taylor & Francis group, 2006.
5. Biomaterials: A Nano Approach, Seeram Ramakrishna, Murugan Ramalingam, T.S. Sampath Kumar, Winston O. Soboyejo, CRC Press, 2010.
6. Bionanotechnology: Lessons from Nature, David S. Goodsell, by John Wiley & Sons, Inc., 2004.
7. Nanobiotechnology: Concepts, Applications and Perspectives, Eds. Christof M. Niemeyer and Chand A. Mirkin, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004.

MARINE BIOFOULING

L T P C
4 0 0 4

Objectives:

This course will introduce the concept of marine pollution, biofouling patterns and their control technology.

Unit 1: Fouling and Corrosion: Biofouling, biofilm formation; Marine fouling and boring organisms - their biology, adaptation; Factors influencing the settlement of macrofoulers; Antifouling and Anti boring treatments; Corrosion process and control of marine structures. (12 h)

Unit 2: Marine Pollution and Biodeterioration: Marine pollution-major pollutants and Biological indicators (e.g., Marine microbes, algae and crustaceans) and accumulators, Oil pollution: Sources, composition and its fate in marine habitats. Treatment options available, case studies, Thermal and radioactive pollution: sources, effects and remedial measures. Solid dumping, mining and dredging operations: their effects on marine ecosystem, Biofouling and biodeterioration: Agents and protection methods. (14 h)

Unit 3: Biofouling Patterns: Biofouling patterns with depth, Natural control of fouling, Freshwater biofilms, Biofilms in medicine, Fouling on artificial substrata, Paint and coatings technology for the control of marine fouling, Fouling on shipping: Data-Mining the World's largest Antifouling archive. (12 h)

Unit 4: Biofouling and Control Technology: Biofouling organisms - Problems due to biofouling - Antifouling paints and its environmental pollution - Biotechnological approach to control of biofoulers. (12 h)

Unit 5: Biofouling, Biocorrosion and Biomaterials: Microorganisms in biofouling and biocorrosion. Biofilms and general mechanisms in biocorrosion. Biocorrosion and biofouling – Mechanisms, failure analysis and control. Biomaterials and human implants. (10 h)

Total 60 h

References

1. Fouling Organisms of the Indian Ocean, Biology and Control Technology, Nagabushanam, R and Thompson, M.F. (Eds), Oxford and IBH Publishing Co. Pvt. Ltd, 1997.
2. Absorption of Microorganisms to Surfaces, Bilton, G. and Marshall. C. (Eds), John Wiley and sons, New York, 1980.
3. Marine Biodeterioration: an Interdisciplinary Study, Costlow, J.D. and Tipper, R.C. (Eds), Naval institute press, Annapolis, 1984.
4. Environmental Biotechnology, Principles and Applications, Bruce E. Rittmann and Perry L. McCarthy, McGraw Hill, 2001.

MARINE NATURAL PRODUCTS

L T P C
4 0 0 4

Objectives:

This course work will provide an understanding on the marine environment and its metabolites, as it became a focus of natural products drug discovery research because of its relatively unexplored biodiversity compared to terrestrial environments.

Unit 1: Introduction to Marine Natural Products: Survey, resource assessment, sampling and identification of organisms containing bioactive compounds. Theories of drug action and factors affecting drug action. (10 h)

Unit 2: Significance of Marine Natural Products: Isolation techniques- liquid-liquid extraction, membrane separation methods, chromatography (Paper, TLC, HPLC) techniques. Characterization techniques- IR, UV, NMR and Mass Spectral analysis. (12 h)

Unit 3: Types of important products: Antibiotic, anti-tumour, tumour-promotor, anti-inflammatory, analgesic, cytotoxic, anti-viral and anti-fouling compounds of marine origin. Marine toxins- saxitoxin, brevetoxin and ciguatoxin. Marine peptides and alkaloids- pyridoacridine, pyrrolocridine indole, pyrrole, isoquinoline alkaloids. Marine prostaglandins and marine cosmetic products. (14 h)

Unit 4: Important Products isolated from Marine Organisms and Their Uses: Marine colloids and hydrocolloids, agarose, agar, alginate, carageenans, chitin, chitosan and glucosamines – their extraction process, methods of purification, their importance and uses. (12 h)

Unit 5: Other By-Products from Marine Organisms: Fish meal, silage products, FPC, fish hydrolydate, fish flakes, fish glue, pearl essence, fish peptones – their production process and importance. (12 h)

Total 60 h

References

1. Fish Resources of the ocean – J.A. Gulland, Fishing News (Books) Ltd., England, 1971.
2. Pharmaceuticals and the Sea - C.W. Jefford, Kenneth L. Rinehart, Lois S. Shield, Taylor & Francis, 1988.
3. *Marine Natural Products* – Editors: Paul J. Scheuer, 1st Edition, Academic Press, 1998.
4. *Bioactive Marine Natural Products* - **Bhakuni**, S. Dewan, D.S. **Rawat**, Springer, 2005.
5. Fish and fish products – A.L. Winton, B.K.B. Winton, Allied Scientific Publishers, 1998
6. Fishery by products (CIFT Manual) – CIFT Publications, Cochin, India, 2002.

BIOETHICS AND BIOSAFETY

L T P C
4 0 0 4

Objectives:

Aims to study the typically controversial ethical issues emerging from new situations and possibilities brought about by advances in biology and medicine. It is also moral discernment as it relates to medical policy, practice, and research and the prevention of large-scale loss of biological integrity, focusing both on ecology and human health.

Unit 1: Biosafety-Regulatory Framework for GMOs in India: Regulatory framework in India governing GMOs-Recombinant DNA Advisory Committee (RDAC), Institutional Biosafety Committee (IBC), Review Committee on Genetic Manipulation, Genetic Engineering Approval Committee (GEAC), State Biosafety Coordination Committee (SBCC), District Level Committee (DLC). Recombinant DNA Guidelines (1990), Revised Guidelines for Research in Transgenic Plants (1998), Seed Policy (2002), Prevention Food Adulteration Act (1955), The Food Safety and Standards Bill (2005), Plant Quarantine Order (2003), Regulation for Import of GM Products Under Foreign Trade Policy (2006-2007), National Environment Policy (2006). Rules for the manufacture, use/import/export and storage of hazardous microorganisms/genetically engineered organisms or cells (Ministry of Environment and Forests Notification (1989). **(14 h)**

Unit 2: Biosafety-Regulatory Framework for GMOs at International Level: Convention of Biological Diversity (1992) – Cartagena Protocol on Biosafety – Objectives and salient features of Cartagena Protocol – Advanced Information Agreement (AIA) procedure – procedures for GMOs intended for direct use-risk assessment-risk management-handling, transport, packaging and identification of GMOs- Biosafety Clearing House-unintentional transboundary movement of GMOs-Benefits of becoming a party to the Cartagena Protocol- status of implementation in India. **(12 h)**

Unit3: Bioethics: Distinction among various forms of IPR, Prior art for a patent, Patenting live microorganism, Human genome project and ethical issues, Animal cloning, human cloning and their ethical issues, Experimenting on animals. Public education of producing transgenic organism, legal and socioeconomic impacts of biotechnology, testing drugs on human volunteers, Hazardous materials used in biotechnology, their handling and disposal. **(12 h)**

Unit 4: Intellectual Property Rights: Concept of property, rights, duties and Jurisprudential definition, Introduction to patent, copy right, trademarks, Design, geographical indication. History and evolution of IPR, Economic importance of IPR, Indian patent act 1970 (amendment 2000), Distinction among various forms of IPR, invention step, biopiracy and bioprospecting-Appropriate case studies. Infringement/violation of patent, remedies against infringement (civil, criminal, administrative) **(12 h)**

Unit 5: Patents and Patent Laws: Plant and Animal growers rights patents trade secrets, and plant genetic recourses GATT and TRIPS, Dunkels Draft Patenting of biological materials, Current Issues of Patents for higher animal and higher plants, patenting of transgenic organisms, isolated genes and DNA sequences. **(10 h)**

Total 60 h

References

1. Biotechnology and Patent Protection – An International Review - F.K. Beier, R.S. Crespi, and J. Straus, Oxford and IBH Publishing Co. New Delhi, 1985.
2. Intellectual Property Rights and Biotechnology (Biosafety and Bioethics) - Anupam Singh and Ashwani Singh, Narendra Publishing House, New Delhi, 2012.
3. Biotechnologies and Development, A. Sasson, UNESCO Publications, 1988.
4. Intellectual Property Rights on Biotechnology – K. Singh, BCIL, New Delhi, 2010.
5. IPR, Biosafety and Bioethics – Deepa Goel, Shomini Parashar, Pearson, New Delhi, 2013.
6. Regulatory Framework for GMOs in India - Ministry of Environment and Forest, Government of India, New Delhi, 2006.
7. Cartagena Protocol in Biosafety - Ministry of Environment and Forest, Government of India, New Delhi, 2006.

EXTREMOPHILES

L T P C

4 0 0 4

Objectives:

This course will provide an understanding about the extreme microorganisms and their applications.

Unit 1: Microbes in Extreme Environments: Thermophilic, alkalophilic, asomophilic, barophilic, psychrophilic microorganisms – Hyperthermophilic and halophilic organisms and their importance in biotechnology. **(12 h)**

Unit 2: Classification and Characteristics of Archaeobacteria: Halophiles – Dead Sea – halotolerance – Applications of halophiles and their extremozymes. Barophiles – high pressure habitats, life under pressure, barophily, death under pressure. **(12 h)**

Unit 3: Biotechnological Applications of Extremophiles in Bioprocessing: diagnostics, molecular biology, food industry, genetic engineering, geo-microbiology sectors. **(10 h)**

Unit 4: Thermophiles: History and discovery of hyper thermophiles, Carbohydrate-active enzymes from hyper thermophiles. Lignocellulose converting enzymes from thermophiles. Enzymes involved in DNA amplification (e.g., polymerases) from thermophiles, evolution of PCR enzymes. Metalloproteins from hyperthermophiles. **(14 h)**

Unit 5: Psychrophiles: Ecology of Psychrophiles-Subglacial and permafrost environments. Taxonomy, adaptative mechanisms of psychro tolerant bacterial pathogens. Psychrophilic enzymes, Acidophiles: Physiological features, adaptative strategies, growth kinetics and enzymes of various extremophilic acidophiles. **(12 h)**

Total 60 h

References

1. Microbiology, Prescott, Harley and Klein, W.C. Brown publishers, 2006.
2. Bacterial Systematics, N.A. Logan, Blackeell Scientific publishers, 1994.
3. Biology of Microorganisms, T.D. Brock and M. T.Madigan, Prentice Hall publishers, 1991.
4. Microbiology, M.J. Pelczar and Reid, 5th Edn., Tata Mc Graw Hill Co., New Delhi, 1986.
5. Introduction of Microbiology, Robert G. Arnegar, Mac Millan, New York, 1973.

ANIMAL CELL CULTURE TECHNOLOGY

L T P C

4 0 0 4

Objectives:

Animal cell culture is an important course for any biotechnology-related training program because it is a technique that must be performed by investigators before they perform many molecular procedures and vertebrate cell culture is becoming increasingly important for biomanufacturing of therapeutic proteins.

Unit 1: Introduction and Biology of Cultured Cells: Introduction - historical background- technological innovations in development of cell and tissue culture-types of tissue culture- culture environment- cell adhesion, cell proliferation, differentiation, cell signalling, energy metabolism- selection –cell line development. (12 h)

Unit 2: Laboratory Design: Requirements, ventilation - design and layout, Equipments - sterile working area, incubation and culture, preparation and sterilization, storage, supplementary and specialized equipments; aseptic techniques - sterile handling, standard procedure; safety protocols - biohazards, bioethics and quality assurance. (12 h)

Unit 3: Culture Vessels and Media Development: Culture vessel-substrate, substrate coating, choice of culture vessel, specialized systems; Media development - physicochemical parameters, balanced salt solutions, complete media, serum, selection of media, supplements. Serum-free medium development and sterilization. (12 h)

Unit 4: Primary Culture, Secondary Culture, Cloning and Selection: Isolation of tissue, types of primary culture, subculture and cell lines, cloning and selection- monolayer clones and suspension clones, Contamination, cryopreservation and cytotoxicity. (12 h)

Unit 5: Organo-typic Culture and Specialized Cell Culture Techniques: Cell separation, characterization, differentiation & transformation; organ culture- histotypic culture -organotypic culture; Culture of specialised cells - epithelial, mesenchymal, neuroectodermal, hematopoietic and tumour cell culture; stem cell culture. (12 h)

Total 60 h

References

1. Culture of Animal Cells, 6th Edition- R Ian Freshney – John Wiley & Sons, Inc., 2016.
2. Cell Culture Technology: Recent Advances and Future Prospects (Euroscicon Meeting Reports Book 1) - Oystein Bruserud, Astrid Englezou – Honno Publishers, 2012.
3. Vertebrate Cell Culture II and Enzyme Technology: Volume 39 (Advances in Biochemical Engineering/ Biotechnology) - A.F. Bückmann et al., Springer, 2013.
4. Animal Cell Culture and Technology (The Basics) (Garland Science)) - Michael Butler, CRC Press, 2003.
5. The Immortal Life of Henrietta Lacks - Rebecca Skloot, Crown, 2010.

MARINE PHARMACOLOGY

L T P C

4 0 0 4

Objectives:

This course enables the students to know the efficacy and specificity of the different classes of drugs available from marine resource.

Unit 1: Terms and Definitions: Pharmacokinetics – ADMET properties- drug metabolism; Bioavailability; Pharmacodynamics – Dose response relationship, drug receptors- interactions- quantification. (12 h)

Unit 2: Biologically Active Compounds from marine flora, fauna and microbes – Anti-bacterial anti-fungal, anti-viral, anti-parasitic, anti-inflammatory and cytotoxic compounds, anti-coagulants and marine toxins. Fish pharmacological and pharmacodynamical agents: - vaccines, immunostimulants, breeding induction agents, osmoregulators, disinfectants. (12 h)

Unit 3: Bioprospecting of Marine Natural Products: Isolation, structural elucidation and mode of action. Biological evaluation of novel compounds-Primary screens-broad spectrum evaluation; secondary screens- binding assays, functional activity, reporter gene assay, pharmacodynamic assays; animal models- preclinical proof of concept. Strategy and tactics in drug discovery-target identification and validation, lead identification, optimization-candidate selection. (14 h)

Unit 4: Computational Chemistry: Introduction- basic toolkit-protein modelling programs-structural information-X-ray crystallography, NMR, databases- Docking and virtual screening- prediction of binding energies- homology modelling- QSAR. (12 h)

Unit 5: Drug Safety: Methods of drug administration, antibiotic hazards and biotransformation; Toxicology in drug discovery process- toxicity assessment-in vivo, in vitro, in silico systems; - genetic toxicity- target organ toxicity; Novel technologies in safety assessment-toxicogenomics, proteomics, NMR; ethical issues; IPR and patents. (12 h)

Total 60 h

References

1. Pharmacology – Rapid Review – T. Pazdernik, L. Kerecsen, Elsevier Health Sciences, 2010.
2. Essentials of Medical Pharmacology, 8th Edition - K.D. Tripathi, Jaypee Brothers Medical Publishers, 2018.
3. Marine Natural Products – D.S. Bhakuni, S. Devan and D.S. Rawat, Springer, 2005.
4. Applied Fish Pharmacology, 2nd Edition – John F. Burka, Kluwer Academic Publishers, 2000.
5. Medicinal Chemistry- Principles and Practice, 2nd Edition, Frank. D. King (Ed.), Glaxosmithkline, UK, 2002.

RESEARCH METHODOLOGY

L T P C
4 0 0 4

Objectives:

This course will introduce the concept and methods of research, to impart knowledge on scientific procedures on preparing research reports and papers and making presentations and to provide information on preparing research projects, research ethics and impact factors of publications.

Unit 1: Foundations of Research: Meaning, objectives, motivation, utility. Concept of theory, empiricism, deductive and inductive theory. Characteristics of scientific methods – Understanding the language of research – Concept, construct, definition, variable, research process. Problem identification and formulation – Research question – Investigation question – Measurement issues. (12 h)

Unit 2: Research Design: Concept and importance in research – Features of a good research design – Exploratory research design – concept, types and uses, Descriptive research designs – concept, types and uses. Experimental design: Concept of independent and dependent variables. Qualitative and quantitative research: Qualitative research – Quantitative research – Concept of measurement, merging the two approaches. (12 h)

Unit 3: Sampling: Concepts of statistical population, sample, sampling frame, sampling error, sample size, non response. Characteristics of a good sample. Probability sample – Simple random sample, systematic sample, stratified random sample and Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size. (12 h)

Unit 4: Data Analysis: Data preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations numerical and graphical presentation of data; Measures of central tendency; Measures of dispersion; Testing of significance of hypothesis by student's t-test, paired t-test and Fisher's t test; Determination of correlation coefficient between two variables; Regression analysis; Analysis of variance; Chi-square test including testing hypothesis of association Post-hoc test; Basic statistical modelling. (12 h)

Unit 5: Interpretation of Data and Paper Writing: Layout of a research paper, Journals in life science, Impact factor of journals, When and where to publish?, Ethical issues related to publishing, Plagiarism and self-plagiarism. Use of tools/techniques for research: Methods to search required information effectively. Reference management software like Zotero/Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection of plagiarism. (12 h)

Total 60 h

References:

1. Introducing Research Methodology – A Beginners Guide to do Research Project – Uwe Flick, 2nd Edition, SAGE Publishing, 2015.
2. Quality Inquiry and Research Design: Choosing among five approaches – John W. Creswell, Cheryl N. Poth, 4th Edition, SAGE Publications Inc, 2017.
3. Research Methodology – Methods and Techniques, C.R. Kothari and Gaurav Garg, New Age International Publishers, 2019.
4. Biostatistics – P.N. Arora, P.K. Malhan, Himalayan Publishing House, 2010.
5. Statistical Methods – S.P. Gupta, S. Chand & Sons, New Delhi, 2017.
6. Biostatistical Analysis – Jerrold H. Zar, 5th Edition, Northern Illinois University, Pearson, 2010.

MARINE TOXICOLOGY

L T P C
4 0 0 4

Objectives:

This course will provide an understanding on different marine habitats: salt marshes, mangroves, corals, barrier beaches, rocky coastlines and openocean. This course will give opportunity to take a close look at coastal ecosystems, and learn about the scientific sampling techniques in the field and also the sample handling and analyses techniques in the lab.

Unit 1: Coastal and Marine Ecosystems: Estuarine and mangrove ecology – Soft sediment ecology - Salt marsh ecology - Coral reef ecology - Rocky intertidal ecology - Hydrothermal vents ecology - Polar ecology - Human impacts on the marine environment and biofouling. **(10 h)**

Unit 2: Marine Ecotoxicology and Toxicants: General introduction and principles on marine toxicology – General chemistry of different types of pesticides and toxicants like organochlorine, organophosphate, PCBs, POPs, PAH, Dioxins, heavy metals – Effect of Toxicants on animal physiology – Global transport of POPs – Mercury and Lead cycling in the environment. **(12 h)**

Unit 3: Metal Sources in Marine Environment and Their Impacts: Natural, anthropogenic, metal retention in sediments, role of grain size, organic matter, Fe-Mn oxides, sulphides. Bioaccumulation of metals: definition, metal accumulation in benthic biota, Arsenic bioaccumulation in biota of the Sundarban mangrove wetland – a case study. Bioaccumulation factor (BAF): concept of Bioconcentration, Bioconcentration factor (BCA), harmful effects of bioaccumulation of metals on biota, Biomagnification in trophic levels – risk to human health. Metal accumulation in mangroves, Remediation of metal contamination: phytoremediation, techniques of phytoremediation, phytostabilization, phytodegradation and advantages & disadvantages of phytoremediation. **(16 h)**

Unit 4: Toxicology: Principles of toxicology, dose-response relationships, chronic and acute toxicity; effective concentration, LD₅₀, Median tolerance limit and Margin of safety; Toxicity testing (holistic and numeric approach). Uptake, bioaccumulation, bio-transformation and excretion of xenobiotics. **(10 h)**

Unit 5: Risk Assessmesnt: Aquatic toxicology testing methods – Chemical uptake, transformation, elimination and accumulation – Marine and estuarine invertebrate toxicity tests - Bioassays and biomarkers – Multi-species test systems – Biodegradation – Factors influencing bioaccumulation and trophic transfer – Sub-lethal effects – Acute and chronic lethal effects – Risk assessment of contaminants on communities and ecosystems. **(12 h)**

Total 60 h

References

1. Toxicology- The Basic Science of Poisons - Klaassen, D. Curtis, 7th Edition, McGraw-Hill, 2008.
2. Essentials of Toxicology - Curtis D. Klaassen, John B. Watkins III, 3rd edition, LANGE, 2015.
3. Environmental Toxicology – D.A. Wright, P. Welbourne, Cambridge University Press, 2002.
4. Principles and Practices of Toxicology in Public Health - Ira. S. Richards, Barlett Publications, 2008.
5. Trace Elements in Terrestrial Environments – D.C. Adriano, Springer Science, 2001.
6. Bioaccumulation in Marine Organisms – J.M. Neff, Elsevier Ltd, 2002.

MARINE GENOMICS AND PROTEOMICS

L T P C

4 0 0 4

Objectives:

The objective of this course is to get a thorough knowledge about the marine genomics and proteomics and the techniques involved in it.

Unit 1: Genomes and Genomics: Genomics as a discipline, Structure and organization of genomes- prokaryotic, eukaryotic, organellar genomes, transposable elements, Beyond the genome-Epigenome, Central dogma revisited, Genome function, chromatin modification and gene expression, transcription initiation, synthesis and processing of RNA, synthesis and processing of proteome, Regulons and regulation of gene expression, Genomes of marine organisms, Genomics and human health-Gene Therapy-Somatic and germ-line therapy, Suicide gene therapy; Gene replacement; Gene targeting, Personalized medicine; Pharmacogenomics, Ethical, Legal and Social Implications (ELSI) of genomics. (12 h)

Unit 2: Genomic Techniques for Marine Genomics: Genomic libraries of marine organisms, Genome mapping methods, Sequencing genomes- Classical and next generation sequencing methods; Assembly of DNA sequences- methods; Databases-; Primary Databases; Nucleotide Sequence Database - NCBI, EMBL, EBI, DDBJ, Genome databases; Comparative genomics, Functional genomics- Transcriptomics; Computational functional genomics-, ORF and promoter predictions. Intron and exon predictions. Experimental- cDNA libraries of marine organisms, Assigning gene function; Differential gene expression, digital gene expression, DNA and cDNA microarrays. (12 h)

Unit 3: Marine Genomics: Population genomics of marine organisms to understand environmental adaptations, Phylogenomics of marine animals, Genomics of marine model organisms; Genomic approaches- fisheries and aquaculture- breeding and reproduction, growth and nutrition, host-pathogen interactions, seafood product quality and safety. Marine metagenomics- Accessing the metagenome, Construction of metagenomic libraries, Metagenome analyses, Library independent metagenomic analyses. (12 h)

Unit 4: Structural Proteomics: X-ray crystallography and NMR spectroscopy; Protein engineering; Interaction proteomics- complex isolation of proteins, protein interactions genetic methods, affinity approaches, physical methods, Functional proteomics - protein arrays; methods of analysis of protein modifications. (12 h)

Unit 5: Marine Proteomics: Marine based drug discovery, Protein structure prediction methods; Homology modeling; Threading and *ab initio* methods; Protein function prediction; Protein structure visualization tools- Rasmol, Swiss PDB Viewer; Target identification and validation; Lead optimization and validation; Structure-based drug design and ligand-based drug design. (12 h)

(12 h)

Total 60 h

References

1. Genomes, T.A. Brown, 3rd ed. Garland Science, 2007.
2. Introduction to Marine Genomics, Cock, JM, Tessmar-Raibe, K., Boyen, C., Viard F. (Eds)., Springer, 2010.
3. Metagenomics: Theory, Methods and Applications, Diana M. (Ed.), Caister Academic Press, 2010.
4. Introduction to Proteomics: Tools for the New Biology, Liebler D.C., Humana Press Inc., New Jersey, 2002.
5. Principles of Gene Manipulation and Genomics, 7th Edition, Primrose, S.B., Twyman. R.M., Blackwell Publishing, 2006.
6. Principles of Proteomics, Twyman R.M., Garland Science/BIOS Scientific Publishers, New York, 2004.
7. An Introduction to Molecular Biotechnology, Wink, W., Wiley VCH Verlag Gm BH and Co. KGaA, Germany, 2006.
8. Introduction to Bioinformatics: A theoretical and Practical Approach, Stephen A. Krawetz and David D. Womble, Humana Press, Totowa, NJ, 2003.
9. Molecular Approaches to the Study of the Ocean, Cooksey, K.E. (Ed)., Springer Netherlands, 1998.
10. Discovering Genomics, Proteomics and Bioinformatics, Heyer L. and Campbell A. 2006, Cold Spring Harbor Lab. Press, USA, 2006. .

MARINE PLANKTOLOGY

L T P C
4 0 0 4

Objectives:

This course will give a detailed idea about the phytoplanktons and zooplanktons present in the marine environment, their preservation and commercial applications.

Unit 1: General Planktology: Definition for plankton, history of planktology, Plankton and environment, habit and habitat, nutrition, thallus, organisation and life cycle of commercially important phytoplankton, life cycle of commercially important zooplankton. (10 h)

Unit 2: Phytoplankton: Methods for isolation of phytoplankton from the natural stock, Strain improvement, Stock maintenance of isolated species, Culture – Culture media preparation, Continuous culture system, Batch-culture system, Photo bioreactors and its application. Phytoplankton used in aquaculture, Oil industry and algal carotenoid production, Green water Aquaculture and preparation of pure culture of phytoplankton. (14 h)

Unit 3: Zooplanktons: General characteristics of zooplankton, Feed and feeding of zooplanktons. Methods for isolation and identification of zooplankton, Stock maintenance, Indoor and outdoor culture of commercially important zooplankton, Improvement of nutritive quality in zooplankton. Preparation of pure culture of zooplankton. (12 h)

Unit 4: Plankton and Larval Rearing: Selection and preparation of plankton for larval feeding optimization of physiochemical and biological parameters for the better growth of plankton, Enrichment and storage of planktons. (10 h)

Unit 5: Preservation of Plankton: Short term storage – Indoor culture (Stock culture), Longer term storage – Cryopreservation – Introduction to algal cryopreservation, Internal and External cryoprotectants and their advantages and disadvantages, Freezing Techniques – Slow and Rapid Freezing and their advantages and disadvantages, Vitrification – Importance and their advantages and disadvantages. (12 h)

Total 60 h

References:

1. Algae Anatomy, Biochemistry and Biotechnology, Laura Barsanthi, Paolo Gualtieri, CRC Press Taylor & Francis Group, 2013.
2. Plankton- A Guide to their Ecology and Monitoring for Water Quality, Iain M. Suthers and David Rissik, CSIRO Publishing, 2009.
3. Introduction to Marine Plankton, Abhijit Mitra, Kakoli Banerjee and Avijit Gangopadhyay, Daya Publishing House, 2004.

4. Introduction to Marine Phytoplankton, Abhijit Mitra, Kakoli Banerjee and D.P. Bhattacharyya, Narendra Publishing House, 2006.
5. Basic and Applied Zooplankton Biology, Perumal, Santhanam, Begum, Ajima, Pachiyappan, Perumal, Springer, 2019.
6. Zooplankton and Phytoplankton: Types, Characteristics and Ecology, Giri Kattel, Nova Science Publishers Inc., 2012.
7. An Introduction to Phytoplanktons: Diversity and Ecology, Avik Kumar Choudhury and Ruma Pal, Springer, 2014.
8. Practical Manuel on Microalgal Technology, M. Michael Babu and T. Citarasu, Southern Book Star Publishers, Trivandrum, 2019.

Websites

1. [Plankton - Science Publishing Group
sciencepublishinggroup.com/book/download?chapterId=2171&stateId=8000...4](http://sciencepublishinggroup.com/book/download?chapterId=2171&stateId=8000...4)
2. [Zooplankton Methodology, Collection & Identification -- a field ... - NIO](#)
3. www.nio.org/userfiles/file/biology/Zooplankton_Manual_new.pdf

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

Ph.D. course work study papers in Microbiology

Ph.D. Microbiology

(With effect from the academic year 2018-2019 onwards)

Semester	Sub. No.	Subject Status	Subject Title	Hrs/ week	L Hrs/ week	T Hrs/ week	P Hrs/ week	C Credits
I	1		Advanced Research Methodology	4	4	-	-	4
	2		Advanced Bioinstrumentation	4	4	-	-	4
	3		Microbial Probiotics and Prebiotics	4	4	-	-	4
	4		Synthetic Biology and its Applications	4	4	-	-	4
	5		Nanobiotechnology and Application	4	4	-	-	4
	6		Microbial Drug Discovery and Management of Drug Resistance	4	4	-	-	4
	7		Microbes and Clean Environment	4	4	-	-	4
	8		Microbiome, Metagenomics and Molecular Techniques	4	4	-	-	4
	9		Advanced Marine Microbiology and Extremophiles	4	4	-	-	4
	10		Emerging and Re-emerging Microbial Infectious Diseases in India	4	4	-	-	4
	11		Microbial Product Development and Patenting	4	4	-	-	4
	12		Bioentrepreneurship and STARTUPS	4	4	-	-	4
	13		Mini Project					4

Ph.D. course works Study papers in Microbiology

1. Advanced Research Methodology

Objectives

To inculcate knowledge on research methodology and to familiarize the usage of various instruments, techniques and analysis applied in Microbiology research.

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Unit 1: Research Methodology – Introduction - Meaning - Objectives – Motivation. Types of Research - Research Approaches, Criteria of Good Research. Research and Scientific Method. Research Problem – identification- Selection – Techniques and necessity of defining the Problem. Research ethics- Importance of doing genuine Research.

(10 h)

Unit 2: Survey of Literature: Meaning- Mode of literature survey using scientific documents – research paper, review paper, book reviews, theses, conference and project reports. Research Design: Meaning – Need - Basic Principles – Types- Important concepts relating to research design, Developing a research plan. Sampling: Steps in sampling design, characteristics of a good sample design, Different types of sample designs. Research methods versus methodology, Problems encountered by researchers in India.

(10 h)

Unit 3: Biostatistics and Computer Application: Introduction, significance of statistical methods. Normal distribution. Probability. Degrees of freedom. Measures of variation - standard deviation, Non linear regression, iteration methods. Analysis of variance. Standard error. Test for statistical two ways ANOVA and multiple comparison procedures. Significance - students Test, chi - square test. Fisher's exact test. Wilcoxon rank test. Two - tailed student's t - test. Mann - Whitney test. Dunnet's two - tailed test, Kruskal - Wallis non-parametric test. Computer applications in Biology - Using formulas and functions, Data storing, Features for Statistical data analysis, Generating charts / graph and other features, Tools – Microsoft Word, Excel, Power Point and WWW, Use of search engines, Biological data bases.

(14 h)

Unit 4: Scientific Writing: Definition and kinds of scientific documents – research paper, review paper, book reviews, thesis, conference and project reports (for the scientific community and for funding agencies). Thesis writing – follow the format prescribed by the Manonmaniam Sundaranar University - Components of a research paper – the IMRAD system, submission of manuscript, ordering reprints. Oral and poster presentation of research papers in conferences/symposia. Preparation and submission of research project proposals to funding agencies.

(12 h)

Unit 5: Biomolecular separation Techniques: Identification and characterization of biomolecules – optimization of AGE – Blotting techniques, RAPD, RFLP, DGGE, TGGE, PCR, ELISA. Enzyme assay, enzyme activity and specific activity determination. Cell disintegration and extraction techniques, separation of proteins (ammonium sulphate, organic solvents). Ion exchange chromatography, molecular sieve chromatography, affinity chromatography, column chromatography, thin layer chromatography, ultra filtration, Ultracentrifugation. Gel electrophoresis - PAGE – Gel Documentation – immunoelectrophoresis, advanced Microscopy, HPLC, HPTLC, GC-MS, FTIR, NMR, AAS.

(14 h)

Total (60 h)

References:

1. Kothari, C.R. (2004). Research Methodology: Methods and Techniques, New Age International Publishers, New Delhi.
2. Arya., P.P. and Pal, Y. (2001), Research Methodology in Management: Theory and Case Studies, Deep and Deep Publishers Pvt. Ltd., New Delhi
3. Robert A. Day (1998), How To Write & Publish a Scientific Paper. Oryx Press; 5th edition.
4. Frank D. Bell (1995), Basic Biostatistics: Concepts for the Health Sciences. William C. Brown
5. Suresh C. Sinha and Anil K. Dhiman, (2002), Research Methodology (2 Vols– Set) Vedams Books (P) Ltd.
6. Bajpai, S. 2014. Revised Edition, Biological Instrumentation and Methodology: (Tools and Techniques of Biology), Chand & Company Ltd., New Delhi.
7. Gurumani, N. 2016. First Edition, Research Methodology for Biological Sciences, MJ Publishers, A unit of Tamilnadu Book House, Chennai.
8. Lederberg, J. 2000. Second Edition, Encyclopedia of Microbiology, Volume 4, Academic Press.
4. Palanivelu, P. 2009. Fourth Edition,
9. Analytical biochemistry and separation techniques – A Laboratory Manual, Twenty first Century Publications, Madurai, Tamilnadu.
10. Pelczar, M.J., Schan, E.C. and Kreig, N.R. 2010. Microbiology – An application based approach, Fifth Edition, Tata McGraw Hill Publishing Company Limited, New Delhi.

2. Advanced Bioinstrumentation

Objectives

- To understand the principle, applications and limitations of basic and advanced instruments used in biological research.
- Preparing the researchers for interdisciplinary research.
- To improve the quality and reliability of the research.

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Unit 1: Buffers, standard, percentage, molar and normal solutions, pH meter, pH electrodes – calomel and glass electrodes. Colorimeter –UV-Spectrophotometer. Calibration of Laminar air flow-Different meters available for the measurement of biological research and their applications and calibration.

(14 h)

Unit 2: Centrifugation: Principle – types of centrifuges – low speed, high speed, ultra centrifuge, and Differential centrifugation – density gradient centrifugation. Applications of centrifuge.

(12 h)

Unit 3: Electrophoresis – SDS – PAGE and Agarose gel electrophoresis. Southern blotting – Northern blotting – Western blotting – DOT blotting.

(10 h)

Unit 4: Chromatography – paper, thin layer, column, ion exchange, gas chromatography and GC – GCMS -HPLC-MS - FACS - Biosensors.

(10h)

Unit 5: Biological Techniques - ELISA - Principles and types. Immunodiffusion techniques - ODD, RIA. Agglutination and its applications - IFT, CFT. Principle and Applications of XRD - FTIR - ICPOES- ICP-MS- TGDTA –Proton NMR – C13 NMR – Polarimeter – Mass Spectrum –TEM AND SEM

(14 h)

Total (60 h)

References:

1. Bajpai PK (2010). Biological Instrumentation and Methodology. Revised edition, S.Chand & Co. Ltd., New Delhi.
2. Palanivelu P (2004). Analytical Biochemistry and Separation techniques. Third edition, MKU Co-op, Press Ltd., Palkalai Nagar, Madurai.
3. Gurumani N (2006). Research Methodology for Biological Sciences. First edition, MJP Publishers, A Unit of Tamil Nadu Book House, Chennai.
4. Subramanian MA (2005). Biophysics – Principles and Techniques. First edition, MJP Publishers, A Unit of Tamil Nadu Book House, Chennai.
5. John G Webster (2004). Bioinstrumentation. Student edition. John Wiley and Sons, Ltd.
6. Ravishankar S (2001). A Text Book of Pharmaceutical Analysis. Third edition. Rx Publications, Tirunelveli.
7. Upadhyay & Upadhyay. Biophysical Chemistry, (2010). Himalaya Publishing house

3. Microbial Probiotics and Prebiotics

Objectives:

- To study the use of live bacterial supplements on disease resistance and growth promotion in aquatic organisms.
- To understand the history, growth and development of probiotics.
- To study the prebiotic effect on gut bacterial community.
- To explore knowledge on isolation, screening, characterization and production of probiotic microbes.

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Unit 1: Probiotic History : Definition, History and development of probiotics, Indian and Global Scenario of Probiotics, General features of probiotics, Mechanism of action of probiotics. (12 h)

Unit 2: Probiotic characterization: Isolation of probiotic bacterial strains from various sources, Screening of probiotic bacteria: antimicrobial potentials, enzyme producing ability, colonization potentials, Identification of probiotics using molecular tools – Mass cultivation of probiotic bacterial strains. (12 h)

Unit 3: Probiotics in Food: Dairy and Non dairy based probiotic products. Interactions between probiotics and components of fermented foods - Probiotic food Product Specifications, Quality Assurance and Regulatory Issues - (12 h)

Unit 4: Application of Probiotics – Humans: Bowel diseases, Oral and Dental health, Diabetes and obesity, Cancer prevention. Plants: Role of plant probiotics in production of highly functional fruits and disease resistance. Animals: Probiotics in poultry, pig and ruminant nutrition. Aquatic organisms- Probiotics for finfish and shellfish. (14 h)

Unit 5: Prebiotics and Synbiotics: Definition – Types of prebiotics - Characteristics of probiotics – Synbiotics – List of synbiotics and their applications (10 h)

Total (60 h)

Reference

1. Daniel Merrifield and Einar Ringo, 2014, Aquaculture nutrition: Gut Health, Probiotics and Prebiotics, Wiley Blackwell.
2. Soundarapandian, P. and Ramanan, V. 2010. Role of probiotics on the farming of shrimp *Penaeus monodon*, India, VDM Verlag Publishers.
3. Ganguly, S. And Mukhopadhyay, S.K. 2011. Immunostimulants, Probiotics and Prebiotics, LAP Lambert Academic Publishing, Germany
4. Anthony von Fraunhofer, J. 2012. Prebiotics and Probiotics, CreateSpace Independent Publishing Platform, USA.
5. Watson, R.R. and V.R. Preedy, 2016. Probiotics, Prebiotics and Synbiotics: Bioactive foods in health promotion, Academic Press, USA.

4. Synthetic Biology and its Applications

Objectives

- To understand the gene regulation in naturally occurring organisms and to learn the mode of alteration of genes and their products. Also to explore the possibility of alteration of properties of cells / organisms.
- To apply a scientific approach to the planning, execution, reporting and interpretation of advanced projects with the aim at creating replicating systems with new properties that can be regulated, and to critically analyse the results and generate testable hypotheses from these experiments
- To critically analyse, present and defend scientific literature in synthetic biology, including practical applications such as biofuel and metabolic engineering and to develop ethical perspectives in synthetic biology

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Unit 1: Introduction to Synthetic Biology: Basic concepts in biology – Definition – History - Perspectives- Engineering- Re-writing- Enabling technologies-Standardized parts - Synthesis - Sequencing - Microfluidics - Modular protein assembly - Modeling – Chemical Synthetic biology

(12h)

Unit 2: Concepts and Components in Synthetic genomics: Metabolic engineering -Biological computers -Biosensors - Cell transformation

(10 h)

Unit 3: Synthetic genomics – Synthetic Genomes – basic concepts of genomics -Elements of genetic circuits. Natural and synthetic promoters; attenuation and termination. Codon usage, Operons, RBSs and their relevance to biotechnology sRNA and ribolocks - Hybrid systems - RNA Replicon-cell factories-algae befouls

(14 h)

Unit 4: Applications of Synthetic Biology: - Designed proteins - Industrial enzymes - Information storage - Materials production - Reduced amino-acid libraries - Space exploration - Synthetic genetic pathways - Synthetic life - Synthetic amino acids - Synthetic nucleotides. Therapeutics: Gene circuits- Delivery platform- Engineered bacteria-based platform- Cell-based platform- Cancer detection/diagnostic

(14 h)

Unit 5:Bioethics and Security: European initiatives – US initiatives – opposition – ethical concern – status of research in Synthetic biology in India.

(10 h)

References:

https://en.wikipedia.org/wiki/Synthetic_biology

www.synbioproject.org/topics/synbio101/definition/

<https://www.syntheticgenomics.com/cell-factories>

<https://www.syntheticgenomics.com/ ExxonMobil-and-synthetic-genomics-algae-biofu>

5. Nanobiotechnology and Application

Objectives

- To familiarize students with new concepts and understand the fundamentals of Nanotechnology.
- To give basic knowledge on classes of nanomaterials and various synthesis and characterisation techniques involved in Nanotechnology.
- To employ bio-nanomaterials for analysis and sensing techniques.
- To explain the bio-medical applications of Nanobiotechnology.

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Unit 1: Basics of Nanotechnology: Time and Length scale in structures - Definition of nanosystem - Properties of nanoscale (optical, mechanical electronic and magnetic) - Classes of Nanomaterials: Classification based on dimensionality - Quantum dots - Wells and wires - Carbon based nanomaterials (nanogold, nanosilver and metal oxides) - Nanocomposites, Synthesis of nanomaterials: Physical methods - Electrodeposition, Ball Milling, Magnetron Sputtering, Molecular Beam Epitaxy (MBE) - Chemical Methods - Metal nanocrystals by reduction, Solvothermal synthesis, Photochemical synthesis, Sonochemical routes, Chemical vapour Deposition.

(12 h)

Unit 2: Bio-Analytcs of Nanoparticles: Nanofabrication: Photolithography - Electron-beam lithography (EBL) - Nanoimprint - Soft Lithography patterning, Characterisation: Scanning Electron Microscope (SEM) - Transmission Electron Microscope (TEM), Atomic Force Microscope (AFM) - Analysis of Biomolecular Structure by Atomic Force Microscopy and Molecular Pulling - X-ray photoelectron spectroscopy (XPS) - Rutherford Backscattering Spectroscopy (RBS) - Surface Enhanced Raman Spectroscopy (SERS) - Force Spectroscopy - Biofunctionalized Nanoparticles for Surface - Enhanced Raman Scattering and Surface Plasmon Resonance - Luminescent Quantum Dots for Biological Labeling - Nanoparticle Molecular Labels - Bioconjugated Silica Nanoparticles for Bioanalytical Applications.

(13h)

Unit 3: Principles of Nanobiotechnology: Structural and Functional Principles: Lipid Bilayers - Liposomes - Neosomes - Polysaccharides - Peptides - Nucleic acids - DNA scaffolds - Enzymes - Biomolecular motors: Linear, Rotary motors - Immunotoxins - Membrane transporters and pumps - Antibodies - Monoclonal Antibodies - Immunoconjugates - Limitations of natural biomolecules.

(10 h)

Unit 4: Nanobiomaterials: Surface and Bulk Properties of Biomaterials –Nano ceramics - Nanopolymers - Nano Silica - Hydroxy apatite - Surface modification - Textured and Porous Materials - Surface immobilized biomolecules - Cell-biomaterial interactions - Immune response - *in vitro* and *in vivo* assessment of tissue compatibility,Protein and DNA Based Nanostructures: Nanocircuitry - S-layer proteins: structure, chemistry and assembly - lipid chips – S-Layers as Templates - Engineered nanopores - DNA–Protein Nanostructures - DNA-templated Electronics - DNA-based Metallic Nanowires and Networks - DNA-Gold-Nanoparticle Conjugates - DNA - templated Electronics - DNA Nanostructures for Mechanics and Computing.

(13 h)

Unit 5: Applications of Nanotechnology in Health Science: Nano particle based drug delivery systems - Ultra sound triggered Nano/Microbubbles - Regenerative Medicine – Nanoimmuno conjugates- Biosensors - Optical Biosensors Based on Nanoplasmonics - Nanobiosensors - Nanobiosensors for Mimicking Gustatory and Olfactory Senses -Cyclodextrin in Nanomedicinal Foods and Cosmetics - Bioavailability and delivery of nutraceuticals and functional foods using Nanotechnology - Polymer based nanocomposites for food packaging - Nanocomposites for food packaging - Toxicity and environmental risks of nanomaterials - Challenges of nanotoxicology.

(12 h)

(Total 60 h)

References

1. Pradeep T., “A Textbook of Nanoscience and Nanotechnology”, Tata McGraw Hill Education Pvt. Ltd., 2012.
2. Niemeyer C. M., “Nanobiotechnology: Concepts, Applications and Perspectives”, Wiley – VCH, 2006.
3. David S Goodsell, “Bionanotechnology”, John Wiley & Sons, 2004.
4. Debasis Bagchi, Manashi Bagchi, Hiroyoshi Moriyama, Fereidoon Shahidi, “Bio-Nanotechnology: A Revolution in Food, Biomedical and Health Sciences” Wiley-Blackwell, 2013.
5. Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen, Jack E. Lemons, “Biomaterials Science: An Introduction to Materials in Medicine”, Academic Press, 2012.
6. Balaji Sitharaman “Nanobiomaterials Handbook”, Taylor & Francis Group, 2011.
7. Nabok A., “Organic and Inorganic Nanostructures”, Artech House, 2005.

6. Microbial Drug Discovery and Management of Drug Resistance

Objectives:

To provide an in-depth knowledge about the development of new antimicrobial agents using standard guidelines of NCCLS and CLSI.

To make a clear understanding of Pharmacogenomics.

To give a brief knowledge about the databases and tools used for drug designing.

To furnish the ideas regarding clinical trials and guidelines of FDA.

To provide knowledge on the discovery of drugs from microbial resources and management of the drug resistant microorganisms.

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Unit 1 :Screening and development strategies for new antimicrobial agents acting on bacterial cell wall, cell membrane, nucleic acid and protein metabolism, Bioassay of antibacterial agents in liquid media and in agar media using standard guidelines (e.g. National Committee for Clinical Laboratory Standards (NCCLS)/Clinical and Laboratory Standards Institute (CLSI)).

(12 h)

Unit 2: Drug discovery-Historical perspectives, Current approaches to drug discovery-Rational Drug design, receptor/target concept in drug designing, Introduction to pharmacogenomics, Phases of drug discovery: Bioprospecting, Principles of extraction, purification and characterization of bioactive molecules from natural resources. (12 h)

Unit 3: Search of database/data mining for Drug designing, Preclinical and Clinical trials, Estimation of toxicity-LD50, Acute, subacute and chronic toxicity, Rational drug design-principle (Structure activity relationship- SAR) and Tools (applications of High through Put Screening, Combinatorial synthesis). (12 h)

Unit 4: Regulatory authorities for introduction of medicines in market-Role of Food and Drug Administration, FDA guidelines for drugs/biologicals, Validation (GMP, GLP, GCP, etc.), Clinical studies: Phase I, phase II, phase III and phase IV of clinical trials-Objectives, Conduct of trials, Outcome of trials, Drug distribution in body, bio-availability and pharmacokinetic studies.

(12 h)

Unit 4: Mechanisms of bacterial resistance to host cellular (phagocytosis) and humoral defences, Antibiotic/Drug resistance-origin, cause and clinical implication with special references of multidrug resistant tuberculosis and MRSA.

(12 h)

Total (60 h)

References

1. Hugo, WB and Russell, AD. *Pharmaceutical Microbiology*, (2003). Blackwell Science, Oxford, UK.
2. Krogsgaard L, Lilijefors T. and Madsen, U. *Textbook of Drug Design and Discovery*, (2004). Taylor and Francis, London.
3. Geoffrey Hanlon and Norman Hodges. *Essential Microbiology for Pharmacy and Pharmaceutical Science*.(2013).Wiley Blackwell.
4. S. P. Vyas& V. K. Dixit. *Pharmaceutical Biotechnology*. (2003) CBS Publishers & Distributors, New Delhi.
5. Bhatia R and Ichhpujani RL. *Quality Assurance in Microbiology*. (1995). CBS Publishers, New Delhi.
6. Gregory Gregoriadis. *Drug Carriers in Biology & Medicine*. (2001). Academic Press New York.
5. Davis, B. D., Dulbecco, R, Eisen, H. N., Ginsberg, R. S. *Microbiology*. (1990). Harper and Row Publishers, Singapore.

7. Microbes and Clean Environment

Objectives:

Strengthening the knowledge of students in the area of microbiological and its allied subjects research by exposing them to basic and advanced concepts and applications of clean Environment and make them fit for their effective operations.

L T P C

4 0 0 4

Unit1: A tribute to clean environment: The contamination clean up strategy- bioremediation- bioaugmentation- Aerobic biodegradation pathway- Anaerobic biodegradation pathway- physicochemical mechanism- Molecular mechanism- Biotechnological invention- Bioremediation Research studies using designed and developed laboratory bioreactors- Nanobioremediation.

(14 h)

Unit2: Biological control agents for sustainable agriculture, safe water and soil health:

Brief history of biopesticides- Biopesticides in India- Bio agents- Bioremediation of pesticides in surface soil treatment unit using microbial consortia- scale up process- Designed and developed partitioning bioreactor- Mycorrhizosphere ecological remediation- Industrial effluent treatment- GMO'S.(14 h)

Unit3: Food Industry Waste: Food processing industrial waste- solids and liquids- ultimate goal of green productivity- Zerodischarge- Zero emission- Zero pollution- cost effective production and application of clean production technology. Fruit and vegetable food processing sector. Beverage and fermentation sector- Dairy industry- Food packaging waste.

(12 h)

Unit 4: Carbon Foot Printing, Ecological Foot Printing, Global Dimming (GD) and Global warming (GW): Green gases- suspended pollutants- causes of global dimming- burning fossil fuels- Global warming- comparison of GD and GW- common factors- carbon positive, carbon negative and neutral- future challenges.

(10 h)

Unit 5: Environmental toxicological studies: Global scenario- Indian scenario- Vehicles- Road dust- Hotels and Restaurants- Hospitals- Shopping mall- municipal and corporation solid waste burning- Aiming for eco-friendly, biodegradable products- Bioplastics.

(10 h)

Total (60 h)

References:

1. <http://www.enviroliteracy.org/625php>
2. <http://www.Epa.gov/superfund/site>
3. http://www.yale.edu/epi/files/2008EPI_textpdf
4. http://www.yale.edu/esi/ESI 2005 Main_Report.pdf
5. <http://www.bact.wise.edu/Microtextbook/index.php>
6. <http://www.teachingtools.com/crude energy/Oil environment.htm>
7. <http://www.Sfgate.com/cgi-bim/article>

8. Microbiome, Metagenomics and Molecular Techniques

Objectives

To make students familiar with and can use and apply modern technologies used in microbiome research.

To use metagenomic data to describe the taxonomic make-up, functional potential and ecological processes of microbial communities from a range of environments.

To make students familiar with new techniques in genetic engineering.

L T P C

4 0 0 4

UNIT 1:Microbiome : Introduction- History of the study of the microbiome; Describing the organisms present in the microbiome: 16S rRNA sequencing; Analysis and interpretation of 16S rRNA sequencing; Extracting Whole genomes from the microbiome – genome sequencing through PacBio; Culturing organisms of interest from the microbiome: bacteria, fungal and archaea. Learning the metabolic potential of the microbiome :Metagenomics. Microbiome- transcriptomics; RNA influencing gene expression: sRNA sequencing. Functions available in the microbiome- Metaproteomics

(14 h)

Unit 2:Metagenomics: Introduction; Pure culture and in consortium ; Cultivable and Non-cultivable microbial analysis; Recombination DNA technology and DNA cloning; Types of vectors, applications of recombination DNA technology; Molecular fingerprinting techniques (RFLP, T-RFLP, ARISA, DGGE, rDNA library, and FISH); Stable isotope probing (SIP); Suppressive subtractive hybridization (SSH); Differential expression analysis (DEA); Microarrays &Metagenome sequencing; Next-generation sequencing approaches to metagenomics

(12 h)

Unit 3:Cataloging microbes: phylogenetic tree and construction - Construction of a metagenomic library; Analysis of metagenomic libraries; Sequence-based metagenomics Analysis; Functionbased metagenomics analysis; Phylogenetic analysis and comparative genomics softwares & Tools

(10 h)

Unit 4:Metagenomic analysis of soil microbial communities; Metagenomic analysis of marine microbial communities; Metagenome of the Microbial Community in acid mine drainage ;Metagenomic analysis of Bacteriophage; metagenomics and its applications to the study of the human microbiome; Archaeal metagenomics: Bioprospecting novel genes and exploring new concepts.

(10 h)

Unit 5: Genetic Engineering – Introduction, Mendelian and non mendelian inheritance, Basics of r-DNA technology: Enzymes used in r-DNA technology; DNA ligase, DNA polymerase,

Klenow fragment, reverse transcriptase, exonuclease, endonuclease, terminal deoxynucleotidyltransferase, alkaline phosphatase, polynucleotide kinase, and dephosphatases; restriction modification systems and their types; sticky and blunt end ligation, joining with linkers, adapters & homopolymer tailing. Recent trends in Molecular Biology Research Targeted Genome Editing: ZFNs, TALENs, CRISPRs -- Gene Targeting: Knock-ins & Knock-outs -- DNA Finger Printing
(14 h)

Total (60 h)

References

1. Diana Marco Universidad Nacional de Cordoba, Argentina, "Metagenomics: Theory, Methods and Applications", Caister Academic Press, 2010.
2. Diana Marco Universidad Nacional de Cordoba, Argentina "Metagenomics: Current Innovations and Future Trends", Caister Academic Press, 2011.
3. Joanna R. Freeland, Heather Kirk, Stephen Petersen, "Molecular Ecology", McGraw Hill, 2nd Edition "2012.
4. Beebe T.J.C., D G. Rowe," An Introduction to Molecular Ecology", McGraw Hill, 2004.
5. Brown T. A. Gene Cloning and DNA Analysis: An Introduction - 6th Edition - - John Wiley & Sons
6. Desmond Nicholl S. T. An Introduction to Genetic Engineering - 3rd Edition - - Cambridge University Press

9. Advanced Marine Microbiology and Extremophiles

Objectives

- Marine microbes are fundamental players of marine food webs. They mediate in all fluxes of matter and energy in the oceans. Many important microbes are recorded from extreme environments from marine habitat.
- The aim of this course is to provide the students with a basic theoretical and practical understanding of the interactions between microorganisms and ocean processes and discuss their future role in a rapidly changing planet.
- This advance course will also build up a strong scientific base from the oceanographic properties and processes affecting microbial life through extensive review of microbial ecology, role of these microorganisms in global biogeochemical cycles and physiological adaptations to extreme ecological conditions.

L T P C
4 0 0 4

Unit 1: Marine Microbial Ecology: Vertical structure and physico-chemical gradients in the ocean - The physical nature of the ocean (stratification / mixing, light gradients) - Chemical and biological vertical partitioning -overview on structure and function of microbial communities in the oceans including discussions on novel methods, results and hypotheses - Current understanding of microbial diversity - Microbial diversity and evolution - physiology and interactions with the environment – Microbes in marine sediments - Role of microbes in biogeochemical cycles. Invasive microbial species - ship ballast water -introduction of alien species in new ecological areas and their effects.

(12h)

Unit 2: Microbial growth and marine food webs:Marine microbes – bacteria, fungi, phytoplankton, zooplankton, viruses: Modes of microbial growth: viable but non-culturable (VBNC) microorganisms, Marine Biofilm, microbial mats, epibiosis. - physiology and contribution to ocean processes - Marine bacteria and the carbon cycle- UV radiation effects on microbes and microbial processes- uptake and regeneration of inorganic nutrients by marine heterotrophic bacteria. Bacterivory: interactions between bacteria and their grazers- Mixotrophy among pelagic microorganisms.

(12 h)

Unit 3: Marine Symbiotic Microbes and their importance:Symbiosis in marine organisms with special reference to microbes: Symbiotic marine bacteria with other marine organisms - Endosymbionts (Ex: Sponge-microbial interaction; sea weedsmicrobes interaction) - Molecular methods and conventional methods for studying symbiotic bacteria – Marine endophytic fungi and their significance - Global Ocean Survey of Marine Metagenomics. Methods to study marine microbial diversity: flow cytometry; molecular approaches such as metagenomics, community fingerprinting and Fluorescence *in situ* hybridization (FISH).

(12 h)

Unit 4: Physiology of marine microbes: Metabolic diversity and energy-yielding processes in marine microbes: microbial loop - marine snow; phototrophy and primary productivity, fermentation, aerobic respiration, anaerobic respiration (denitrification, sulphate reduction, methanogenesis); nitrification, annamox, sulphur oxidation, methanotrophy; carbon dioxide fixation in autotrophs; the role of microorganisms in biogeochemical cycling: carbon- nitrogen - phosphorous- sulphur- iron- manganese.

(12 h)

Unit 5: Extremophiles : Concept of extremophiles versus conventional microbial forms and archaea – Genetic basics of adaptation - Anaerobes (Ex: *Anaerobrancahorikoshi*, *Methanobacteriumthermoautotrophicus*) - Microbial communities in Deep sea (piezophilic/ barophilic microorganisms in the deep sea), Aphotic Zone and Hydrothermal vents - Microbial diversity and factors influencing microorganisms in polar environments: Archaea – Thaumarchaeota; Bacteria - *Glaciecolapsychrophila*, *Pseudoalteromonashaloplanktis*, *Marinomonaspolaris*; cyanobacteria – Oscillatoria; fungi and yeast - *Glaciozyma Antarctica* - Cellular, structural and physiological characteristics, community interactions and food webs - Biotechnological importance of extremophilic microorganisms: psychroenzymes, anti-freeze proteins, novel antibiotics and other bioactive compounds.

(12h)

Total (60)

Reference

- 1.A practical handbook of seawater analysis. Strickland, J.D.H and Parsons, T.R. Fisheries Research Board of Canada, Ottawa. (1972).
- 2.Extremophiles in Deep Sea Environments. K. Horikoshi, K. Tsujii. Springer Science & Business Media.316 pages (1999).
- 3.Marine Microbiology: Ecology and Applications (C. Munn, Garland Science, 2011)
- 4.Marine viruses and global climate change. FEMS Microbiology Reviews, 35: 993–1034. (Danovaro, R., Corinaldesi, C., Dell’Anno, A., Fuhrman, J.A., Middelburg, J.J., Noble, R.T., Suttle, C.A. 2011) .
- 5.Microbial Ecology of the Oceans. (Third Edition).J.M. Gasol and D.L. Kirchman (Editors). 528 pages (2018).
- 6.Methods of Seawater Analysis (Third Edition). K. Grasshoff; K. Kremling and M. Ehrhardt Print ISBN:9783527295890 (2007)
- 7.Polar Microbiology: The ecology, biodiversity and bioremediation potential of microorganisms in extremely cold environments, Bej, A. K., Aislabie, J. and Atlas, R. M., CRC Press (2009).
- 8.Extremophiles: Microbial Life in Extreme Environments. Horikoshi, K and Grant, W.D (Eds). 322pp. (1998).

10. Emerging and Re-emerging Microbial Infectious Diseases in India

Objectives:

- i. To create an awareness about the re-emerging infectious diseases.
- ii. To inculcate the significance of microbiology in the diagnosis and treatment of infectious diseases.
- iii. To learn the molecular diagnostic procedures.

L T P C
4 0 0 4

Unit 1: Emerging and re-emerging infectious diseases - Epidemiological triad of disease - Factors contributing to emergence: Agent. Antimicrobial drug resistance, Host and Environmental factors. Role of Microbiology in diagnosis - Role of public health professionals- Strategies to reduce threats.

(12 h)

Unit 2: Emerging bacterial diseases - Zoonotic diseases: Leptospirosis, Brucellosis, Anthrax, Rickettsial diseases - Food and water borne diseases: Enterohaemorrhagic *Escherichia coli*, *Vibrio cholerae*, *Listeria monocytogens*, *Campylobacter spp*; Drug resistant bacteria - Drug resistant Mycobacterium tuberculosis, Drug resistant *Staphylococcus aureus* (MRSA, VISA, VRSA, VRE), AMR *Neisseria gonorrhoeae*; Molluscoidosis - Chronic neoplastic diseases : *Helicobacter pylori*, *Chlamydiae*, *Pneumoniae*.

(12 h)

Unit 3: Emergence of viral diseases: Indian scenario - Nipah virus, Hantavirus, Chikungunya virus, Human enterovirus 71 (EV-71). Influenza virus, Avian influenza (H5N1), Chandipura virus, Crimean Congo virus, Haemorrhagic fever, SARS, Coronavirus, Buffalopox, Dengue, Japanese encephalitis, Rotaviruses, Noroviruses, Bocaviruses, Parvoviruses B-19.

(12 h)

Unit 4: Emergence of fungal infections - Non albicans candida, *Penicillium marneffi*, *Apophysomyces spp.*, *Fusarium*, *Trichosporon*, *Curvularia*, *Alternaria*, *Zygomycetes*, *Aspergillus*, Pencillosis, Histoplasmosis.

(10h)

Unit 5: Diagnostics: Traditional Microbial typing - Biotyping, Antibigrams, Resistograms and Bacteriocin typing. Protein analysis, Phage analysis, Chromatographic analysis, Nucleic acid based typing systems - plasmid analysis, restriction enzyme pattern, Ribotyping, RAPD, Nucleic acid probes, Branched DNA signal amplification. PCR Methods - RT-PCR, nested PCR, Multiplex PCR, broad range PCR, Transcription based amplification system (TAS), Ligase chain

Reaction (LCR), Strand displacement amplification (SDA), $q\beta$ - replicase system. Current applications of molecular diagnostics in clinical microbiology, clinical epidemiology and infection control.

(14h)

Total (60h)

References:

1. Emerging and Re-emerging Infectious Diseases , Subhash Chandra Parija, JaminiKantaDutta, Tarun Kumar Dutta, Jaypee Brothers Medical Publishers, Karnataka.
2. Emerging Infectious Diseases and Society, Washer, Palgrave Scholarly, UK
3. Pandemics and Emerging Infectious Diseases, Staniland Hoffman Dingwall, Wiley-Blackwell Publishers, USA.
4. Emerging infections 6 6th Revised edition Edition, Barbara E. Murray, W. Michael Scheld, James M. Hughes, American Society For Microbiology, USA.
5. Human Emerging and Re-emerging Infections, 2 Volume Set 1st Edition, Sunit Kumar Singh, Wiley-Blackwell Publishers, USA

11. Microbial Product Development and Patenting

Objectives:

- i. To teach the recent development of products using the microorganisms in industries.
- ii. To provide a brief knowledge about the industrial production of organic solvents, organic acids, antibiotics, enzymes etc. and their applications in industries.
- iii. To insist the awareness of patenting.

L T P C

4 0 0 4

Unit 1: History and development of microbial products, Isolation, preservation and screening of microbes used in industries, Strain improvement by mutation, selection and enrichment, Types of bioreactor-Air lift, acetator, fluid bed reactors. (12 h)

Unit 2: Production of beverages and industrial alcohols, wine and beer, Production of organic acids-lactic acid, acetone, butanol, citric acid and acetic acid, Production of microbial biomass-SCP.(12 h)

Unit 3: Industrial production of antibiotics-Penicillin, erythromycin and streptomycin, Bacterial production of enzymes-protease, cellulose, amylase, Immobilization of enzymes, Development of biosensors, Biopolymers and EPS, Bioplastics, Biosurfactants, Biopreservatives and its uses. (12 h)

Unit 4: Role of microorganisms in cheese production-cheddar cheese, blue cheese, camembert cheese, yogurt, sour cream, Leather processing and development. (10 h)

Unit 5: Basic requirement of patentability, process of patenting, patenting biological materials, National and International patent laws, Biosafety regulations and assessment of biotechnology products- drugs/vaccines and GMO, Biosafety protocols-Biological weapons, Principles of bioethics- ethical conflicts in biotechnology. (14 h)

Total (60 h)

References

1. Glick BR and Pasternak JJ. Molecular Biotechnology-Principles and applications of recombinant DNA, ASM Press, 2006.
2. Staneberry et al., Fermentation Technology, 1998.
3. Glazer AN, Nikaido H. (1994) Microbial Biotechnology-Fundamentals of Applied Microbiology WH Freeman and Company, New York.
4. Raledge C. and Kristiansen B Eds. (2001) Basic Biotechnology, 2nd edition, Cambridge University Press.
5. NdukaOkafor (2007). Modern Industrial Microbiology and Biotechnology. 1st Edition: Science Publishers.
6. Waites, M.J., Morgan, N.L., Rockey, J.S. and Higton, G. (2002). Industrial Microbiology: An Introduction. Blackwell Science Publishers.

12. Bioentrepreneurship and STARTUPS

Objectives

This course gives the students an oversight as how an idea can lead to a business. The contents give knowledge into making a business plan, market growth, managing competitions, human resource planning and financing the company.

L T P C
4 0 0 4

Unit 1: From an idea to a company – developmental stages of a business, innovative business ideas, benefit to the customer, unique selling proposition (usp), market and competitors, profitability scenario, protecting your idea, formal presentation of the business idea (12 h)

Unit 2: The business plan-product idea-management team, building a strong team, the founders and their shares, introducing the team, market and competition, defining your market, choosing your target market, positioning vis-à-vis competitors, market growth and market life cycle, competitors analysis (12 h)

Unit 3: Barriers to market entry and patent strategy, designing a strategy to keep the competition out, patents – essential market entry barriers in the life sciences Marketing and distribution, use of marketing tools, business organization and processes (12 h)

Unit 4: Human resources planning-make or buy – outsourcing and cooperation agreements, legal forms, partnerships and joint ventures, location planning - implementation plan, fundamentals of planning, effective planning, potential consequences of poor planning, presenting your plans (12 h)

Unit 5: Finance and financial planning- opportunities and risks, Financing options , financing planning, using ratios to assess a business Risks , risk assessment and sensitivity analysis, typical crisis situations of companies, presenting opportunities and risks (12 h)

Total (60 h)

References

1. Bob businessplan handbook 2017
2. www.bestofbiotech.at/content/node/media/bob_businessplan_handbook_2017.pdf
3. The entrepreneur's guide to a biotech startup, 4th edition - uclactsi.
4. https://www.ctsi.ucla.edu/researcher-resources/files/view/docs/egbs4_kolchinsky.pdf

13. Mini Project

Manonmaniam Sundaranar University, Tirunelveli-12.

PhD Nutrition and Dietetics

COURSE WORK PAPER with effective from (2020-21) onwards

Sl.No.	Course Work Papers	Credit
1.	Research Methodology and Statistics in Nutrition	4
2.	Nutrigenomics	4
3.	Personalized Nutrition and Biohacking	4
4.	Food Microbiology and Food Safety (MOOC)	4
5.*	Research and Publication Ethics	2
6.	Mini Project	4

* Refer Ph.D Common syllabus for all

RESEARCH METHODOLOGY AND STATISTICS IN NUTRITION

Course Credit - 4

Objectives

- To enable the students
- To enrich the knowledge in research and to design research.

Course Outcome:

CO No	Expected course outcomes	Cognitive level
CO 1	Understand some basic concepts of research and its methodologies related to food science and nutrition	Understanding
CO 2	Select and define appropriate research problem and parameters	Knowledge
CO 3	Propose and distinguish appropriate research designs and methodologies to apply to a specific research project	Create
CO 4	Develop a comprehensive research methodology for a research question	Create
CO 5	Apply the understanding of feasibility and practicality of research methodology for a proposed project	Application

UNIT 1

Research Methodology: Meaning and Objectives of research; Types of research [Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical, Field setting vs. laboratory, clinical vs. diagnostic, Exploratory vs. Formalized]; Research Approaches [Qualitative approach and Quantitative approach] Significance of research; Basic concepts about research and scientific method; Research process. Hypothesis, designing research-different types- Completely randomized design, Randomized block design, Latin square design, Factorial design, and Trend analysis

UNIT 2

Nutritional epidemiology

- i. Levels of epidemiologic research (primary, secondary and tertiary prevention)
- ii. Observational studies – cross-sectional, case-control, cohort (prospective, retrospective, time- series)
- iii. Types of analysis – eg., incidence rate, prevalence rate.

UNIT 3

Experimental studies

- i. Pre-clinical studies - Laboratory based in vitro and animal studies
- ii. Clinical studies - Human intervention trials. Types - Randomized controlled trials (RCT), Non-randomized trial.
 - C. Ethical issues, Informed consent process, Regulations and Guidelines for research on human subjects

UNIT 4

Nutrition research - Data collection- Principles, definition and examples in nutrition research for the following.

A. Quantitative tools

- i. Direct parameters – Application of anthropometry, dietary survey, clinical, biochemical and growth monitoring tests, body composition tests and physical fitness tests.
- ii. Indirect parameters –vital statistics, population tests, socio – economic indices, KAP surveys.

B. Qualitative research tools- Types of interviews, Focus group discussions, Free listing and pile sorting, Narrative, Case studies, Participatory methods.

C. Integrating qualitative and quantitative methods.

D. Nutrition Intervention: Tools & techniques to facilitate nutrition intervention.
Biomarkers and their use in nutrition intervention

UNIT 5

Data Management and Analysis

Quantitative analysis, descriptive statistics, inferential statistics: Uses and limitations Summation sign and its properties. Data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.).

Proportions, percentages, ratios

Measures of central tendency-mean, median, mode arithmetic mean and its uses, mid – range, geometric mean, weighted mean, measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, Sleekness

References:

1. Lovegrove, Julie & Hodson, Leanne & Sharma, Sangita & Lanham-New, Susan. (2015). “Nutrition Research Methodologies”, John Wiley & Sons, Ltd.
2. Kothari, C.R. (2000). “Research Methodology: Methods and Techniques”, Wishwa Prakashan, New Delhi.
3. Gupta, S. (2001). “Research Methodology and Statistical Techniques”, Deep and Deep, New Delhi,
4. Hooda, R.P. (2003). “Statistics for Business and Economics”, 3rd ed., Macmillan IndiaLtd., Delhi.

NUTRIGENOMICS

Course Credit - 4

Objectives:

To enable students to:

- Gain Knowledge of how diet and underlying genetics interact to increase susceptibility to disease.
- To identify the methods and strategies used to study complex trait genetics and nutrition

Course Outcomes

To enable the students to

CO	Course Outcomes	Cognitive Level
-1	CO Develop an understanding of genomics and gene regulation with respect to diet	Understanding
-2	CO Formulate an appreciation for the role and importance of nutrition in prevention of polygenic diseases	Create
-3	CO Apply nutrigenomics and to design nutritional strategies for prevention of chronic diseases such as cardiovascular disease, obesity, type-2 diabetes, bowel diseases and cancer	Application
-4	CO Relate the interactions between the expression of various genes and the intake of various nutrients	Application
-5	CO Outline the various techniques used in nutrigenomics	Knowledge

Unit 1:

Introduction to gene-diet interactions

Nutrigenomics: Scope and Importance to Human Health and Industry
Transporter gene polymorphisms -interaction with effects of micronutrients in humans.
Polymorphisms in genes affecting the uptake and transport of omega-6 and omega-3 polyunsaturated fatty acids: interactions with dietary lipids and chronic disease risk.
Nutrigenomics approaches to unraveling physiological effects of complex foods. The intestinal microbiota - role of gut microbiome in nutrigenomics.

Unit 2:

Modifying disease risk through nutrigenomics:

Modulating the risk of cardiovascular disease, diabetes, cancer, obesity and inflammatory bowel diseases and malnutrition through nutrigenomics.

Overview of lipid metabolism; cholesterol metabolic pathway; hyperlipidaemia, LDL receptor mutations.

Relevance of folate, vitamin B12; hyperhomocysteinemia and gene polymorphisms in diseases.

Unit 3:

Influence of maternal nutrition on fetal gene expression. Obesity, genetic predisposition, candidate genes like leptin, FTO and other hormones involved in the control of appetite. Baker's hypothesis

Polyunsaturated fatty acid and their roles in the control of gene expression
example lipogenesis and lipid oxidation pathways

Polyphenols. transcriptomic analysis on the effect of the polyphenols in the human diet.

Unit 4:

Technologies in nutrigenomics genomics techniques:

Different sequencing approaches, Microarray, Massarray, Single Nucleotide Polymorphism genotyping, PCR and RT-PCR techniques

Proteomics techniques: 1-D, 2-D gel electrophoresis, DIGE, novel peptide identification, peptide sequencing methods

Metabolomics techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders.

Computational approaches: Introduction to different types of public domain databases, data mining strategies, primer designing.

Unit 5:

Bringing Nutrigenomics to Industry, Health Professionals, and The Public:

Bringing nutrigenomics to the food industry: Industry-Academia partnerships as an important challenge; Bringing nutrigenomics to the public: Is direct-to-consumer testing the future of nutritional genomics. Interaction with health professionals in bringing

nutrigenomics to the public; Is contemporary society ready for nutrigenomic science. Public health significance of nutrigenomics and nutrigenetics

References:

1. Lehninger Principles of Biochemistry. Macmillan. 2008
2. Ordovas: Nutrigenetics and Nutrigenomics. Wiley. 2004
3. Brigelius-Flohe, Joost: Nutritional Genomics. Wiley. 2006.
4. Rimbach, Fuchs, Packer: Nutrigenomics, CRC Press. 2005

PERSONALIZED NUTRITION AND BIOHACKING

Course Credit - 4

Objectives:

To enable students to

- Acquire advanced knowledge of the physiological, molecular, and biochemical concepts involved in how nutrients regulate gene expression
- Develop a distinctive understanding of how an individual's genotype influences their nutrient requirements.
- Develop an advanced understanding of the unique roles that foods, nutrients, and micro-compounds therein play in chronic diseases with a focus on their role in nutritional genomics.

Course Outcomes:

CO	Course Outcomes	Cognitive Level
-1	CO Apply the foundations of nutrigenomics and personalized nutrition in health promotion.	Application
-2	CO Analyze how an individual's genotype may influence their nutritional requirements and be involved in the development of chronic disease.	Knowledge
-3	CO To be able to analyze the benefit / risk balance of dietary recommendations and interventions according to the genotype.	Analysis
-4	CO Justify the importance of taking care of diet in the perinatal period for health in adulthood.	Evaluation
-5	CO Realize the applicability of the science in practice, examining the current testing that is available i.e through Biohacking	Analysis

UNIT 1:

Origin of the concept of Personalized Nutrition, Definition, Introduction, Nutrigenomics for personalized nutrition.

Human Genomic Variations: - Diversity of human population. - Metabolism, genetics, and environment. - Nutritional implications. - Nutritional requirements. - Genetic variation and physical performance.

Molecular Basis of Genetics: - Metabolic control and mechanisms. - Nutrient and gene expression. - Nuclear receptors. - Role of PPARs. - Role of the immune response. - Metabolic-circadian control.

UNIT 2:

Nutrition and Human Genome Adaptation: - Genetic adaptation to dietary changes. - Omics analysis in nutrition. - Nutrient-gene interactions. - Genetics and lipid metabolism. - Genetics and CHO metabolism. - Genetics and protein metabolism. - Genetics and vitamin metabolism. - Genetics and mineral metabolism. - Personalized nutrition.

UNIT 3:

Nutritional Epigenomics: - Mechanisms of epigenetics. - Metabolism and epigenetic signaling. Epigenetic programming in humans. - Nutritional signaling and aging. Inflammation, metabolic stress and genetics.

UNIT 4:

Modern Technologies for personalized nutrition, Personalized nutrition for women, infants, and the child population, Personalized nutrition for athletes, Consumer acceptance of personalized nutrition. Perinatal programming Diet in early life and metabolic programming. Case studies in nutrigenomics, nutrigenetics and personalised nutrition

UNIT 5:

Biohacking – Introduction. Biohacking through Self Tracking, Human Performance improvement and Human Enhancement. Types of Biohacking - Nutrigenomics in Biohacking, DIY Biology, Grinder. Biohacking with nootropics. Transhumanism. Pros and Cons of Biohacking – Legal and ethical issues involved in biohacking.

References:

1. Charis Galanakis (2019), “Trends in Personalized Nutrition”, Academic Press, USA.
2. Frans Kok, Laura Bouwman, Frank Desiere (2019), “Personalized Nutrition – Principle and Application” CRC Press, UK
3. George Moschonis, Katherine Livingstone and Jessica Biesiekierski (Eds.) (2019) “Personalized Nutrition”, MDPI, Switzerland

Food Microbiology and Food Safety (MOOC)

Course Credit – 4

UNIT: I

Introduction to Food Microbiology and Food Safety
Microflora of Food
Intrinsic Factors Affecting Microbial Growth and Survival in Food

UNIT II

Extrinsic Factors Affecting Microbial Growth and Survival in Food
Microbiological Examination of Food
Advances in Isolation and Enumeration of Microorganisms in Food

UNIT III

Principles of Food Preservation and Significance
Preservation of Food by Physical Methods – Low and High Temperatures
Preservation of Food by Physical Methods – Radiations

UNIT IV

Preservation of Food by Chemical Methods
Biopreservation of Food
Assignment-I

UNIT V

Modified Environment for Storage of Food
Fermentative Microorganisms as Food and Value-Added Product
Lactic Fermentation in Food

UNIT VI

Yeast-Lactic Fermentation in Food
Mold-Lactic Fermentation in Food
Starter Cultures for Food Fermentation

UNIT VII

Fermented Milk
Fermented Milk Products
Fermented Juice, Vegetables and other Beverages

UNIT VIII

Fermented Meat
Fermented Fish Products

Assignment-II**UNIT IX**

Introduction to Food Spoilage
Spoilage of Fruits, Vegetables, and their Products
Spoilage of Dairy Products

UNIT X

Spoilage of Canned Food
Spoilage of Bakery and Egg Products
Spoilage of Meat, Fish, and Sea Food

UNIT XI

Newer Methods for Controlling Spoilage of Food
Predictive Modelling for Food Spoilage

Assignment-III**UNIT XII**

Foodborne Outbreaks- Bacterial Agents for Foodborne Illnesses
Fungal and Algal Agents for Foodborne Illnesses
Foodborne Animal Parasites

UNIT XIII

Investigation of Foodborne Illnesses Outbreaks
Indicators of Food Microbial Quality and Safety
Principles and Applications of Hurdle Technology in Food Industry

UNIT XIV

Principles of Hygiene and Sanitation in Food Service Establishment.
Food Safety Laws

Food Safety and Quality Management System

UNIT XV

Principles and Guidelines for Conducting Microbiological Risk of Food

Revision of the course

Final assessment/Term-end examination

Books and references

- Adams MR and Moss MO. (1995). Food Microbiology. 4th edition. New Age International (P) Limited Publishers, New Delhi, India.
- Banwart JM. (1987). Basic Food Microbiology. 1st edition. CBS Publishers and Distributors, Delhi, India.
- Davidson PM and Brannen AL. (1993). Antimicrobials in Foods. Marcel Dekker, New York.
- Dillion VM and Board RG. (1996). Natural Antimicrobial Systems and Food Preservation. CAB International, Wallingford, Oxon.
- Frazier WC and Westhoff DC. (1992). Food Microbiology. 3rd edition. Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.
- Gould GW. (1995). New Methods of Food Preservation. Blackie Academic and Professional, London.
- Jay JM, Loessner MJ and Golden DA. (2005). Modern Food Microbiology. 7th edition, CBS Publishers and Distributors, Delhi, India.
- Lund BM, Baird Parker AC, and Gould GW. (2000). The Microbiological Safety and Quality of Foods. Vol. 1-2, ASPEN Publication, Gaithersberg, MD.
- Matthews KR, Kniel KE, and Montville TJ. (2017). Food Microbiology: An introduction. 4th edition, ASM Press.
- Pederson CS. (1971). Microbiology of Food Fermentations. Westport, CT: AVI.
- Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.
- Tanner FW, and Tanner LP (1953). Food-Borne Infections and Intoxications. 2nd edition. Champaign, IL: Garrard Press.

Mini Project

Course Credit – 4

Manonmaniam Sundaranar University, Tirunelveli – 12

List of papers for the Ph.D. course work in Physics

S. No.	Courses
1	Materials Science
2	Nanomaterials
3	Space Physics
4	Crystal Growth
5	Thin film
6	Electronic structure calculation
7	Non linear dynamics
8	Medical Physics
9	Radiation Physics
10	Alternative energy conversion devices
11	Lasers and applications

S. No.	Online courses - NPTL
12	Advanced materials and processes
13	Introduction to nonlinear optics and its applications
14	Non-conventional energy resources
15	Design of photo-voltaic systems

S. No.	Courses
16	Research and Teaching Methodology
17	Advanced Physics
18	Mini Project

Paper - 1: MATERIALS SCIENCE

Preamble: To expose the students with theoretical aspects of materials science. To provide the knowledge about phase diagrams, mechanical properties, ceramics, polymers, plastics and crystals.

Unit – I: Phase Diagrams

(12 hrs)

Solid solutions and intermediate phases – Equilibrium phase diagrams, Cu-Ni, Pb-Sn, Al-Cu system phase diagrams – Free energy and equilibrium phase diagrams – Nucleation and growth – Martensitic transformation – Strengthening mechanisms – Iron-Carbon system – Alloy steels – Aluminium-Copper system – Copper-Zinc system – Corrosion

Unit - II: Mechanical Properties

(12 hrs)

Stress- Strain curve – Elastic deformation: Characteristics, Atomic mechanism, Shear stress, Bulk modulus, Strain energy, Strain deformation – Viscous deformation: Spring-Dashpot models – Anelastic and Viscoelastic deformation: Viscoelastic models – Plastic deformation: Dislocations and Stress-strain curves, Plasticity theory – Fracture: Ideal fracture, Brittle fracture, Fracture mechanics, Cohesive models, Ductile fracture – Mechanical testing

Unit - III: Ceramics

(12 hrs)

Structure of ceramics – Production of ceramics: Raw materials, Forming and Post-forming processes – Production of glass: Melting of glass, Glass forming and annealing – Mechanical properties of ceramics – Wear and erosion resistance – Thermal shock – Silica-Alumina system – Commercial systems: Zirconia, Sialones, Cement and Concrete

Unit - IV: Polymers and Plastics

(12 hrs)

Molecular structure: Monomers & Polymers, Synthesis, Molecular weight measurement, Branching & Tacticity, Copolymers and blend – Mechanics of polymer chain: Freely jointed chains, Entanglements, Rubber elasticity – Thermoplastic melts: Viscosity, Shear thinning, Processing, Extrusion – Amorphous polymers: Solidification, glass transition, Various models – Crystalline polymers – Crosslinked polymers: Elastomers, Thermosets – Liquid crystal polymers – Mechanical properties: Stress-Strain behaviour – Chemical properties

Unit - V: Crystals

(12 hrs)

Crystal growth from solution – Melt growth techniques: Bridgman method, Czochralski crystal pulling technique, Crystal growth from Vapour phase – Crystal Imperfections – Point defects: Vacancies, interstitials, Impurities, electronic defects – Line defects: Edge dislocation, Screw dislocation – Surface defects: Grain boundaries, Tilt boundaries, Twin boundaries, Stacking faults, Ferromagnetic domain walls – Volume defects: Cracks, Voids

Books for Study and References

1. J.C.Anderson, K.D.Lever, P. Leever and R.D.Rowlings, Materials Science for Engineers, Nelson Thomas Ltd, First Indian reprint, 2010
2. M.Arumugam, Materials Science, Anuradha Agencies, Publishers, Second Edition, Fifth Reprint, 2005
3. R,Balasubramaniam, Materials Science and Engineering, Wiley India (P) Ltd, 2010
4. V.Raghavan, Materials Science for Engineering, Prentice Hall of India Pvt Ltd, 2006

Paper - 2: NANOMATERIALS

Preamble: To felicitates the knowledge on nanomaterials. To make the students understanding the fundamental aspects of nanomaterials, synthesis, nanostructures, properties and characterization techniques

Unit-I: Synthesis (12 hrs)

Sol-Gel and Precipitation technologies - Ball milling - RF plasma - Combustion Flame - Chemical Vapor Condensation process – Electrodeposition - Laser synthesis - Gas phase condensation - Sonochemical.

Unit-II: Nanostructures (12 hrs)

Preparation of quantum nanostructures: Preparation - Size and Dimensionality Effects – Excitations - Single-Electron Tunneling - Applications. Nanomachines and Nano devices: Micoelectrochemical systems – Nano electrochemical systems - Molecular and Super molecular switches.

Unit-III: Properties (12 hrs)

Properties of Individual Nanoparticles: Metal Nanoclusters – Semiconducting Nanoparticles - Rare Gas and Molecular clusters. Bulk Nanostructured Materials: Solid disordered Nanostructure - Nanostructured crystals.

Unit - IV: Characterization Techniques (12 hrs)

Structural: Powder XRD & particle size determination, Neutron diffraction; Spectroscopic: X-ray Photoelectron (XPS), Photoluminescence, Impedance and Energy Dispersive X-ray (EDAX) spectroscopy.

Unit - V: Characterization Techniques (12 hrs)

Thermal: Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC); Microscopic: Atomic Force Microscopy (AFM); Electrical and Magnetic: Four - probe method, Vibrating sample Magnetometer.

Books for Study and Reference

1. Evgenij Barsoukov and J. Ross Macdonald : Impedance Spectroscopy : Theory, Experiment and Applications, (John Wiley & Sons, Inc., Hoboken, New Jersey, second edition), 2005.
2. G. Cao: Nanostructures & Nanomaterials: Synthesis, Properties & Applications, (Imperial College Press), 2004.
3. Koch CC, Nanostructured Materials processing, properties and potential applications, Williams Andrew Publishing, Noyes, 2002
4. Pavia, Lampman, Kriz and Vyvyan, Spectroscopy, Cengage Learning India Pvt Ltd., 2011.
5. Willard, Merritt, Dean and Settle, Instrumental Methods of Analysis. CBS Publishers & Distributors, Delhi, 1986.
6. J.Ross Mcdonald, Impedance Spectroscopy Emphasizing solid materials and systems, John Wiley & sons, New York, 1996.
7. T. Pradeep, NANO: The Essentials, Tata Mc Graw-Hill Pvt. Ltd., New Delhi, 2007.
8. Charles P. Poole Jr & Frank J. Owens, Introduction to Nanotechnology, John Wiley & Sons (Asia) Pvt. Ltd., New Delhi, 2006.
9. Jackie Y.Ying, Nanostructured Materials, Academic Press, USA, 2001.

Paper – 3: SPACE PHYSICS

Preamble: To enlighten the students with the concepts of space physics. To make the students understanding the concepts of remote sensing of earth's climate system, space and plasma physics, space weather, introduction to magneto hydrodynamics, x-ray astronomy

Unit – I: Remote Sensing of Earth's Climate System (12 hrs)

Remote sensing of earth's climate system- requirements for remote sensing of climate system- methodology- constrains- basic concept of remote sensing- surface factors- atmospheric factors- instrumental factors- using reflected sunlight- global vegetation remote sensing- using thermal emission- global sea surface temperature measurement- radar altimetry- surface effects- atmospheric effects- ocean and ice monitoring by radar altimetry.

Unit - II: Space and Plasma Physics (12 hrs)

Basic plasma physics- principle- application- space plasma- the frozen in-flux-MHD plasma waves- solar wind and IMF- collision less shocks- bow shocks- shock jumps- shock structure- shock acceleration- magnetic reconnection- terrestrial magnetosphere- closed, open and flux transfer events- storms , sub storms- solar wind interaction with ionosphere- planets- insulator bodies(moon)- comets.

Unit – III: Space Weather (12 hrs)

Space weather- structure of sun- solar cycle- solar activity- coronal heating. The solar wind- wind- Aurora- Auroral sub storms- co-rotating interaction region(CIR)- solar flares- the ionosphere- solar energetic particle events(SEP)- coronal mass ejections(CME) and geomagnetic storms- Halo CME's- interplanetary CME's- magnetic clouds.

Unit - IV: Introduction to Magneto Hydrodynamics (12 Hrs)

Maxwell's equations in MHD- magnetic Reynold's number- Alfven speed- plasma beta parameter- force free magnetic field- magnetic buoyancy- magneto ststic equilibrium- magnetic reconnection- current sheet- acoustic waves- Alfven waves compressional Alfven waves- magneto acoustic waves- inertial waves.

Unit – V: X-Ray Astronomy (12 hrs)

Origin of X-rays astronomy- X-ray binaries- black hole- neutron stars- pulsars- white dwarfs- clusters of galaxies.

Books for Study and References

1. Thomas E Cravens, Physics of Solar System Plasma, (Cambridge University Press), 1997.
2. Thomas I Gombosi, Physics for Space Environment, (Cambridge University Press), 2004.
3. Louise K Hara and Keith O Mason, Space Science, (University of London, World Scientific Publishing Co.), 2004.
4. Margaret G Kivelson and Christopher T Russell, Introduction to Space Physics, (Cambridge University Press), 1995.

Paper – 4 : CRYSTAL GROWTH

Preamble: To introduce the knowledge on crystal growth and characterization. To expose the students with theories of nucleation & crystal growth, crystal growth from various techniques such as, solution, melt and vapour phase and their characterization.

Unit – I: Fundamentals of Crystal Growth (12 hrs)

Importance of crystal growth – Classification of crystal growth methods – Basic steps: Generation, transport and adsorption of growth reactants – Nucleation: Kinds of nucleation – Classical theory of nucleation: Gibbs Thomson equations for vapour and solution – Kinetic theory of nucleation – Becker and Doring concept on nucleation rate – Energy of formation of a spherical nucleus – Statistical theory on nucleation: Equilibrium concentration of critical nuclei, Free energy of formation.

Unit – II: Theories of Crystal Growth (12 hrs)

An introductory note to Surface energy theory, Diffusion theory and Adsorption layer theory – Concepts of Volmer theory, Bravais theory, Kossel theory and Stranski's treatment – Two-dimensional nucleation theory: Free energy of formation, Possible shapes and Rate of nucleation – Mononuclear, Polynuclear and Birth and Spread models – Modified Birth and Spread model – Crystal growth by mass transfer processes: Burton, Cabrera and Frank (BCF) bulk diffusion model, Surface diffusion growth theory.

Unit – III: Experimental Crystal Growth-Part-I: Melt Growth Techniques (12 hrs)

Basics of melt growth – Heat and mass transfer – Conservative growth processes: Bridgman-Stockbarger method – Czochralski pulling method – Kyropoulos method – Non-conservative processes: Zone-refining – Vertical and horizontal float zone methods – Skull melting method – Vernueil flame fusion method.

Unit – IV: Experimental Crystal Growth-Part-II: Solution Growth Techniques (12 hrs)

Growth from low temperature solutions: Selection of solvents and solubility – Meir's solubility diagram – Saturation and supersaturation – Metastable zone width – Growth by restricted evaporation of solvent, slow cooling of solution and temperature gradient methods– Crystal growth in Gel media: Chemical reaction and solubility reduction methods – Growth from high temperature solutions: Flux growth Principles of flux method – Choice of flux – Growth by slow evaporation and slow cooling methods – Hydrothermal growth method.

Unit – V: Experimental Crystal Growth-Part-III: Vapour Growth Techniques (12 hrs)

Basic principles – Physical Vapour Deposition (PVD): Vapour phase crystallization in a closed system – Gas flow crystallization – Chemical Vapour Deposition (CVD): Advantageous and disadvantageous – Growth by chemical vapour transport reaction: Transporting agents, Sealed capsule method, Open flow systems – Temperature variation method: Stationary temperature profile, Linearly time varying temperature profile and Oscillatory temperature profile.

Books for Study and Reference

1. 'Crystal Growth Processes' by J.C. Brice, 1986, John Wiley and Sons, New York.
2. 'Crystallization' by J.W. Mullin, 2004, Elsevier Butterworth-Heinemann, London.
3. 'Crystal Growth: Principles and Progress' by A.W. Vere, 1987, Plenum Press, New York.
4. 'Crystals: Growth, Morphology and Perfection' by Ichiro Sunagawa, 2005, Cambridge University Press, Cambridge.
5. 'Crystal Growth' by B.R. Pamplin, 1975, Pergamon Press, Oxford.

PAPER – 5: Thin film

Preamble: To expose the students with knowledge of understanding the basic preparation and to get knowledge about the various properties of thin films. To make the understand the preparation and various necessary techniques used for analyzing the thin films

Unit- I: Preparation of Thin Films (12 hrs)

Spray pyrolytic process – characteristic feature of the spray pyrolytic process – ion plating – Vacuum evaporation – Evaporation theory – The construction and use of vapour sources – sputtering Methods of sputtering – Reactive sputtering – RF sputtering - DC planar m magnetron sputtering .

Unit - II: (Thickness Measurement and Nucleation and Growth in Thin Film (12 hrs)

Thickness measurement: electrical methods – optical interference methods – multiple beam interferometry – Fizeau – FECO methods – Quartz crystal thickness monitor. Theories of thin film nucleation – Four stages of film growth incorporation of defects during growth.

Unit - III: Electrical Properties of Metallic Thin Films (12 hrs)

Sources of resistivity in metallic conductors – sheet resistance - Temperature coefficient of resistance (TCR) – influence of thickness on resistivity – Hall effect and magneto resistance – Annealing – Agglomeration and oxidation.

Unit - IV: Transport Properties of Semiconducting and Insulating Films (12 hrs)

Semiconducting films ; Theoretical considerations - Experimental results – Photoconduction – Field effect thin films – transistors, Insulation films Dielectric properties – dielectric losses – Ohmic contacts – Metal – Insulator and Metal – metal contacts – DC and AC conduction mechanism

Unit - V: Optical Properties of Thin Films and Thin Films Solar Cells (12 hrs)

Thin films optics –Theory – Optical constants of thin films – Experimental techniques – Multilayer optical system – interference filters – Antireflection coating ,Thin films solar cells : Role, Progress , and production of thin solar cells – Photovoltaic parameter, Thin film silicon (Poly crystalline) solar cells : current status of bulk silicon solar cells – Fabrication technology – Photo voltaic performance : Emerging solar cells : GaAs and CuInSe.

Books for study and reference

1. Hand book of Thin films Technology: L I Maissel and R Clang .
2. Thin film Phenomena : K L Chopra .
3. Physics of thin films, vol. 12 , Ed George Hass and others .
4. Thin films solar cells – K L Chopra and S R Das .
5. Thin films processes – J L vilsan
6. vacuum deposition of thin films – L Holland .
7. The use of thin films in physical investigation – J C Anderson.
8. Thin films technology – Berry, Koil and Harri

PAPER – 6: ELECTRONIC STRUCTURE CALCULATION

Preamble: To introduce knowledge on electronic structure calculation. To make the students to understand basic concepts, various analysis on natural bond Orbitals, normal coordinates and different experimental methods

Unit – I: FTIR Raman Spectra (12 hrs)

Normal modes of vibration – Group frequencies – Origin of Infrared and Raman spectra – Infrared and Raman activity – IR and Raman spectral characteristics – FTIR and Raman spectra and their interpretation – Factors affecting Vibrational spectra - Hydrogen bonding – Structure elucidation using IR and Raman spectra – Resonance Raman scattering – Vibrational spectra of aromatic molecules

Unit – II: Quantum Chemical Computation (12 hrs)

Molecular Orbital Theory - Basis set – Electronic structure methods – Semi empirical methods – *Ab initio* methods - density functional theory methods - Z-matrix – geometry optimization – Harmonic Vibrational analysis – Atoms in molecules charges and Bond order – Potential energy surface – Mulliken population analysis – Vibrational circular dichroism intensities – Software: MOPAC, Gaussian

Unit – III: Natural Bond Orbital Analysis (12 hrs)

Natural bond orbitals and one-particle density matrix – Atomic eigenvectors – Natural atomic orbitals and natural population analysis – Bond eigenvectors – natural hybrids and natural bond orbitals – Natural localized molecular orbitals – Hyperconjugative interaction in NBO analysis.

Unit – IV: Normal Coordinate Analysis (12 hrs)

Classical theory of molecular vibrations – Construction of force constant matrix F – Internal coordinates in force field calculations – Theory of lattice vibrations – Scale factor calculation – Intensity calculation – Natural internal coordinates – MOLVIB software: General structure input data – Control parameters

Unit – V: Experimental Techniques (12 hrs)

IR spectrometer instrumentation – IR sources – Sample handling techniques – IR detectors – FTIR spectrometer – FTIR Raman spectrometer – Sample handling techniques – Laser exciting sources – Raman detectors – SERS techniques.

BOOKS FOR REFERENCE

1. Brain Smith, Infrared Spectral Interpretation – A Systematic Approach , CRC Press, New York, (1999)
2. G.Aruldas, Molecular structure and spectroscopy, prentice-Hall of India (P) Ltd., New Delhi-1110001, (2001).
3. G.Socrates, Infrared characteristic group frequencies, John Wiley & Sons, New York, (1980)
4. Ira N.Levine, Quantum chemistry V Ed., Prentice Hall International, Inc., London (2003).
5. Alan E. Reed et al., Chem. Rev. 88 (1988) 899-906.
6. Tom Sundius, MOLVIB User's guide Ver. 2, Helsinki (June 2002)
7. Robert M. Silverstein et al., Spectrometric identification of organic compounds, John Wiley & Sons, Inc., New York, (2003).

PAPER – 7: NONLINEAR DYNAMICS

Preamble: To understand the basic concepts of nonlinear dynamics. This course provides knowledge about the effects of nonlinearity on dynamical systems

Unit – I: Nonlinearity, linear and nonlinear oscillators (12 hrs)

Dynamical systems - linear and nonlinear forces - Mathematical implications of nonlinearity - Working definition of nonlinearity - Effects of nonlinearity-Linear oscillators and predictability - Damped and driven nonlinear oscillators.

Unit – II: Equilibrium points, bifurcations and chaos (12 hrs)

Equilibrium points - General criteria for stability – Classification - Some simple bifurcations - Saddle node, pitch fork, transcritical and Hopf bifurcations - Discrete dynamical systems - Logistic map - Equilibrium points and their stability - period doubling phenomenon - chaos.

Unit – III: Chaos in nonlinear electronic circuits (12 hrs)

Linear and nonlinear circuit elements - nonlinear circuits - Chua's diode - Autonomous case - Bifurcations and chaos - Chaotic dynamics of MLC circuit-Analogue circuit simulation - Some other useful nonlinear circuit - Colpitt's oscillator.

Unit – IV: Fractals (12 hrs)

Self similarity - Properties and examples of fractals - Fractal dimension - Construction and properties of some fractals-Middle one third cantor set-Koch curve - Sierpinski triangle-Julia set - Mandelbrot set - Applications of fractals.

Unit – V: Solitons (12 hrs)

Linear waves - Linear non dispersive wave propagation - Linear dispersive wave propagation - Nonlinear dispersive systems - Korteweg de vries equation - solitary and cnoidal waves - Numerical experiments of Zabusky and Kruskal - birth of solitons - Properties of solitons - applications of solitons.

Book For Study:

Nonlinear dynamics, Integrability, Chaos, Patterns, M. Lakshmanan and S.Rajasekar, Springer, Berlin, 2003.

Books for Reference:

1. Chaos in nonlinear oscillator, controlling and synchronization, M.Lakshmanan and K.Murali (World Scientific, Singapor,1997.)
2. Deterministic chaos, H.G.Schuster, (Verlag,Weinheim,1998.)

PAPER – 8: MEDICAL PHYSICS

Preamble: To study the basic concepts of medical physics. To make the students to understanding the concepts of Physics in lungs and breathing, sound in medicine, light in medicine, physics of diagnostic X-rays and cardio vascular systems.

Unit - I: The Physics of the Lungs and Breathing (12 hrs)

The Airways– How the blood interact – Measurement of Lung Volumes – Pressure, Airflow, Volume Relationships of the Lungs – Physics of the Alveoli – The Breathing Mechanism – Airway Resistance – work of Breathing – Physics of some common Lung Diseases. Electricity within the Body: Electric signals – from the Heart (Electro Cardiogram) – From the Brain (Electro encephalogram) – From the Eye (Electro retinogram and electrooculogram) – Magnetic signals from Heart and Brain (Magnetocardiogram and Magnetoencephalogram) – Current Research involving electricity in the body.

Unit – II: Sound in Medicine (12 hrs)

General properties of sound, the body as a drum (percussion in medicine) – The stethoscope – ultrasound pictures of the body – ultrasound to measure motion – physiological effects of ultrasound in therapy – the production of speech – Physics of the ear and hearing : The outer ear – the middle ear – the inner ear – sensitivity of the ears – testing your hearing – deafness and hearing aids

Unit – III: Light in Medicine (12 hrs)

Measurement of light and its units – applications of visible light in medicine – applications of ultraviolet and infrared light in medicine – Lasers in Medicine applications of microscopes in medicine – Physics of eye and vision: Focusing elements of the eye – some other elements of the eye – the retina – the light detector of the eye – how sharp are your eye? Optical illusions and related phenomena – defective vision and its correction – colour vision and chromatic aberration – instruments used in ophthalmology.

Unit – IV: Physics of Diagnostic X-Rays (12 hrs)

Production of X-ray beam – how X-ray are absorbed – making an X-ray image – radiation to patients from X-rays – producing live X-ray images – fluoroscopy – X-ray slices of the body – radiographs taken without film Physics of Radiation Therapy: The dose units used in radiotherapy – the red and the gray – principles of radiation therapy – a short course in radiotherapy planning – megavoltage therapy – short distance radiotherapy or brachytherapy other radiation sources – closing thought of radiotherapy.

Unit – V: Physics of the Cardiovascular System (12 hrs)

Major Components of the Cardiovascular system – O₂ and CO₂ Exchange in the Capillary system – Work done by the Heart – Blood pressure and its measurement Transmural Pressure– Bernoulli's Principle – Blood flow – Heart Sounds – Cardiovascular Diseases – Functions of Blood Cardiovascular Instrumentation: Biopotentials of the Heart – Electrodes – Amplifiers – Patient Monitoring – Defibrillators – Pacemakers

BOOK FOR STUDY

Medical Physics–John R.Cameron & James G.Skofronick (John Wiley&Sons, New York1978)

PAPER – 9: RADIATION PHYSICS

Preamble: To teach the students about the basic concepts of radiation physics. To impart knowledge on radiation and interaction, principles of radiation detection and measurement, radiation therapy techniques, diagnostic radiology and radiation protection.

Unit-I: Radiation and Interactions

(12 hrs)

Interaction of Electromagnetic radiation with matter – Photoelectric and Compton process – pair production – interaction of particles with matter – neutrons – heavy ions – nuclear reactions and production of radioisotopes – radiation sources – natural and artificial radio active for medical applications – Bethe- Bloch formula.

Unit – II: Principles of Radiation Detection and Measurement

(12 hrs)

Radiation units and definitions – G.M. Counter – Scintillation detectors – Solid state detectors – Photofilm method - Pocket dosimeter – TLD - FBX dosimeters.

Unit – III: Radio Therapy Techniques

(12 hrs)

Telegamma unit – accelerators for therapy – Iridium and cobalt needles – preparation of tracers and labeled compound – uses of radioisotopes (Gamma and beta) in brachytherapy. Dosimetry in medical applications – beta particles dose computation for biological models – dosimetry of internally administered isotopes Principles and overview of conformal radiotherapy, SRS, SRT and IMRT.

Unit – IV: Diagnostic Radiology

(12 hrs)

The physical basis of diagnostic radiology – the diagnostic X-ray tube – electrical circuits – rating of the x-ray unit – factors on which quality and quantity of x-ray production depends – geometric factor which influences the radiographic image – fluoroscopy – tomography – radio isotopes in clinical medicine – rectilinear scanner – gamma camera.

Unit – V: Radiation Protection

(12 hrs)

Philosophy behind radiation protection – basic concepts of MPD – recent ICRP recommendations – tissues at risk – risk factor – evaluation of internal and external radiation hazards – transport and waste disposal of radioactive materials.

REFERENCES

1. Meredith and Massay. "Fundamental Physics of Radiology", John Wright & Sons Jones M.E. and Cunningham J, "Physics of Radiology", Charles C. Thomas, USA, 1984.
2. Knoll, "Radiation Detection and Measurement", John Wiley and Sons, New York, 1982.
3. Mould R.F, "Radiation Protection", Adam Hilger's Boston, 1985.
4. Govindarajan K.N, "Advanced Medical Radiation Dosimetry", Prentice Hall of India, New Delhi, 1992

PAPER- 10: ALTERNATIVE ENERGY CONVERSION DEVICES

Preamble: To introduce knowledge on alternative energy sources. To introduce the importance and overview of alternate energy sources. To make the students learn the basics of various energy conversion devices

Unit – I: Introduction and Overview of Alternative Energy Sources and Utilization (12 hrs)

Global energy budget – origins of fossil fuels – Principles of energy conversion: thermodynamic first and second laws – the Carnot cycle – Solar energy: Solar intensity and spectrum – global solar energy potential and current level of utilization – Photovoltaic: history – principles and theoretical limits – Solar cells and modules – semiconductor materials – single and multiple layer p-n junction diodes – Solar cells and modules – maximum power output – energy efficiency – quantum efficiency – Solar cells: characterization and modeling – Photovoltaic utilization.

Unit – II: Fundamentals of Electrochemistry and Electrode Kinetics (12 hrs)

Charge transfer reaction and reaction kinetics – Third-generation solar cells: dye-sensitized photocell – organic/polymer solar cell-Fuel cells: overview of types – basic operation and performance – Fuel cells: catalysis – Fuel cells: charge and mass transport – PEM fuel cells' Molten carbonate fuel cells – Solid oxide fuel cells – Overview of fuel cell systems: fuel-cell stack and thermal management.

Unit – III: Hydrogen as a Renewable Energy Source (12 hrs)

Sources of Hydrogen, Fuel cell – Principle of working – construction and applications – Fuel for Vehicles – Hydrogen Production: Direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production – Storage of Hydrogen: Gaseous, Cryogenic and Metal hydride – Environmental impact.

Unit – IV: Batteries (12 hrs)

Primary and Secondary batteries - principles and application – Lithium batteries, Lithium ion and polymer batteries. Super-capacitors: principles and working, electrode materials synthesis process, fabrication of the devices and their applications.

Unit – V: Biomass Utilization (12 hrs)

Biodiesel and ethanol, Biomass utilization, Nuclear Energy: Potential of Nuclear Energy, International Nuclear Energy Policies and Regulations. Nuclear Energy Technologies – Fuel enrichment, Different Types of Nuclear Reactors, Nuclear Waste Disposal, and Nuclear Fusion.

REFERENCES:

1. Renewable Sources of Energy and Conversion Systems: N.K.Bansal and M.K.Kleman.
2. Principles of Thermal Process : Duffie -Beckman
3. Solar Energy Handbook: Kreith and Kreider (McGrawHill)
4. Solar Cell : Marteen A. Green
5. Solar Hydrogen Energy Systems -T. Ohta (Ed.) (Pergamon Press)
6. Hydrogen Technology for Energy – D.A.Maths (Noyes Data Corp.)
7. Handbook : Batteries and Fuel cell – Linden (Mc.Graw Hill)
8. Batteries Volume (I) and (II) – Collins
9. Fuel Cell Fundamentals :O'Hayre, Suk-Won Cha, Whitney Colella, and Fritz B. Prinz, 2nd ed, John Wiley & Sons, New York.
10. Energy Storage Materials: S.Selladurai Proceedings, 2010
11. Practical Photovoltaics: Electricity from Solar Cells, 3rd Ed.Richard J. Komp, Aatec Publications, Ann Arbor, MI, 2002

PAPER – 11 : LASERS AND APPLICATIONS

Preamble: To facilitates the students with theoretical aspects of laser theory and its applications. To provide the knowledge on laser theory, resonators and switching theory, gas & liquid lasers, solid state & semiconductor lasers and their applications.

Unit – I: Laser Theory (12 hrs)

Absorption - Spontaneous and stimulated emission - Einstein's coefficients - threshold conditions for laser action - Line broadening, Mechanism - Lorentzian and Doppler line shapes - Small signal gain - Gain coefficient - gain saturation - Rate equations for 3 and 4 level systems.

Unit – II: Resonators and Switching Theory (12 hrs)

Resonant cavity - Fox and Li - Boyd and Gorden's theory on resonators - modes - Spot size - Types of resonators - Mode selection - Q switching theory and technique - Mode locking theory and technique.

Unit – III: Gas and Liquid Lasers (12 hrs)

He-Ne, Argon Ion, Carbon dioxide, Nitrogen - Metal vapour - Gas dynamics - Excimer - Free electron lasers - Dye lasers organic dyes - Pulsed and CW dye lasers - Threshold conditions - Puming configurations.

Unit – IV: Solid State And Semiconductor Lasers (12 hrs)

Ruby, Nd : YAG, Nd : Glass, Ti-sapphire, Alexandrite, lasers - Semiconductor lasers - Homo function - Hetro function - Quantum well laser.

Unit – V: Applications (12 hrs)

Speckle, speckle interferometry - Holography - Holographic interferometry - Material processing - Surface treatment - welding, drilling - Laser ranging - Laser Doppler Velocimetry - Pollution monitoring - Medical applications.

REFERENCES

1. Laser Fundamentals, William T. Silfvast, Cambridge University Press, 1999.
2. O Shea, Callen and Rhcdes, "An Introduction to Lasers and their Applications", Addison Wesley, 1985.
3. A.Yariv, "Quantum Electronics", Third Edn., Addison-Wesley 1990.
4. Hariharan, "Optical Holography", Academic Press, New York, 1983.
5. Erf.R.K."Speckle Metrology", Academic Press, New York, 1978.

PAPER – 12: Advanced Materials and Processes

Preamble: This course provides a fundamental understanding of materials' properties, their processing and classification, which are essential for product commercialization from the concept phase. It also includes the development of new materials and the improvement and application of current materials in new and novel structures.

Unit-I: Introduction and classification of structural and functional materials (12 hrs)

Introduction to metastable and functional alloys - Bulk Metallic glasses Part I: Fundamental concepts - Bulk Metallic glasses Part II: Mechanical and Functional properties

Unit – II: High Temperature Materials (12 hrs)

Introduction to high temperature materials - Superalloys: Alloy design, Microstructure and Properties -Shape memory alloys and Pseudelasticity - Shape memory alloys: Applications and case studies

Unit – III: Nano-materials (12 hrs)

Nano-materials: Classification, size effect on structural and functional properties, Processing and properties of nanocrystalline materials, thin films and multilayered coatings, single walled and multiwalled carbon nanotubes

Unit – IV: Soft and hard magnetic materials (12 hrs)

Soft and hard magnetic materials for storage devices: Design and Processing; Piezoelectric Materials: Processing and Properties

Unit – V: Advanced Processes applied for Advanced Materials (12 hrs)

Non-equilibrium Processes, Single Crystal Growth, Rapid Solidification, Inert Gas Condensation - Advanced Functional Alloys -, Physical and Chemical Vapour Deposition of Thin Films

Reference

https://onlinecourses.nptel.ac.in/noc18_mm12/preview

PAPER – 13: Introduction to Non-linear Optics and its Applications

Preamble: To introduce the basic concepts and theory of Nonlinear Optics. To study the basic nonlinear optical effects (like higher harmonic generation, optical Kerr effect, self-phase modulation etc). The course offers the subject matter by giving a rigorous theoretical background and framework for a nonlinear effect, followed by details of how such an effect is implemented in real applications.

Unit – I (12 hrs)

Introduction & Linear Optics: Maxwell's Equation (in free space and medium), Wave equation (Homogeneous and Isotropic medium), Plane wave solution, Poynting Theorem, Intensity and Amplitude relation, Linear Polarization, Classical 1D anharmonic oscillator, Refractive Index, Dispersion (Damped Harmonic Oscillator Model, Sellmeier Equation) - Polarization Tensor, Susceptibility Tensor, Wave motion in Crystal, E-Ray & O-Ray, Walk Off.

Unit – II (12 hrs)

Nonlinear Optics: Nonlinear Susceptibility, 2nd order nonlinear effect ($\chi^{(2)} \neq 0$)- Optical Rectification, 2nd harmonic generation, Nonlinear Maxwell's equation, Concept of phase matching - Birefringence Phase Matching (BPM), Kleinman's symmetry, Index contraction, d-matrix, Quasi Phase Matching (QPM)

Unit – III (12 hrs)

Parametric Processes, Three wave interaction, Difference frequency generation, Manley-Rowe Relation - Phase sensitive and insensitive amplification, Sum frequency Generation - Optical Parametric Oscillator (OPO)- (i) Singly Resonant Oscillator (SRO), (ii) Doubly Resonant Oscillator.

Unit – IV (12 hrs)

Third order nonlinear effect ($\chi^{(3)} \neq 0$), Optical Kerr effect, Self Phase Modulation (SPM) - 3rd harmonic generation, Two wave interaction, Cross Phase Modulation (XPM) - Nonlinear absorption / Two Photon Absorption (TPA), Four Wave mixing, Cross Talk, Optical Phase Conjugation

Unit – V (12 hrs)

Stimulated Raman Scattering, Classical Picture of SRS, Raman Gain, Applications -Nonlinear Schrödinger Equation, Optical soliton, Applications

Reference

https://onlinecourses.nptel.ac.in/noc18_ph10/preview

PAPER – 14: Non-Conventional Energy Resources

Preamble: To study the operating principle of a range of non-conventional energy resources, materials used, characterization, and key performance characteristics. The technologies looked at will include, Solar energy, Wind, Batteries, Fuel cells, and Geothermal conversion. The advantages and limitations of these technologies in comparison to conventional sources of energy will also be examined.

Unit – I: Conventional and non-conventional sources (12 hrs)

Scale of quantities - Impact of current energy usage - Conventional sources of energy - Overview of non-conventional energy resources - Consumption by sector

Unit – II: Solar energy (12 hrs)

Solar energy incident on earth - solar spectrum - Overview of solar energy technologies - Solar Thermal devices - Solar Photovoltaic devices - Performance and durability of solar devices

Unit – III: wind, Geothermal and biomass energies (12 hrs)

Wind energy - technology and geographical aspects - Geothermal - Biomass

Unit – IV: Battery (12 hrs)

Battery basics – types – Testing - performance of batteries

Unit – V: Fuel cells (12 hrs)

Fuel cell types - Fuel processing - concept to product - Characterization and durability of fuel cells - Flywheels and super capacitors

Reference

https://onlinecourses.nptel.ac.in/noc18_ge14/preview

PAPER – 15: Design of Photovoltaic Systems

Preamble: To discuss about the PV cell electrical characteristics and interconnections. Estimation of insolation and PV sizing is addressed in some detail. Maximum power point tracking and circuits related to it are discussed. Later, applications related to peltier refrigeration, water pumping, grid connection and micro grids are discussed in detail. Lastly a brief discussion on life cycle costing is also discussed in order to bring in a measure of completeness to the course.

Unit – I: The PV cell

(12 hrs)

A historical perspective, PV cell characteristics and equivalent circuit, Model of PV cell, Short Circuit, Open Circuit and peak power parameters, Datasheet study, Cell efficiency, Effect of temperature, Temperature effect calculation example, Fill factor, PV cell simulation - Identical cells in series, Load line, Non-identical cells in series, Protecting cells in series, Interconnecting modules in series, Simulation of cells in series, Identical cells in parallel, Non-identical cells in parallel, Protecting cells in parallel, Interconnecting modules in parallel, Simulation of cells in parallel, Measuring I-V characteristics, PV source emulation

Unit – II: Energy from sun

(12 hrs)

Insolation and irradiance, Insolation variation with time of day, Earth centric viewpoint and declination, Solar geometry, Insolation on a horizontal flat plate, Energy on a horizontal flat plate, Sunrise and sunset hour angles - Energy on a tilted flat plate, Energy plots in octave, Atmospheric effects, Air Mass, Energy with atmospheric effects, Clearness index, Clearness index and energy scripts in Octave

Unit – III: Maximum power point tracking

(12 hrs)

MPPT concept, Input impedance of DC-DC converters -Boost converter, Buck converter, Buck-Boost converter, PV module in SPICE , Simulation - PV and DC-DC interface - Impedance control methods, Reference cell, Sampling method, Power slope methods, Hill climbing method, Practical points - Housekeeping power supply, Gate driver, MPPT for non-resistive loads, Simulation

Unit – IV: PV-battery interfaces

(12 hrs)

Direct PV-battery connection, Charge controller, Battery charger - Understanding current control, slope compensation, simulation of current control, Batteries in series - charge equalisation, Batteries in parallel - Peltier device - principle, Peltier element - datasheet, Peltier cooling, Thermal aspects - Conduction, Convection , A peltier refrigeration example, Radiation and mass transport, Demo of Peltier cooling

Unit – V: PV and water pumping, grid interface

(12 hrs)

Water pumping principle, Hydraulic energy and power, Total dynamic head, Numerical solution - Colebrook formula, Octave script for head calculation, Octave script for hydraulic power, Centrifugal pump, Reciprocating pump, PV power, Pumped hydro application - Grid connection principle, PV to grid topologies, 3ph d-q controlled grid connection, dq-axis theory, AC to DC transformations, DC to AC transformations, Complete 3ph grid connection, 1ph d-q controlled grid connection - SVPWM, Application of integrated magnetics, Life cycle costing, Growth models, Annual payment and present worth factor, LCC with examples

Reference

https://onlinecourses.nptel.ac.in/noc18_ee35/preview

PAPER – 16: RESEARCH AND TEACHING METHODOLOGY

Preamble: To introduce the knowledge on research. This paper provides a broad knowledge on methods of research, problem solving and analytical techniques

Unit - I: Research Methodology (12 hrs)

Methods of Research and Methodology of Research – Types of Research – Selection of Research Topic and Problem – Literature survey – Reference collection – Internet and its applications – Inflightnet - Accessing the current status – Mode of Approach – Actual Investigation – Results and Conclusion – Presenting a paper in a Scientific Seminar – - Art of writing a Research Paper – Layout of M.Phil. Dissertation

Unit - II: Statistical Methods And Simulations (12 hrs)

Statistical description of data: Mean, Variance, Skewness, Median, Mode; Distributions: Binomial, Poisson, Gaussian – Student's t-test and chi-square test - Simulation studies (theory only): Generation of uniform random numbers by Park - Miller method – Gaussian random number generation – Box-Muller method – Basic ideas of Monte-Carlo method – Evaluation of definite integrals and value of π .

Unit – III: Numerical Methods (12 hrs)

Curve fitting: straight line and exponential, Numerical integration: Composite Trapezoidal rule, Interpolation: Newton's forward and backward interpolation – Numerical integration – Ordinary differential equation: Fourth order Runge-Kutta method – Eigen value problem

Unit – IV: Analytical Techniques (14 hrs)

Analytical techniques – X - Ray Diffraction – SEM and TEM techniques – XPS – TG-DTA – Hall measurement – VSM and EDAX

Unit – V: Methodology of Teaching (10 hrs)

Teaching – Objectives of Teaching, Phases of Teaching – Teaching Methods: Lecture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project Method, Seminar – Integrating ICT in Teaching: Individualised Instruction, Ways for Effective Presentation with Power Point – Documentation – Evaluation: Formative, Summative & Continuous and Comprehensive Evaluation – Later Adolescent Psychology: Meaning, Physical, Cognitive, Emotional, Social and Moral Development – Teaching Later Adolescents.

Books for Study and References

1. J. Anderson, B.H. Durstan and M.Poole, Thesis and Assignment Writing (Wiley Eastern, New Delhi,1977)
2. Rajammal P. Devadas, A Handbook of Methodology of Research (S.R.K. Vidyalaya Press, Chennai, 1976)
3. G.B.Arffen and H.J.Weber, Mathematical Methods for Physicists (Academic Press,2005)
4. C.R.Kothari, Research methodology methods and techniques
5. Vijaya How to teach science
6. J A Belk: Electron Microscopy and Microanalysis of Crystalline Materials (Applied Science Publishers), 1979.
7. K.P.N. Murthy, Monte - Carlo Basics (ISRP, Kalpakkam, 2000)
8. K.P.N. Murthy: Monte-Carlo Methods (University Press, 2004)
9. Louis A. Pipes and Lawrence R. Harvill: Mathematical Physics for Engineers and Physicists (McGraw Hill International, Singapore, 1971)
10. Hobarl H. Willard, Lynne L. Merritt, Jr., and John A. Dean, Instrumental Methods of Analysis

11. Sampath K, Panneerselvam, A & Santhanam S (1984). Introsuction to educationaltechnology. (2nd revised ed.) New Delhi: Sterling Publishers.
12. Sharma. SR (2003) Effective classroom teaching modern methods, tools & techniques. Jaipur: Mangal Deep
13. Vendanayagam EG (1989). Teaching technology for college teachers. New York: Sterling Publishers.

Paper 17: ADVANCED PHYSICS

Preamble: To impart knowledge on various materials of technological importance. To make the students learn the basics of quantum mechanical calculations, nanomaterials, thin films, environmental physics and biophysics

Unit - I: Quantum Mechanical Calculations (12 hrs)

Molecular orbital theory - Basis set – Electronic structure methods – Semi empirical methods – *Ab initio* methods - density functional theory methods – Z-matrix - geometry optimization – Harmonic Vibrational analysis – Atoms in molecules charges and bond order – Potential energy surface – Mulliken population analysis – Vibrational circular dichroism intensities – Softwares: MOPAC, Gaussian.

Unit - II: Nanomaterials (12 hrs)

Nanomaterials: Salient features – Different methods of fabrication – Physical and chemical methods - Characterisation – Effect of size on various physical properties – Applications – Quantum wells, wires, dots – Fullerenes – Nanotubes – Carbon Nanotubes

Unit - III: Thin Films (12 hrs)

Thin films - Fundamentals and Salient features – Different methods of preparation – Solution growth - Spray Pyrolysis – Electrodeposition - Thermal evaporation – Flash evaporation – Electron beam evaporation – Thickness measurement method – Applications of thin films.

Unit - IV: Environmental Physics (12 hrs)

UV radiation impact on human health – Ozone formation – Depletion of Ozone layer – Conservation methods – Montreal Protocol – Effect of Nuclear Radiation - Radioactive Pollution – IR radiation and its effect – Green house effect – Global warming – Impact of microwave radiation.

Unit - V: Biophysics (12 hrs)

Molecular alphabets of life (Amino acids, nucleic acid bases, saccharides and lipids) – Roles of biomolecules in biological functions – Geometry of biomolecules – Conformation and Configuration – Lennard-Jones potential – Basis of molecular interactions – Various bonds involved in structural stabilization of biomolecules

Books for Study and References

1. Rodney Cotterill: Biophysics: An Introduction (John Wiley & Sons), 2003.
2. G. Cao: Nanostructures & Nanomaterials: Synthesis, Properties & Applications, (Imperial College Press), 2004.
3. B.D. Cullity: Elements of X-ray diffraction, (Addison – Wesley, London), second edition, 1977.
4. A.Goswami: Thin film fundamentals (New Age international (P) Ltd., New Delhi), 2006. Charles P. Poole Jr and Frand J. Owens : Introduction to Nanotechnology, (John Wiley & Sons), 2003.
5. Vasantha Patabhi, Gautham N: Biophysics (Narosa Publishing House, 2ndEdition), 2011

18. Mini Project

As per the guidelines of the Centre for Research, Manonmaniam Sundaranar University, Tirunelveli.

**DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS
MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI - 12**



**REGULATION AND SYLLABI FOR DOCTOR OF
PHILOSOPHY IN PHYSICAL EDUCATION (Ph.D)
(2018-19 Onwards)**



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DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



COURSE	NAME OF THE COURSE
1	RESEARCH METHODOLOGY AND STATISTICS IN PHYSICAL EDUCATION
2	SPORTS TECHNOLOGY
3	GENERAL THEORY AND METHODS OF TRAINING
4	HUMAN PERFORMANCE ASSESSMENT AND EVALUATION
5	SPORTS PHYSIOLOGY AND KINESIOLOGY
6	SPORTS PSYCHOLOGY AND SOCIOLOGY
7	SPORTS MANAGEMENT AND MARKETING
8	INFORMATION AND COMMUNICATION TECHNOLOGY IN SPORTS
9	SPORTS BIOMECHANICS AND ERGONOMICS
10	SPORTS MEDICINE AND REHABILITATION
11	ADAPTED PHYSICAL EDUCATION
12	PRINCIPLES OF MOTOR DEVELOPMENT
13	PRINCIPLES OF YOGIC SCIENCES
14	GAME OF SPECIALIZATION
15	MINI PROJECT



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



RESEARCH METHODOLOGY AND STATISTICS IN PHYSICAL EDUCATION

Objectives:

1. To study an overview of research processes
2. To realize the research methodology
3. To understand the concept of statistical tools in research
4. To be appropriate statistical tools in research
5. To understand thesis preparation and to know the SPSS methods.

UNIT-I: Research in Physical Activity

Nature of Research, Unscientific Vs Scientific Methods of Problem Solving, Types of Research, Overview of Research Process and choosing the title. Literature – Purpose, Sources and Search techniques.

UNIT-II: Formulating the Method

Principles of planning experiments, Describing Participants, Instruments, Procedures, Design and Analysis, Sampling Techniques, Research Design, Ethical issues in Research

UNIT-III: Methods of Data collection

Concepts of Statistical Techniques - Types of Data, Assumption Tests, Methods of Establishing Reliability - Relationship among variables, Multiple Correlation and Chi-square - Using correlation for prediction (Regression equation)

UNIT-IV: Measurement and Scaling Techniques

Types of Error, Degrees of freedom, Level of Significance - Non-Parametric tests; Man Whitney U test, Sign Test - Kruskal-Wallis analysis of ranks, Difference among Groups – T-tests, ANOVA, ANCOVA & Follow-up test, Use of Computers in Statistical Analysis

UNIT-V: Interpretation and Report Writing

SPSS Package – Introduction and application - Organisation of Research Report, Format for Bibliography - Writing and publishing research articles - Application of computer in research and statistics

REFERENCES

Clarke, David H. Clarke, Harrison H. *Research Process in Physical Education*, New Jersey: Prentice Hall Inc. 1984.

Jerry R. Thomas, Jack K. Nelson and Stephen J. Silverman., *Research Methods in Physical Activity (5th Ed)*, New York: Human Kinetics. 2005.

Chris Gratton and Ian Jones., *Research Methods for Sports Studies*, London: Routledge Taylor & Francis Group, 2004.

Kothari C.R., *Research Methodology (2nd Ed)*, New Delhi: New Age International Pvt., 2004.

K.D. Broota., *Experimental Design in Behavioural Research*, New Delhi: New Age International Publishers, 2006.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



SPORTS TECHNOLOGY

Objectives:

1. Introduction and Application of Technology in sports
2. To evaluate the impact of Sports Materials
3. To explore surfaces and its impact on sports
4. To examine the impact of Technology on sports
5. To analyse sports performance using technology

UNIT-I: Sports Technology

Meaning, definition, purpose, advantages and applications, General Principles and purpose of instrumentation in sports, Workflow of instrumentation and business aspects, Technological impacts on sports. Use of computer and software in Analysis of competition and Coaching.

UNIT-II: Science of Sports Materials

Adhesives- Nano glue, Nano moulding technology, Nano turf. Foot wear production, Factors and application in sports, Constraints. Foams- Polyurethane, Polystyrene, Styrofoam, closed cell and open-cell foams, Neoprene, Foam. Smart Materials – Shape Memory Alloy (SMA), Thermo chromic film, High-density modelling foam.

UNIT-III: Surfaces of Playfields

Modern surfaces for playfields, Construction and installation of sports surfaces. Types of materials – synthetic, wood, polyurethane. Artificial turf. Modern technology in the construction of indoor and outdoor facilities. Technology in manufacture of modern play equipments.

Unit – IV: Modern Equipment

Playing Equipments: Balls: Types, Materials and Advantages, Bat/Stick/ Racquets: Types, Materials and Advantages. Clothing and shoes: Types, Materials and Advantages. Measuring equipments: Throwing and Jumping Events. Protective equipments: Types, Materials and Advantages. Sports equipment with nanotechnology, Advantages and Disadvantages.

UNIT-V: Training Gadgets

Basketball: Ball Feeder, Mechanism and Advantages. Cricket: Bowling Machine, Mechanism and Advantages, Tennis: Serving Machine, Mechanism and Advantages, Volleyball: Serving Machine Mechanism and Advantages. Lighting Facilities: Method of erecting Flood Light and measuring luminous. Video Coverage: Types, Size, Capacity, Place and Position of Camera in Live coverage of sporting events.

REFERENCE:

- Dhinu., M.R. (2017) *Sports Technology*, Friends Publication, New Delhi. ISBN -978-81-7216-527-7
- John Mongilo, (2001), “*Nano Technology 101*” New York: Green wood publishing group.
- UK: Butterworth Heiremann. Finn, R.A. and Trojan P.K. (1999) “*Engineering Materials and their Applications*” UK: Jaico Publisher.
- Walia, J.S. *Principles and Methods of Education* (Paul Publishers, Jullandhar), 1999.
- Kochar, S.K. *Methods and Techniques of Teaching* (New Delhi, Jullandhar, Sterling Publishers Pvt. Ltd.), 1982
- Charles J.A. Crane, F.A.A. and Furness, J.A.G. (1987) “Selection of Engineering Materials”



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



GENERAL THEORY AND METHODS OF TRAINING

Objectives

1. To provide knowledge and concept of sports training
2. To develop an understanding of the technical and tactical training
3. To provide the role of sport sciences to achieve the research excellence
4. To apply various training methods and principles for improve performance for various sport
5. To understand and prepare training schedule for research activities

UNIT-I: Introduction of Sports Training

Introduction, Definition and aims of sports training: Characteristics of sports training, training means, Physical exercises, classification of physical exercises, Physical – technical – tactical – psychological preparations

UNIT-II: Sports Performance and Skill Teaching-Learning Process

Sports performance: Definition of Sports performance, Performance capacity and training structure, model of sports performance. Skill teaching and learning process: definition of techniques, skill and style, types of skills, Teaching of motor skills, skill learning stages, methods of teaching skills, Methods of corrections, feedback, importance and types of feedback.

UNIT-III: Planning, Training load and Recovery

Planning: Definition, importance, types of plan, principles of planning, planning of competitions, training sessions, one day plan, micro cycle and meso cycle. Training load: definition and types of training load, factors of load, classification of training load, load and adaptation, adaptation models, judgement of load, over training, causes and remedy of over training, Recovery: Definition factors affecting recovery, means of recovery, and selection of recovery means

UNIT-IV: Periodisation and Principle of Sports Training

Periodisation: Definition, importance, macro cycles and annual plan, Periods, types, aim and contents of different periods, steps in formulation of annual plan. Principle of sports training: Principle of over load, progression, specificity, reversibility, individualization, variation, diminishing return, regulation and its application in training

UNIT-V: Motor Abilities, Control and Regulation of Training Process

Motor Abilities: Strength, Speed, Endurance, Flexibility - Definition, types and factors determining Motor abilities, Programme designing and methods for the development of Motor abilities. Effect of climate changes and high altitude on performance – Control and regulation of training process. Importance, types of control and different motor test for monitoring of training process

References:

- Bill Foren, (2001). *High Performance Sports Conditioning*. USA: Human Kinetics Publishers.
Jensen, C.R. & Fisher A.G. (2000). *Scientific Basic of Athletic Conditioning*. Philadelphia.
Thomas R. Baechle, & Roger W. Earle, (2000). *Essentials of Strength Training and Conditioning* (2nd Ed.). USA: Human Kinetics Publishers.
Cart, E. Klafs & Daniel, D. Arnheim, (1999). *Modern Principles of Athletic Training*, St. Louis: C. V. Mosby Company
Tudor O. Bompa, (1999). *Periodisation*. USA: Human Kinetics Publishers.
Ronald, P. Pfeiffer., (1998). *Concepts of Athletics Training* (2nd Ed.). London: Jones and Bartlett Publications
Bunn, J.N., (1998). *Scientific Principles of Coaching*, New Jersey Engle Wood Cliffs, Prentice Hall Inc.
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MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



HUMAN PERFORMANCE ASSESSMENT AND EVALUATION

Objectives:

1. To study an overview of measurement and evaluation
2. To understand and conduct grading and fitness tests
3. To conduct performance fitness Tests
4. To conduct skill Tests
5. To measure the dependent and independent variables in research.

UNIT-I: Construction of Tests

Nature of Measurement and Evaluation-Domains of Human Performance. Purpose of Measurement, Testing and Evaluation. Classification of Tests. Criteria for selection and construction of tests-Reliability, Validity and Objectivity. Qualitative versus Quantitative Measurement.

UNIT-II: Grading and Fitness Test

Grading– Norm-referenced and Criterion-referenced grading systems. Process of Grading, Consistency in Grading, Grading Mechanics - Fitness test for Senior Citizen. Fitness test for Adapted Children. Fitness test for Children

UNIT-III: Performance Fitness Tests

Body Composition Assessment. Health Related Physical fitness Assessment Performance Related Physical fitness Assessment. Postural and Body Alignment Tests Anthropometrical Measures

UNIT-IV: Skill Test in various Games

Basketball, Volleyball, Hockey, Football, and Kho-Kho. Racket Games – Tennis, Table Tennis, Badminton.

UNIT-V: Measures of Variables

Psychological variables - Physiological Variables Haematological and Bio-chemical Variables. Psychomotor Variables - Psychosomatic and Socio-economic Variables

REFERENCES

- Barrow, Harold M & McGee, Rosemary. *A Practical Approach to Measurement in Physical Education*, Philadelphia: Lea and Febiger. 1979.
- Safrit, Margaret J. *Introduction to Measurement in Physical Education and Exercise Science*, St. Louis: Mosby. 1995.
- Edmund O. Acevedo and Michael A. Starks., *Exercise Testing and Prescription lab Manual*, USA: Human Kinetics Publishers, 2003.
- Roberta E.Rikli&C.Jessie Jones. (2001). *Senior Fitness Test Manual*, USA: Human Kinetics Publishers, 2001.
- Michael Horvat, Martin E.Block& Luke E.Kelly. (2007). *Development and Adapted Physical Activity Assessment*, USA: Human Kinetics Publishers, 2007.
- Gregory J.Welk. *Physical Activity Assessments for Health Related Research*, USA: Human Kinetics Publishers, 2002.
- Vivian H.Heyward& Dale R.Wagner. *Applied Body Composition Assessment*, USA: Human Kinetics Publishers, 2004.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



SPORTS PHYSIOLOGY AND KINESIOLOGY

Objectives:

1. To guide training and enhance sport performance.
2. Produce pioneering research applied to coaching.
3. To discover their underlying principles, Safety, effectiveness, and efficiency.
4. Understand the importance of thermoregulation during exercise.
5. Rehabilitation of musculoskeletal, cardiac and neurological conditions.

UNIT–I: Skeletal Muscles and Exercise

Macro & Micro Structure of the Skeletal Muscle, Chemical Composition, Types of Muscle fiber, Muscle Tone. Nerve supply to muscle, concept of neuromuscular transmission. Sliding Filament theory of Muscle Contraction, Chemistry of Muscular Contraction –Heat Production in the Muscle. Effect of exercises and training on the muscular system.

UNIT–II: Cardiovascular System and Exercise

Conduction System of the Heart- Blood Supply to the Heart- Stroke Volume- Cardiac Output. Blood Flow at rest and during exercise – hemodynamic principle. Heart Rate-Factors Affecting Heart Rate- Regulation of Heart rate, Cardiac Hypertrophy. Effect of exercises and training on the Cardio vascular system. Cardiac diseases and therapeutic exercises.

UNIT–III: Respiratory System and Exercise

Mechanism of Breathing –Respiratory Muscles, Pulmonary- Ventilation at Rest and During Exercise. Exchange of Gases in the Lungs –Exchange of Gases in the Tissues- Control of Ventilation- Oxygen Debt/ EPOC. Vo₂ max: concept, determination and its implication in sports performance. Effect of exercises and training on the respiratory system.

UNIT–IV: Metabolism and Energy Transfer

Metabolism- ATP-PC or Phosphagen System-Lactic Acid System –Anaerobic Metabolism- Aerobic Metabolism. Aerobic and Anaerobic Systems during Rest and Exercise. Energy supply at Short Duration High Intensity Exercises –High Intensity Exercise Lasting Several Minutes- Long Duration Exercises. Measurement of energy cost of an activity.

UNIT–V: Climatic conditions and sports performance Ergogenic Aid

Variation in Temperature and Humidity- Thermoregulation. Sports performance in hot climate, Cool Climate, high altitude. Ergogenic Aid - Androstenedione, Beta Blocker, Choline, Creatine, Human growth hormone on sports performance. Doping agents: Narcotics, Stimulants, Amphetamines, Caffeine, Ephedrine, Sympathomimetic amines. Stimulants and sports performance.

REFERENCES:

- Amrit Kumar, R, Moses. (1995). *Introduction to Exercise Physiology*. Madras: Poompugar Pathipagam.
- David, L Costill. (2004). *Physiology of Sports and Exercise*. Human Kinetics.
- Fox, E.L., and Mathews, D.K. (1981). *The Physiological Basis of Physical Education and Athletics*. Philadelphia: Sanders College Publishing.
- Richard, W. Bowers. (1992). *Sports Physiology*. WMC: Brown Publishers.
- William, D. McAradle. (2015). *Exercise Physiology, Energy, Nutrition and Human Performance*. Philadelphia: Lippincott Williams and Wilkins Company.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)
SPORTS PSYCHOLOGY AND SOCIOLOGY



Objectives:

1. To realize impact of perception and personality on sports performance
2. To value of arousal regulation and motivation
3. To apply psychological skill training for sports performance
4. To study of children behaviour and adherence in sports
5. To understand the social issues in sports

UNIT-I: PERCEPTION AND PERSONALITY

Sports psychology: Definition – Importance. Perception: Theories of Perception – Perception and Motor Learning – Wrong Perception - Personality: Meaning of personality, Measures of personality, Personality and Sports Performance. Need of Sports Psychology in Physical Education and Sports

UNIT-II: AROUSAL AND MOTIVATION

Arousal: Definition and Regulation- Types and Theories of Aggression – Anxiety – Stress. Motivation: Types of motivation – Achievement motivation and Sports performance. Counselling in sports: Importance, Methods & Techniques of Effective sports counselling.

UNIT-III: PSYCHOLOGICAL SKILL TRAINING AND CONCENTRATION

Psychological Skill Training: Hypnosis - Autogenic training - Progressive Relaxation. Sports Imagery- Self confidence: Building self-confidence. Concentration: connecting concentration to optimal performance – improving concentration.

UNIT-IV: EXERCISE BEHAVIOUR AND ADHERENCE

Exercise Behaviour and Adherence: reason to exercise and for not exercising, Problem of exercise adherence. Children and Sports Psychology: children's reasons for participation and nonparticipation, Parent, Coach and friends role in sports participation.

UNIT-V: SPORTS SOCIOLOGY

Sports Sociology: Group interaction -Competition and Cooperation in sports, Leadership: Types and Style, Audience: Types and effects of audience in sports competitions, National and International integration through sports

REFERENCES:

Robert S. Weinberg. Daniel Gould. *Foundation of Sport and Exercise Psychology (6th Ed.)*. Human Kinetics, 2015.

Daniel Smith, Michael Bar-Eli. *Essential Readings in Sport and Exercise Psychology*. Human Kinetics, 2007 .

Janet Buckworth, Rod K. Dishman. *Exercise Psychology*, Human Kinetics, 2002.

Nick Ford and David Brown, *Surfing and Social Theory*, Routledge Taylor and Francis Group, 2006.

Diane L. Gill. *Psychological Dynamics of Sport*. New York: Human Kinetics Publishers Inc. 1986.

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MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



SPORTS MANAGEMENT AND MARKETING

Objectives:

1. To management function and marketing techniques
2. To identify issues relevant to modern physical education and sport management
3. To construct and laying the play field facilities
4. To Identify and analyze ethical, legal, and socio-cultural issues, and formulate responses for use in managerial decision making and policy determinations in sport
5. To understand principles of planning, and financial and human resource management

Unit-I: Management and Functions

Meaning of Management - Definition and importance of Sports management - Concept and principles of Management - Functions of Management - Personal Management, objectives and personal policies - Skills of Management, Roles of Manager

Unit-II: Sports Organisation

Attributers of Organization - Classifying Organizations - Organisation and functions of sports bodies
Supervision: Qualities of Supervisor - Supervisory Techniques

Unit-III: Physical Education Administration

Maintenance of Records and Registers - Preparation of Budgeting, Generate and utilization of Games Fund - Qualification and Quality of Administrator - Management guidelines for School, College sports programmes - Programme management and factors influencing programme development. Community based physical education and sports programmes

Unit-IV: Facility and Equipment Management

Indoor-Outdoor Sports Facilities - Equipment Management, purchase, care of supplies equipment. Guidelines for selection of equipment and supplies - Guidelines for checking, storing, issuing, caring and maintenance of supplies and equipment - Laying of Play Fields - Tournament Types

Unit-V: Sports Administration and Marketing

Organization of Sports Events - Management of infrastructure, equipment, finance and personnel - Writing of Circulars, Notifications and Invitations - Publicity and Fund Raising - Report preparation of sports event - Selecting and Fixing of Officials - Writing Reports, Monitoring and Writing Up – Press - Sponsoring Teams and public relationship in sports - Principles of public relation and the media- Audit management of sports events - Factors in Sports Marketing - Sports Sponsorship - SWOT Analysis

References

- Chelladurai .P. *Managing organizations for Sports and Physical Activity*, Holcomb Hathaway Publishers: Arizona, 2001.
- David C. Watt, *Sports Management and Administration*, Routledge Taylor & Francis Group, 2004.
- Lisa Pike Masteralexis, Carol A. Barr and Mary A. Hums, *Principles and Practice of Sports Management*, Jone and Bartlett Publishers, 2005.
- Philip Kotler, *Marketing Management*, Pearson Education. Inc, 2003.
- Hoye, R. (2012). *Sport management*, Milton Park, Abingdon, Oxon: Routledge. ISBN-13: 9781856178198, ISBN-10: 1856178196
- Bowers, M. (2015). *Sport management*, Champaign: Sagamore Publishing. ISBN10: 1571677267. ISBN-13: 978-1571677266
- Krotee, M., & Bucher, C. (2007). *Management of physical education and sport*, Boston: McGraw-Hill. ISBN-10: 0072972920. ISBN-13: 978-0072972924



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012

DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



INFORMATION AND COMMUNICATION TECHNOLOGY IN SPORTS

Objectives:

1. To understand all the fundamental of computers and its uses.
2. To develop communication knowledge using Multimedia.
3. To Apply MS Office application in the field of physical Education.
4. To provide an opportunity in approach to Integrating ICT in Teaching Learning Process.
5. To acquire multimedia Technology and its application in sport.

UNIT-I: Fundamentals of Computers

Characteristics, Types, Functions, Advantages & Applications of Computers. Hardware of Computer: Input, Output & Storage Devices. Software of Computer: Concept & Types application in Physical Education and Sport. Concepts, Types & Functions of Computer Networks, Internet and its applications, Web Browsers & Search Engines, Legal & Ethical Issues.

UNIT-II: Communication & Classroom Interaction

Concept, Elements, Process & Types of Communication, Communication Barriers & Facilitators of Communication and cloud computing. Communicative Skills in English - Listening, Speaking, Reading & Writing.

UNIT-III: MS Office Applications

Word: Main Features & their uses in Physical Education. Excel: Main Features & their applications in Physical Education. Access: Creating a Database, Creating a Table, Queries, Forms & Reports on Tables and its Uses in Physical Education. Power Point: Preparation of Slides with Multimedia Effects, MS Publisher: Newsletter & Brochure.

UNIT-IV: ICT Integration in Teaching Learning Process

Concept & Importance of ICT, Need of ICT in Education, Scope of ICT: Teaching - Learning Process, Publication, Evaluation, Research and Administration. Challenges in Integrating ICT in Physical Education. Approaches to Integrating ICT in Teaching Learning Process.

UNIT-V: Multimedia Technology Application

Project Based Learning (PBL), Co- Operative Learning, Collaborative Learning. ICT and Constructivism: A Pedagogical Dimension. E-Learning, Web Based Learning, Visual Classroom.

REFERENCES:

- B. Ram, New Age International Publication, *Computer Fundamental*, Third Edition-2000
Brain under IDG Book. India (p) Ltd Teach Yourself Office 2000, Fourth Edition- 2001
Douglas E. Comer, *The Internet Book*, Purdue University, West Lafayette in 2005
Heidi Steel Low price Edition, *Microsoft Office Word 2003- 2004*
ITL Education Solution Ltd. *Introduction to information Technology*, Research and Development Wing-2006
Pradeep K. Sinha & Priti. Sinha. *Foundations computing* , BPB Publications -2004.
Rebecca Bridges Altman Peach pit Press, *Power point for window* , 2002
Sanjay Saxena, Vikas Publication House, Pvt. Ltd. *Microsoft Office for everyone*, Second Edition.



SPORTS BIOMECHANICS AND ERGONOMICS

Objectives:

- To gain a better understanding of the cause-effect mechanisms of sports motions
- Understanding of knowledge of Ergonomics is to improve working conditions, work tools and work structuring in order for the optimum result to be achieved from the work and the person at work to suffer as few setbacks as possible.
- To explain the concept of mechanical laws involved in human motion.
- Apply and analyze the factors of mechanical laws involved in human movement
- Analyze the mechanical principles of motor skills and sports related skills along with their proper techniques and corrective measures

UNIT-I: Introduction of Sports Biomechanics and Ergonomics

History, meaning and definitions of Sports Biomechanics – brief history, meaning and definition of ergonomics and sports ergonomics – need and importance of biomechanics in physical education and sports – need and importance of sports ergonomics – organisation of ergonomics – Principles of ergonomics

UNIT-II: Kinematics and Kinetics

Definition of Kinematics and Kinetics – Static and dynamic – vector and scalar measurements – Law of kinetics – types of kinetics – types of kinematics – Types of motion - Newton's law of motion – Distance and Displacement – impulse and momentum – Torque, mass and weight – impact and elasticity - Application of kinetics and Kinematics in sports

UNIT-III: Forces and Lever

Force: Meaning, units of force, effects of force/Sources of Force, Components and Resultant, Friction, Pressure. Movement of Force, magnitude of forces, centrifugal and centripetal forces – Friction force – classes of Levers – center of gravity – center of mass – line of gravity – kinetic and potential energy - Work, Power and Energy

UNIT-IV: Fluid Mechanism and Projectile Motion

Freely falling bodies, Projectiles, Equilibrium principles, factors affecting Stability – fluid mechanism – Characteristics and nature of fluids - Buoyancy – dynamic fluid force – relative motion – specific weight – drag and lift forces - initiating rotation in the air, water resistance and air resistance – Laminar and turbulent flow – aerodynamics - principles and types of spin and Magnus effect

UNIT-V: Movement analysis and Ergonomics

Analysis of fundamental skills: Walking, Running, Jumping, Throwing, Lifting, Pulling, Pushing, Catching, and Climbing - Analysis of Sports Skills: Athletics, Gymnastics, Swimming, Football, Hockey, Basketball, Volleyball and Cricket – analysis of external forces and their effects on the body and its movements - Ergonomics in health and safety – Ergonomics in physical activity and its effect on health – Video analysis of biomechanics principles in sports

REFERENCES:

- Bartlett, R. (2007). Introduction to sports biomechanics. London: Routledge, Taylor & Francis Group. ISBN 9780415339933
- Blazevich, A. (2007). Sports biomechanics. London: A. & C. Black. ISBN 9780713678710
- Carr, Gerry, sports mechanics for coaches new York human kinetics, 2004.
- Hall, S. (2014) Basic biomechanics. Mcgraw Hill Higher Educat. ISBN 9780073522760
- McGinnis, P. (2013). Biomechanics of sport and exercise. Champaign, IL: Human Kinetics. ISBN 9780736079662
- Peter m. McGinnis, Biomechanics Of Sports And Exercises, USA, Human Kinatics, 1999.
- Williams M (1982) Biomechanics of Human Motion, Philadelphia, Saunders Co.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



SPORTS MEDICINE AND REHABILITATION

Objectives:

1. To understand the sports injuries
2. To understand and application of therapeutic modalities
3. To develop rehabilitation programme for sports injuries.
4. To develop rehabilitation programme for lower body sports injuries.
5. To apply massage and First aid techniques in sports arena.

UNIT-I: ATHLETIC INJURIES AND PREVENTION

Sports Medicine: Definition and Importance. Common types of Athletic injuries: Skin Injuries - Soft Tissue injuries – Thermal injuries – Bone Injuries - General Principles of Injury Prevention. RICE – PRICE procedure for minor injuries.

UNIT-II: THERAPEUTIC MODALITIES

Therapeutic Exercise - Therapeutic Modalities: Cold Modalities: Ice Packs, Ice Immersion, Ice massage, Cryostretch - Heat Modalities: Moist Hot Packs, Paraffin Baths - Electrical Modalities: Ultrasound, Shortwave Diathermy, Microwave Diathermy:

UNIT-III: ATHLETIC REHABILITATION

Sports Rehabilitation - Shoulder girdle injuries and Rehabilitation: Clavicle Fracture - Acromioclavicular joint sprain - Shoulder joint Dislocations - Tennis elbow- Head and Spine Injuries.

UNIT-IV: LOWER BODY INJURIES AND REHABILITATION

Leg-ankle injuries causes and Rehabilitation: shin pain, Achilles tendonitis, Ankle sprains. Knee injuries: Knee dislocation, Thigh injuries: Quadriceps contusion, Hamstring strain

UNIT-V: FIRST AID AND MASSAGE

Massage - Types of Manipulation Techniques - First Aid: Definition – Importance. Primary Survey (Airway, Breathing, circulation) Rescue breathing – CPR. First aid for Strain – Sprain – Drowning – Haemorrhage – Electrical shock - Food poison.

References:

- Larry J. Durstine and Geoffrey E. Moore, *Exercise Management for Person with Chronic Diseases and Disabilities* (2nd Ed.), USA: Human Kinetics, 2003.
- David R. Mottran, *Drugs in Sport* (5th Ed.), Routledge Taylor and Francis Group, 2011.
- C.S. Jeyaprakash, *Sports Medicine*, J.P. Brothers, New Delhi, 2003.
- Melinda J. Flegel, *Sports First Aid* (5 th Ed.), USA: Human Kinetics, 2014.
- William C. Whiting and Ronald F. Zernicke, *Biomechanics of Musculoskeletal Injury*, USA: Human Kinetics, 1998.
- Bengt O. Eriksson et al., *Sports Medicine*, Guinness Publications, 1990.



ADAPTED PHYSICAL EDUCATION

Objectives:

1. To understand the sports injuries
2. To understand and application of therapeutic modalities
3. To develop rehabilitation programme for sports injuries.
4. To develop rehabilitation programme for lower body sports injuries.
5. To apply massage and First aid techniques in sports arena.

UNIT-I: Introduction to Adapted Physical Education

Adapted Physical Education: Definition – History –Need and Importance. Adapted sports: Purpose – aims – Goals . Principles, Practices and Creativity physical activities/programmes in special children.

UNIT-II: Identification and causes of specific diseases

Attention deficit hyperactivity disorder : Meaning, Symptoms, Causes and Treatment. Meaning of Autism and its Signs Symptoms & Causes. Emotional disturbance: Characteristics, Causes and Treatment. Specific learning disabilities: Common types of learning disabilities their causes, treatment and intervention. Amputations & its types and dwarfism: types, causes, diagnosis and treatment

UNIT-III: Class organization

Class organization strategies: identifying the cause, embrace special needs, setting high expectations and goals. Managing individual programmes: specially designed instructions, programme modifications, classroom accommodations, supplementary aids and services, transportation. Monitoring students performances: Purpose and Implementation Organizing the instructional environment.

UNIT-IV: Paralympics Sports

History of Paralympics. Paralympics events: list of IPC summer and winter sports. Rules and regulations. Eligibility criteria: medical classification & functional classification.

UNIT-V: Organization & Administration

Types and Needs. Kinds of Programme, Importance of Physical education. Talent identification programme for special needs children. Factors of Communication with Parents and Public.

REFERENCES

- Alexander, M. & Schwager, S. (2012) Meeting the physical education needs of children with autism spectrum disorder. Champaign, IL: Human Kinetics
- Bielenberg, K. (2008) All active 35 inclusive physical activities. Champaign, IL: Human Kinetics,
- Block, M. (2007) A teacher's guide to including students with disabilities in general physical education. 3rded. Baltimore, MD: Brookes Publishing Co.
- Canales, L & Lytle, R. (2011) Physical activities for young people with severe disabilities. Champaign, IL: Human Kinetics.
- Davis, R. (2002) Inclusion through sports: A Guide to enhancing sport experiences. Champaign, IL: Human Kinetics.
- Davis, E. A. (2012) Physical activities in the wheelchair and out: An illustrated guide to personalizing participation. Champaign, IL: Human Kinetics



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI | - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



PRINCIPLES OF MOTOR DEVELOPMENT

Objectives:

1. To understand the motor components.
2. To understand the growth and development.
3. To analyse and apply the knowledge of motor skills to identify the movements.
4. To study the neurophysiological basis of movement.
5. To study the genetics and motor skills along with motor skill assessment.

UNIT-I: Introduction to Motor Development

Definition-Motor Development, Motor Learning, Motor Control, Physical growth, Maturation and Aging- Newell's Model of Motor Development-Theoretical perspectives in Motor Development - Principles of Motion and Stability - Classification of Motor Activities.

UNIT-II: Growth and Development

Prenatal and Postnatal Development-Development of the cardio respiratory system, Skeletal System, Muscular System, Adipose System, Endocrine System and Nervous System-Growth in Stature and Body Weight- Chronological age and age groups.

UNIT-III: Motor Skills

Movements of Infant - Motor Milestones-Development of human Locomotion: Creeping, Crawling, Walking and Running-Development of Ballistic Skills: Throwing, Kicking, Punting and Striking-Development of Manipulative Skills: Grasping, Reaching, catching and anticipation.

UNIT-IV: Neurological Basis of Movement

Motor Units and Electromyography – Motor Synergies – Motor Disorders - Sensory-Perceptual Development: Visual, Kinesthetic, Auditory and Intermodal perception- Development of Postural control and Balance.

UNIT-V: Genetics and Growth

Genetic Regulation of Growth: The Human Genome and Gene, Types of hormone and their actions- Physical Activity as a factor in Growth, maturation and Performance - Motor Skill Assessment (BOT-2 & Bayley Motor Skill Test).

REFERENCES

- Allen W. Burton., & Daryl E. Miller. (1998). *Movement Skill Assessment*. USA: Human Kinetics.
- Kathleen M. Haywood., & Nancy Getchell. (2014). *Life Span motor Development (6th Ed.,)*. USA: Human Kinetics,
- Robert M. Malina., Claude Bouchard., & Oded Bar-Or. (2004). *Growth, Maturity and Physical Activity (2nd Ed.,)*. USA: Human Kinetics.
- Claude, Bouchard., Steven N. Blair., & William L. Haskell. (2007). *Physical Activity and Health*. USA: Human Kinetics.
- Cratty Bryant, J. (1975). *Movement Behaviour and Motor Learning*. Philadelphia Lea & Febiger.
- Mark L. Latash. (2008). *Neurophysiological Basis of Movement (2nd Ed.,)*. USA: Human Kinetics.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



PRINCIPLE OF YOGIC SCIENCE

Objectives:

1. To well known about Yoga foundation and its principles
2. To understand the principles and concept of yoga sutra
3. To understand and apply yogic practices for research activities
4. To integrate yoga for enhancement of sports performance
5. To apply yogic sciences to human systems for conducting research activities

UNIT I: Foundation of Yoga

Origin of Yoga – History (epic and modern) and Development of Yoga - Meaning and Definition of Yoga - Aim and Objectives of Yoga - Nature and Principles of Yoga – Concept of Yoga - International Day of Yoga – Yogic principles of healthy living – Yoga for health and wellbeing – Elements of yoga

UNIT II: Principles and Concept of Yoga Sutra

Ashtanga Yoga: Concept of Yama, Niyama, Asana, Pranayama, Pratyahara, Dharana, Dhyana and Samadhi and their usefulness - Yogic concept of diet and its relevance in the management of lifestyle - Types and nature of Samadhi - Four types of Karmas – Patanjali's eight limbs of yoga sutra principles

UNIT III: Yogic Practices and its Applications

Benefits and Practicing Asana: Asnas Standing Postures - Prone postures - Supine postures - Balancing postures - Yoga asana and its values; **Pranayama:** Types, benefits and methods - Nadis: Meaning, methods and benefits; - Breath awareness - Sectional breathing - Nadishuddhi, Bhastrika, Ujjai, Cooling pranayama (Sitali, Sitkari and Sadanta), Bhramari, Pranayama (with Antar & Bahya Kumbhaka); **Meditation:** Pranav and Soham Japa - Yoga Nidra (1,2,3), Antarmauna, Ajapa Dharana (Stage 1,2,3) - Breath Meditation and Om Meditation; **Kriya:** Concept of Kriya Yoga of Patanjali - Dhauti (Kunjali), Vastra dhauti, Danda dhauti, Laghoo and Poorna sankhaprakshalana - Neti (Sutra and Jala) – Kapalbhati - Agnisara - Nauli **Bandhas and Mudras:** Jivha Bandha, Jalandhara Bandha, Uddiyana Bandha, Mula Bandha, Maha Bandha, Yoga Mudra, Maha Mudra, Shanmukhi Mudra, Tadagi Mudra, Vipareet Karni Mudra **Chakras:** Major Chakaras - Benefits of clearing and balancing Chakras; **Surya namaskar**

UNIT IV: Applications of Yoga

Yoga in education – Yoga for stress management – Yoga for personality development - Integrated approach of Yoga Therapy in the treatment of diseases - Yoga Supplemental Exercises - Yoga Compensation Exercises - Yoga Regeneration Exercises - Power Yoga - Role of Yoga in Psychological Preparation of athletes: Mental Wellbeing, Anxiety, Depression, Concentration and Self-Actualization – management of diseases through yogic practices

Unit V: Yoga Science and Human Systems

Effect of Yoga on Physiological System: circulatory, musculo-skeletal, digestive, nervous, excretory; effect of yoga on cardiovascular and respiratory systems; Yoga impact on immune and reproductive systems – yoga and its impact on allied sciences: Behavioral psychology, personality, cognitive psychology and mental wellbeing - Effects of Kundalini Shakti and Shatchakra Sadhana

REFERENCES:

Authors Guide (2015), International Day of Yoga, Common Yoga Protocol, New Delhi: Ministry of AYUSH, Government of India.

George Feuerstein. (1975).Text Book of Yoga. London: MotilalBansaridass Publishers (P) Ltd.,

Gore.(1990). Anatomy and Physiology of Yogac Practices.Lonavala: KanchanPrkashan.

Helen Purperhart (2004) The Yoga Adventure for Children. Netherlands: AHunter House Book.



MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI I - 627 012
DEPARTMENT OF PHYSICAL EDUCATION
Ph.D. Physical Education – Course work Syllabus
(with effect from the academic year 2018-19 onwards)



- Iyengar, B. K. S. (2000). Light on Yoga. New Delhi: Harper Collins Publishers.
- Kuvalyananda Swami & S.L. Vinekar.(1963). Yogic Therapy – Basic Principles and Methods. New Delhi: Govt of India, Central Health Education and Bureau.
- Kenghe.C.T. (1976). Yoga as Depth-Psychology and para-Psychology (Vol-I): Historical Background, Varanasi: BharataManishai.
- Moorthy .A.M &Alagesan.S. (2004).Yoga Therapy. Coimbatore: Teachers Publication House.
- Swami SatyanandaSaraswathi. (1984). Kundalini and Tantra. Bihar: Yoga Publications Trust.
- Swami Kuvalayananda. (1998). Asanas.Lonavla: Kaivalyadhama.
- Swami Satyananda Sarasvati. (1989). Asana Pranayama Mudra Bandha.Munger: Bihar School of Yoga, Swami Sivananda. (1971). The Science of Pranayama. Chennai: A Divine Life Society Publication,
- Tiwari. O .P. (1998). Asanas-Why and How. Lonavla: Kaivalyadhama.
- Thirumalai Kumar. S and Indira .S(2011) Yoga in Your Life, Chennai: The Parkar Publication.
- Khalsa, M., & Bhajan,. (2008). Meditations for addictive behavior. Minneapolis, MN: I Was There Press.ISBN-10: 0979919215. ISBN-13: 978-0979919213
- Lysebeth, A. (1979). Pranayama, the yoga of breathing. London: Unwin Paperbacks.ISBN10: 0041490509. ISBN-13: 978-0041490503
- PanVdVaW, N. (2003). Meditation. New Delhi: D.K. Printworld.ISBN-10: 8124602115 ISBN13: 978-8124602119
- Ramacharaka,. (2009). The science of breath. Waiheke Island: Floating Press.ISBN10: 1508983704. ISBN-13: 978-1508983705
- Desikachar, T. (1999). The heart of yoga. Rochester, Vt.: Inner Traditions International.ISBN13: 978-0892817641. ISBN-10: 089281764X
- Iyengar, B. (1979). Light on yoga. New York: Schocken Books.ISBN-10: 0805210318. ISBN13: 978-0805210316
- Kaminoff, L., & Matthews, A. (2012). Yoga anatomy. Champaign, IL: Human Kinetics.ISBN10: 1450400248. ISBN-13: 978-1450400244



GAME OF SPECIALIZATION

Objectives:

1. To define and acquaint training preparation of Game/Sport
2. To employ the rules and regulation of Game/Sport
3. To emphasis on preparation for the Game/Sport.
4. To acquaint the student with progressive teaching stages of fundamentals skills of Game/Sport.
5. To orient & employ the rules and regulation in organization of competition in Game/Sport.

Unit – I: Introduction (Growth and Development)

Origin and development, Layout and marking of play filed/ground/courts and measurement of equipments used in Game/Sport.

UNIT–II: Techniques/Skills Development

Classification of techniques/skills. Training for mastery in technique/skill. Tactics and Strategy of Offensive and defence. Various playing position- System of play. Offensive and defensive system of play. Fitness – General – Specific training programme, Drills, Recreational and lead up games.

UNIT–III: Training (Means and Methods)

Training methods and means for the development of motor abilities, Basic Concept of preparation of training schedules, Tactical training in game/sport. Psychological preparation required during competition in game/sport. Periodization in training of players in game/sport. General/specific fitness tests and performance/skill test in game/sport.

UNIT–IV: Test Measurement and Evaluation

Importance of test, Measurement and Evaluation of game Performance. Fitness and Skill tests, Subjective and Objective Knowledge tests, Periodical assessment of performance. Analysis of team performance.

UNIT–V: Awards and Tournaments

Organization set up – Federation – International, National, State, District Sports federations & its affiliated units – Tournaments – World Championship, Olympics games, Commonwealth games, Asian Games and other International and Domestic tournaments. Awards and Honours.

REFERENCES:

- Thomas Hanlon., (2010) The Sports Rules book (5th Edition) Human Kinetics, Champaign, IL, United States
- R.G. Goel., Gaurav Goel., (2003) Encyclopedia of Sports and games. (Twelfth edt.,) Vikas Publishers., New Delhi.
- Sunil.kumar., Sharma.O.P., (2013) Encyclopedia of Sports and games. Khel Sahitya Kender., ISBN: 9788175247246, 817524724X
- The Diagram Group., (1994) Rules of the game: The complete illustrated encyclopedia of all the sports of the world, Turtleback Books

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Ph.D Psychology 2020-21 onwards

Sl.No.	Course Work Papers	Credit
1.	Research Methodology and Applied Statistics	4
2.	Guidance and Counselling Psychology	4
3.	Behaviour Modification	4
4.	Cognitive Psychology	4
5.	Psychotherapeutics	4
6.	Psychometry	4
7.	Managing emotions in times of uncertainty and stress (MOOC)	4
8.	Writing in the Sciences (MOOC)	4
9.	Mini Project	4

RESEARCH METHODOLOGY AND APPLIED STATISTICS

4 Credits

L	T	P	C
4	1	0	4

Preamble: Research is undertaken within most professions. It is a way of thinking – examining critically the various aspects of day-to-day professional work; understanding and formulating guiding principles that govern a particular procedure; and developing and testing new theories that contribute to the advancement of your practice and profession.

UNIT I: INTRODUCTION (10 Hours)

Meaning – Basic Concepts - Objectives of science – Need for research – Research approaches – Steps in research. Methods Vs Methodology - General Principles – Ethical issues: Children, Adults, Animals. Research problem – Sources – Criteria of good problem. Reviewing the literature – Research article.

UNIT II: RESEARCH PROBLEM, HYPOTHESIS, VARIABLES & SAMPLING (12 Hours)

Definition, Types and sources of Research Problem – Steps in identifying a Research Problem – Hypothesis: Meaning – Types – Criteria for a good hypothesis – Testing of hypothesis – Levels of Confidence - Constructs & Variables – Meaning - Constitutive and operational definitions – types; Sampling – Meaning – Probability and Non-probability sampling – Sample & effect size. Data collection methods: Observational research – Survey research.

UNIT III: RESEARCH DESIGN (14 Hours)

Definition - Principles and functions - Experimental design: Independent groups designs – Completely randomized groups designs, randomized factorial groups design. Dependent groups designs: Within-participants design, matched groups design – Mixed Designs – Single-participant design – Baseline designs.

Non-experimental designs: Quasi-experiments – Time-series design, nonequivalent groups designs, longitudinal research, Cross-sectional research, Case-studies, Correlational research.

UNIT IV: STATISTICS (14 Hours)

Organizing data: Frequency distribution – Graphs – Descriptive statistics: Measures of central tendency – Measures of variation – Types of distributions. Inferential statistics: z test – t test – Analysis of Variance – Correlation– Concepts related to correlation – Correlation coefficient – Regression.

Non-parametric statistics: Mann-Whitney test – Wilcoxon Chi-square – Spearman Rank correlation – Kruskal-Wallis test. Analysis of data using SPSS

UNIT V: REPORT WRITING (10 Hours)

General purpose of writing a report, structure and format of a report (APA), Style of writing, Typing, Evaluating a report and Preparing a research proposal - Typing guidelines

– Oral and Poster presentation - Precaution for writing research report – Tutorial only:
Computers in research – Internet and research

TEXT BOOKS

1. Howitt, D. and Crammer, D. (2005). *Introduction to Research Methods in Psychology*, Pearson Education.
2. Nachmias, D., & Nachmias, C. (2014). *Research Methods in the Social Sciences*, 8th Ed. St. Martin's Press New York
3. Evans, A. N., & Rooney, B. J. (2008). *Methods in Psychological Research*. New Delhi: Sage Publications India Pvt. Ltd.
4. Jackson, S. L. (2010). *Research Methods and Statistics*. New Delhi: Cengage Learning India Pvt. Ltd.

REFERENCE BOOKS

1. Ranjit Kumar (2006). *Research methodology: A step-by-step guide for beginners*. 3rd ed. Sage Publications, New Delhi.
2. Coolican, H. (2009). *Research Methods in Statistics in Psychology*. New Delhi: Rawat Publications. M.Sc Applied Psychology, 2014-15 9
3. Gravetter, F.J., & Forzana, L.A.B. (2009). *Research methods for behavioral sciences*. United States: Wordsworth Cengage learning
4. Kerlinger, N. (1996). *Foundations of Behavioural research*. India: Prentice Hall
5. Kothari, C.R. (2008). *Research Methodology – Methods and Techniques*. New Delhi: Wiley Eastern Ltd.
6. Research Methodology, Bhattacharya, D. K. (2003), New Delhi: Excel Books.
7. McGuigan, F. J. (1997). *Experimental psychology: methods of research*. 7th ed. Prentice Hall.

GUIDANCE AND COUNSELLING PSYCHOLOGY

4 Credits

L	T	P	C
4	1	0	4

Preamble: The basic objective of this course is to provide a clear but concise account of the different aspects of counseling psychology. Counselling, as a helping profession, desires to bring about changes in knowledge, attitudes and behavior of individuals employing different approaches.

UNIT I: BASIC CONCEPTS (10 Hours)

Definition, process and goals - Guidance & Counselling - Advice & Counselling - Education & Counselling - Direction & Counselling - Instruction & Counselling - Need for Counselling - Emergence and Growth of Guidance and Counselling - Status of Guidance and Counselling Movement in India.

UNIT II: COUNSELLING APPROACHES AND PRACTICES (12 Hours)

Directive or authoritarian approach - Relevance of Psychoanalysis - Non-directive approach: Humanistic-Existential approach - Roger's self theory - Behavioristic approach: Reciprocal inhibition, Behaviour modification - Eclectic approaches.

UNIT III: COUNSELLING PROCESSES (14 Hours)

Preparation for counselling - counselling relationship - content and process of counselling, counselling interactions, counsellor-counselee relationship, factors affecting counselling process - Effective counsellor's skills: characteristics & attitudes; Counselling Interview - Nature and significant features, setting and types of counselling interview, appropriate use of communication and interviewing techniques, degree of lead, silence, relationship techniques, sharing of experiences, resistance.

UNIT IV: COUNSELLING ISSUES (12 Hours)

Professional preparation and training for Counselling: counselling preparation and professional issues, academic preparation, practical skills, selection and training of counsellors, preparation of counsellors; Ethics in Counselling: Codes of professional Ethics, Common Ethical Violations by Mental Health Professionals.

UNIT V: PSYCHOLOGICAL TESTING AND DIAGNOSIS (10 Hours)

Tools & Techniques used in counselling and guidance: Testing & non testing devices, Tools used in assisting individuals towards self discovery; test interpretation in counselling, Issues of Diagnosis in counselling - Limitations.

TEXT BOOKS

1. Gibson, R. L., & Mitchell, M. H. (2015). *Introduction to Counseling and Guidance*. 7th Ed. Pearson Education India.
2. Nelson-Jones, R. (2011). *Theory and Practice of Counselling & Therapy*. 5th Ed. Sage Publications, New Delhi.
3. Rao, S. N. (1992). *Counselling and Guidance*. 2nd Ed., Tata McGraw-Hill

REFERENCES:

1. Brown, S.D & Lent, R.W. (2008). *Handbook of Counselling Psychology* (4th Ed.) New Jersey: John Wiley & Sons, Inc.
2. Feltham, C., & Horton, I. (2006). *The SAGE Handbook of Counselling and Psychotherapy* (3rd Ed.). Log Angeles: Sage Publications Pub. Co.,

BEHAVIOUR MODIFICATION

4 Credits

L	T	P	C
4	1	0	4

Preamble: The fundamental assumptions, principles, and procedures of behaviour modification are described and illustrated in the course, with applications to normal and abnormal human behaviour. This course is designed to help you to learn to talk about and apply behavior modification principles and techniques effectively.

UNIT I: FUNDAMENTALS OF BEHAVIOUR MODIFICATION (12 Hours)

Definition, characteristics, scope and goals of behavior modification; Learning, Biological & Cognitive Foundations; meaning of Behavioral Assessment, Behavior Analysis and Formulation: desirable and undesirable behaviour – overt and covert - Deficit & Excess – normal & deviant – Conceptual issues: reinforcements & punishments - antecedents and consequences

UNIT II: PROCEDURES TO ESTABLISH NEW BEHAVIOR (12 Hours)

Stimulus control: discrimination and generalization. Defining stimulus control, stimulus discrimination training, the three-term contingency. Generalization .
Shaping and its applications - How to use shaping, shaping of problem behaviors.
Prompting and fading techniques. Types of prompts. How to use prompting and transfer of stimulus control (for example in autism).
Chaining. Examples of behavioral chains, analyzing stimulus-response chains, task analysis, backward chaining, forward chaining, total task presentation. Chaining
Components of behavioral skills training procedures. Modeling, instructions, rehearsal, biofeedback.

UNIT III: PROCEDURES TO INCREASE DESIRABLE BEHAVIOR AND DECREASE UNDESIRABLE BEHAVIOR (12 Hours)

Differential reinforcement of alternative behavior, differential reinforcement of other behavior - Differential reinforcement of low rates of responding
Antecedent control procedures. Using antecedent control strategies.
Using punishment. Time out, response cost.

UNIT IV: OTHER BEHAVIOR CHANGE PROCEDURES (12 Hours)

Token economy, practical considerations, implementing a token economy, applications of token economy, advantages and disadvantages of a token economy.
Behavioral contract, components of a behavioral contract. Cognitive behavior change procedures – assertiveness training, thought stopping. Introduction to third wave therapies – Dialectical behavior therapy, metacognitive therapy.
Anxiety reduction procedures – Defining fear and anxiety problems, procedures to reduce fear and anxiety – relaxation, systematic desensitization, in vivo desensitization .
Anxiety induction procedures – implosive therapy flooding, Aversion therapy: aversive counter conditioning – use of electric shock, covert sensitization.

UNIT V: APPLICATIONS & ETHICAL ISSUES

(12 Hours)

Application of Behavioural Modification techniques in various setting - **Clinical Conditions**
– Depression, panic, OCD, GAD, and eating disorders.

TEXTBOOKS

1. Miltenberger, R. (2007). *Behaviour modification: Principles and procedures*. 4thEd. Cengage Learning.
2. Jena, S. P. K. (2008). *Behaviour Therapy: Techniques, Research and Applications*. Sage Publications, New Delhi.

REFERENCES

1. Sundel&Sundel. (1990). *Behavior change in the Human Services*, 4th Ed, Thousand Oaks: Sage Publications.
2. Fisher, W. W., Piazza, C. C., & Roane, H. S. (2011). *Handbook of applied behaviour analysis*. The Guilford Press, London.

COGNITIVE PSYCHOLOGY

4 Credits

L	T	P	C
4	1	0	4

Preamble: The basic objective of this course is to provide a clear but concise account of the different aspects of Cognition from the perspective of psychology.

UNIT 1 – Foundations of Cognitive Psychology (10 Hours)

Definition and Scope of Cognitive Psychology – History and Development of Cognitive Psychology – Approaches to Cognitive Psychology: Information Processing approach – Connectionist approach – New milestone in Cognitive Psychology: Computer Metaphors – Artificial Intelligence

UNIT 2 – ATTENTION, PERCEPTION AND CONSCIOUSNESS (14 Hours)

Definition, nature and characteristics of attention, perception and consciousness – Information processing – determinants of attention - selective attention and division of attention – theories of attention – filter theory, attenuation theory, late selection theory – theories of perception – bottom up and top down process – Gestalt approaches to perception – Disruptions of perception – subliminal perception – Consciousness of complex mental process.

UNIT 3 – MEMORY AND LANGUAGE (13 Hours)

Short term vs long term memory – types of long term memory – encoding, storage and retrieval – working memory – process of forgetting – memory distortions – reconstructive retrieval – eyewitness testimony – Language – properties of language- process of language comprehension- language and thought – language in social context.

UNIT 4 – PROBLEM SOLVING AND CREATIVITY (13Hours)

Problem solving: Meaning – Problem solving cycle – types of problems – Problem solving techniques – obstacles and aids in problem solving – knowledge and problem solving – creativity – definition – divergent thinking – steps in creative thinking – nature of creative people – blocks to creative thinking – Promoting Creativity.

UNIT 5 – REASONING AND DECISION MAKING (10 Hours)

Types of thinking – Reasoning: Meaning – categorical syllogisms – conditional syllogism – syllogistic reasoning – inductive reasoning – heuristics and biases and its types – Decision making: Meaning – types of decision making.

TEXTBOOKS

1. Kellogg, R.T. (2007). Fundamentals of Cognitive Psychology. New Delhi: Sage Publication.
2. Sternberg, R. J. (2009). Applied Cognitive Psychology. Perceiving, learning and remembering. New Delhi: Cengage Learning.

REFERENCES

3. Parkin, A. J. (2000). Essential Cognitive Psychology. London: Psychology Press.
4. Smith, E.E &Kosslyn, S.M. (2007). Cognitive Psychology. Mind and Brain. New Delhi: Prentice – Hall of India.
5. Riegler, B.R &Riegler, G. L. (2008). Cognitive Psychology. Applying the science of the mind. New Delhi: Pearson Education, INC.
6. Galotti, K.M. (2004). Cognitive Psychology. In and out of the laboratory. New Delhi: Wadsworth.

PSYCHOTHERAPEUTICS

4 Credits

L	T	P	C
3	1	0	3

Preamble: This course focuses on how to conduct therapy and also of the underlying reasons why to work that way. The relevance of the theoretical positions extends beyond while assisting clients in therapy. This includes major concepts and practices of many of the main therapeutic approaches used in the helping profession.

UNIT I: INTRODUCTION (8 Hours)

Definition – Goals of Psychotherapy – Professional issues – Personal characteristics of therapists – common and unique features of Psychotherapies – Psychotherapy in India

UNIT II: PSYCHOANALYSIS (10 Hours)

Psycho-Dynamic therapies – Indications and evaluations – Neo-Freudian approaches – Group therapy - Current status and evaluation

UNIT III: HUMANISTIC – EXISTENTIALISTIC THERAPIES (10 Hours)

Person-centred therapy – Gestalt therapy – Transactional analysis – Reality therapy – Existential therapy – Logotherapy– Current status and evaluation

UNIT IV: COGNITIVE BEHAVIOUR THERAPIES (10 Hours)

Behaviour therapy – Rational Emotive behaviour therapy – Cognitive therapy – Current status and evaluation

UNIT V: POSTMODERN THERAPIES (7 Hours)

Solution-focused therapy – Brief therapy – Narrative therapy - Eclecticism– Current status and evaluation

TEXT BOOKS

1. Corey, G. (2009). *Theory and Practice of Counselling & Psychotherapy*. 8thed. Thomson Brooks/Cole.
2. Nelson-Jones, R. (2014). *Theory and Practice of Counselling & Psychotherapy*. 6th ed. Sage, New Delhi.

REFERENCES

1. Kottler, J. A., & Montgomery, M. J. (2011). *Theories of Counselling and Therapy: an experimental approach*. 2nded. Sage, New Delhi.
2. Nelson-Jones, R. (2005). *Practical Counselling and Helping Skills*, 5thEdition, Sage, New Delhi.

PSYCHOMETRY

4 Credits

L	T	P	C
4	1	0	4

Preamble: Testing has been growing at an increasing pace, and it is contributing effectively in more and more areas of daily life.

UNIT I: TEST CONSTRUCTION

(10 Hours)

Defining the test – Classification of tests – Characteristics of standardized test – Steps involved in test construction- Brief history of testing – Scaling – Selecting a scaling method. Representative scaling methods. Constructing the items. Testing the items. Revising the test. Publishing the test - Problems in Psychological measurements

UNIT II: CONSTRUCTING INTELLIGENCE TESTS & PERSONALITY INVENTORIES (12 Hrs)

Item writing for Intelligence tests: Analogies, odd-man-out, sequences. Tests of ability and attainment: Content of items, multiple choice items. Advantages of multiple choice items. True-false items, matching items, choosing the item type. Other item types, arrangement of items for a test trial, guessing; Constructing Personality Inventories- Problems in constructing personality Inventories. Writing items for personality Inventories: item forms, guidelines for item writing. Eliminating response sets. Item content.

UNIT III: ITEM ANALYSIS

(12 Hours)

Important variables for item analysis. Two indices in item analysis- correlations of items and the total score, choice of item – analytic statistics. Item scoring and item analysis- Item difficulty, Item discrimination, Item response theory. Selection of items after item analysis. Rewriting items. Failure to form a test.

UNIT IV: TEST STANDARDIZATION

(14 Hours)

Overview of different types of reliability. Factors affecting reliability and validity- Generalizability of test scores. Special issues in reliability. Interpretation of reliability coefficient. An overview of the different types of validity. Validity coefficient and error of estimate- conditions affecting validity coefficient. Magnitude of validity coefficient. Standardizing the test- obtaining a representative normative sample. Sampling specific groups. Rules for sampling special groups;

UNIT V: TEST STANDARDISATION & ETHICAL ISSUES

(12 Hours)

Norms - Meaning and purpose of norms - Difference between Norms and Standards- Raw score transformation - Percentile and percentile ranks - Standardized scores - Normalizing standard scores - T scores – Stanines - Stenscores - C scale - Selecting a norm group: age and grade norms - Local and sub group norms - Criterion referenced tests and norm referenced tests; Ethical Issues: Ethical considerations in psychological testing

TEXT BOOKS

1. Chaddha, N. K. (2009). *Applied Psychometry*. Sage Publications.
2. Anastasi, A., & Urbina, S. (2017). *Psychological Testing*. 7th Ed. PHI Learning, New Delhi.
3. Gregory, R.J. (2017). *Psychological Testing*. 7th Ed. Pearson India Education Services.

REFERENCES

1. Cohen, R. J., & Swerdlik, M. E. (2005). *Psychological Testing and assessment: An introduction to tests and measurement*. 6th Ed. McGraw-Hill, New Delhi.
2. Kaplan, R. M., & Saccuzzo, D. P. (2012). *Psychological Testing: Principles, applications, and issues*. 8th Ed. Wadsworth Cengage Learning, India.

Managing Emotions in Times of Uncertainty & Stress – MOOC

<u>4 Credits</u>	L	T	P	C
	4	1	0	4

Preamble: Developed by the Yale Center for Emotional Intelligence, Managing Emotions in Times of Uncertainty & Stress will provide participants with the knowledge, skills, and strategies to understand and manage their emotions and those of their students.

UNIT I: INTRODUCTION – Week 1

How We're Feeling and How SEL Can Help – Why Emotions matter: Attention – Decision Making – Relationships – Physical and Mental Health - Creativity

UNIT II: IDENTIFYING ONE’S OWN EMOTIONS – Week 2, 3& 4

Mood Meter – Differences in understanding emotions – Impact of emotions – Emotion words – Making sense of how we feel – Health emotion management – Breathing – Thought Strategies: Positive Self-talk – Positive reframing – Mindfulness – Focusing on Gratitude

UNIT III: CULTURALLY RESPONSIVE EMOTION SCIENTIST – Week 5

Definition of Emotion Scientist - Barriers to Becoming a Culturally Responsive Emotion Scientist - Blindspot-Hidden Biases of Good People - Diversity and Inclusion in Leadership

UNIT IV: IDENTIFYING & HELPING OTHERS EMOTIONS – Week 6 & 7

Understanding others’ feelings - What Differences are Harder to Bridge? - Behavior Doesn't Equal Emotion - Identifying Emotions in Children and Adolescents - Becoming More Accurate at Identifying Emotions – Emotion Co-regulation – Helping students with their emotions – Brainstorm and Strategize – Close the conversation – Follow-up – Mood Congruent instruction - Building A "Culture of Care" In Schools

UNIT V: MAKING A COMMITMENT TO LASTING CHANGE – Week 8

RULER overview – Systematic Social and Emotional Learning – Envisioning Change

Writing in the Sciences – MOOC

4 Credits

L	T	P	C
4	1	0	4

Preamble: This course teaches scientists to become more effective writers, using practical examples and exercises. Topics include: principles of good writing, tricks for writing faster and with less anxiety, the format of a scientific manuscript, peer review, grant writing, ethical issues in scientific publication, and writing for general audiences.

UNIT I: INTRODUCTION – Week 1

principles of effective writing - Examples of what not to do - Overview, principles of effective writing - Cut the clutter - Cut the clutter, more tricks - Practicing cutting clutter

UNIT II: WRITING WITH STRONG GRAMMAR – Week 2, 3 & 4

Use the active voice - Is it really OK to use "We" and "I" - Active voice practice - Write with verbs - Practice examples; Experiment with punctuation - Practice, colon and dash - Parallelism – Paragraphs - Paragraph Editing - Overview of the writing process - The pre-writing step - The writing step - Checklist for the final draft

UNIT III: SECTIONS OF SCIENTIFIC MANUSCRIPT – Week 5

Tables and Figures – Results - Practice writing results – Methods – Introduction - Introduction practice – Discussion - Abstract

UNIT IV: REVIEW PROCESS – Week 6

Plagiarism – Authorship - The Submission Process - Interview with Dr. Bradley Efron - Interview with Dr. George Lundberg - Interview with Dr. Gary Friedman - Doing a peer review - Predatory journals

UNIT V: REVIEW WRITING – Week 7 & 8

Types of writing beyond original research manuscripts: Writing a review article - Grants - Writing letters of recommendation - Writing personal statements; Review Communications: Talking with the media - Panel Interview - Writing for general audiences - Writing a science news story - Interviewing a scientist - Social media

MINI PROJECT

4 Credits

Mini Project work shall be carried out under the supervision of the Guide. The scholar may in certain cases, be permitted to work on projects in an Industrial / Research Organizations, mental health institutions, schools and other institutions where there is scope for psychology, based on the recommendations of the Head of his / her Department. In such cases, the scholar shall be instructed to meet the supervisor periodically and to attend the review committee meetings for evaluating the progress.

Mini Project carried out by a Ph.D. scholar as part of his/her course work, shall have the following components:

- Objective and methodology of the problem
- Literature survey
- Preliminary results of the research work

Format of the mini project shall be the same as like that of a thesis.

Total number of pages shall be between 50 and 80 pages

The Doctoral Committee shall value the mini project and submit the marks to the Controller of Examinations and the same marks would be incorporated in the mark sheet along with the marks of the other course work examinations. The mark detail for coursework examination is given below.

Exam	Internal	Passing Minimum	External	Passing Minimum	Total Passing	
					Minimum	Maximum
Mini Project	Nil	Nil	100	55	50%	100%

Ph.D. Course Work
Syllabi for Sociology (2018-19) - Onwards

ADVANCED SOCIOLOGICAL RESEARCH

Objectives:

To help the researcher to understand the various research methods

To know the ethical and legal issues involved in research

Unit I

Concept of Research Meaning

Motivation, objectives and importance of Research –Types of Research Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical – Selection and formulation of Research Problem – Research Design

Unit II

Research Formulation

Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis

Unit III

Research Methods

(a) Traditional Methods – Historical, Institutional, Legal, Philosophical, Comparative, Ethical methods etc. (b) Modern Methods – Sampling method, Questionnaire, Schedule etc, Interview method and Focus Group discussion, Observation Method, Case Study method, Content analysis, Delphi method, Statistical Method, Experimental method, Brainstorming Techniques etc.

Unit IV

Research design

Basic Principles- Need of research design — Features of good design – Important concepts relating to research design – Observation and Facts, Laws and Theories, Prediction and explanation, Induction, Deduction, Development of Models. Developing a research plan - Exploration, Description, Diagnosis, Experimentation. Determining experimental and sample designs.

Unit-V

Data Collection and analysis

Execution of the research - Observation and Collection of data - Methods of data collection – Types of data (a) Primary, Secondary and Tertiary Data. (b) Construction and adaptation of instruments, Administration of questions and tests, Sampling Methods- Data Processing and Analysis strategies - Data Analysis with Statistical Packages - Hypothesis-testing - Generalization and Interpretation. Tabulation of data - (c) Data organization in SPSS and Excel

(d) Graphical representation of data II. Analysis of Data (a) Discussion and Interpretation of results. (b) Testing of Hypothesis: Logical and Statistical Techniques.

Unit VI

Report Writing Structure and components of scientific reports - Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables - Bibliography, referencing and footnotes - Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids - Importance of effective communication - Organization of the Research Report Preliminaries, - Contents of Report, Bibliography, Appendices Style Manuals - Criteria for the evaluation of the Research Report.

Unit VII

Ethical issues - ethical committees - Commercialisation – Copy right – royalty - Intellectual property rights and patent law – Trade Related aspects of Intellectual Property Rights – Reproduction of published material – Plagiarism - Citation and acknowledgement - Reproducibility and accountability.

References

- Bagchi, Kanak Kanti (2007) *Research Methodology in Social Sciences: A Practical Guide*, Delhi, Abijeet Publications. Sharma, B.A.V., et al., (2000) *Research Methods in Social Sciences*, New Delhi, Sterling Publishers. B.A.V. Busha, C. H and Harter, S. D (1980) *Research Methods in Librarianship*, New York, Academic Press. Cooper, R. Donald and Pamela S. Schindler (2003) *Business Research Methods*, Delhi, Tata McGraw-Hill. Flyvbjerg, Bent (2001) *Making Social Science Matter: Why Social Inquiry Fails and How it can Succeed Again*, United Kingdom, Cambridge University Press.
- Ghosh, B.N. (1999) *Scientific Method and Social Research*, New Delhi. Gilbert, Nigel (1993) *Researching Social life*, New Delhi, Sage Publication.
- Goode and Hatt (1952) *Methods in Social Research*, New York, McGraw – Hill.
- Gopal, M.H (1970) *An Introduction to Research Procedures in Social Sciences*, Bombay, Asia Publishing House. Henn, Matt; Mark Weinstein and Nick Foard (2006) *A Short Introduction to Social Research*, New Delhi, Vistaar Publications.
- Hunt, Morton (1989) *Profiles of Social Research: The Scientific Study of Human Interactions*, Bombay, Popular Prakashan.
- Kothari, C.R (2004) *Research Methodology: An Introduction*, Delhi, New Age.
- Krishnaswami, O.R (2000) *Research Methodology in Social Sciences*, Delhi, Himalaya Publications.
- Kumar, Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. *Research Methods: A Process of Inquiry*, Allyn and Bacon.

Day, R.A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.

Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications

Barnes, John A. 1979. Who Should Know What? Social Science, Privacy and Ethics. Harmondsworth, Penguin.

Beteille A., and T.N. Madan. 1975. Encounter and Experience: Personal Accounts of Fieldwork . New Delhi, Vikas Publishing House Pvt. Ltd.

Bose, Pradip Kumar, 1995. Research Methodology. New Delhi, ICSSR.

Bryman, Alan. 1988. Quality and Quantity in Social Research. London, Unwin Hyman

Denzin Norman, Lincoln Yvonna (ed). 2000. Handbook of Qualitative Research. London, Sage.

Giddens Anthony. 1976. New Rules of Sociological Research. Hutchinson.

Hughes, John. 1987. The Philosophy of Social Research. London, Orient Longman.

Kuhn, T. S. 1970. The Structure of Scientific Revolutions. London, The University of Chicago Press.

Madge, John. 1970. The Origins of Scientific Sociology. London, Tavistock.

Punch, Keith. 1986. Introduction to Social Research. London, Sage.

Mukherjee, P.N. (eds.) 2000. Methodology in Social Research: Dilemmas and Perspectives. New Delhi, Sage.

Mulkay Michel. 1979. Science and the Sociology of Knowledge. London, George Allen and Unwin Ltd.

Popper K. 1999. The Logic of Scientific Discovery. London, Routledge.

Sayer, Andrew. 1992. Method in Social Science (revised 2nd edition). Routledge.

Shipman, Martin. 1988. The Limitations of Social Research. London, Longman.

Silverman David. 1985. Qualitative Methodology and Sociology. Gower. Vermont.

Srinivas, M.N. and A.M. Shah 1979. Field Worker and the Field. New Delhi, Oxford.

Anthony Capon, J. 1988. Elementary Statistics for the Social Sciences. Wadsworth Publishers.

De Vaus, David. 2002. Analysing Social Science Data: 50 Key Problems in Data Analysis, New Delhi, Sage Publications.

Judith Handel. 1978. Introductory Statistics for Sociology. Prentice-Hall Inc.

Loether, Herman J., and Donald G. McTavish. 1993. Descriptive and Inferential Statistics: An Introduction. (Fourth Edition), Singapore, Allyn and Bacon

ADVANCED SOCIOLOGICAL THEORY

- be able to demonstrate a thorough understanding and knowledge of a range of sociological theorists and their contributions to the field;
- have developed a complex appreciation for the central issues and problems of sociological theory;
- to be able to demonstrate an appreciation of the intellectual and social contexts in which sociological theories have been developed;
- be able to assemble ideas about sociological theory into a coherent argument of high standards, applying the tools of critical analysis; and
- be able to demonstrate in depth an understanding of the relationship between theory and the research agendas and processes of contemporary sociology.

Unit I

Positivistic Construction of the Social Order.

This module would critically assess the development of Positivism and Positivistic Sociology with a focus on functionalism in sociology and anthropology and culminating with a consideration of Parsonian systems sociology.

Essential Readings:

1. Durkheim, E. (2013). *Durkheim: The Rules of Sociological Method: And Selected Texts on Sociology and Its Method*. Palgrave Macmillan. (*Read Chapter One on Social Facts*)
2. Merton R. K., (1967) *On Theoretical Sociology*, the Free Press, New York (*Read Two Chapters On the History and Systematic of Sociological Theory and On Sociological Theories of Middle Range*)
3. Kingsley D, (1959). The myth of functional analysis as a special method in sociology and anthropology, *American Sociological Review* Vol. 24, No. 6.
4. Turner J. H.,(2006) *A Handbook of Sociological Theory*, Springer Science and Business Media, (Read Chapter One titled *Sociological Theory Today* and Two titled *What Makes Sciences Scientific* by Stephen Fusch)
5. Bourdieu, P. (1991). The peculiar history of scientific reason. In *Sociological forum*, Vol. 6, No. 1, pp. 326.
6. Taylor C., (1985). *Philosophy and the Human Sciences*, *Philosophical Papers 2*, Cambridge University Press. (Read *Social Theory as Practice*).
7. Mills, C. W. (2000). *The sociological imagination*. Oxford University Press. Read Chapters Two and Three titled 'The Grand Theory' and 'Abstracted Empiricism').
8. Wallerstein, I (1996) *Open the Social Sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences*, Stanford University Press. NA (*Read it in hard copy Chapter One: The Historical Construction of the Social Sciences, from the Eighteenth century to 1945*).
9. Nicholas D. (1994) 'Ritual and Resistance: Subversion as a Social Fact', in *A Reader in Contemporary Social Theory* Princeton University Press, and Princeton, New Jersey, NA

(Read it in hard copy)

Unit II

Marxist orientations to Class society

This module will assess the importance of class analysis in the study of modern capitalist societies both in the advanced countries as well as the global south. Similarly it also assesses the role of critical theory in its attempt to explain modern capitalism.

Essential Readings:

1. Marx M & Friedrich E. (1970) *The German Ideology*. Vol. 1. International Publishers Co, (Read Part One)
2. Polyani, K (1947) *On Belief in Economic Determinism*, *Sociological Review* Vol. 39, No. 1
3. Callinicos, A. (2004) *Making History: Agency Structure, and Change in Social Theory*, Brill Leiden (Read Chapter 1 and Chapter 2)
4. Althusser, L.(2006). "Ideology and ideological state apparatuses (notes towards an investigation)." *The anthropology of the state: A reader*,
5. Jürgen Habermas (1991) *The structural transformation of the public sphere: An inquiry into a category of bourgeois society*. MIT Press. (Read Section I)
6. Bernstein, B. & Henderson, D.(1969) *Social Class Differences in the Relevance of Language to Socialization*, Sage Social Sciences Collections
7. Gramsci, A. (1971) "The intellectuals and the Notes on Italian History and Passive Revolution in 'Selections from Prison Notebook, International Publications New York
8. Marcuse, H. (2013) *Onedimensional Man: Studies in the ideology of advanced industrial society*. Routledge, London (Read Chapter 2 and 4 in part I)
9. Guha R. (1997) *Dominance without hegemony: History and power in colonial India*. Harvard University Press, 1997. NA (Read chapter one and two)

Unit III

Interpretative Orientations in Human Interaction

This module begins with assessing Weberian emphasis on rational social action and moves on to consider the relevance of the cultural turn in modern social theory.

Essential Readings:

1. Weber, M. (1978). *Economy and society: An outline of interpretive sociology*, University of California Press (volume 1: PART 2: THE ECONOMY AND THE ARENA OF NORMATIVE AND DE FACTO POWERS.
2. Gerth, H & Mills, C.W(1946) *From Max Weber: Essays in Sociology, 'Science as Vocation,'* Oxford University Press, New York (Available Online)
3. Giddens, A (1993) *New Rules of Sociological Method: A Positive Critique of Interpretative Sociologies*, Stanford University Press. (Read it in hard copy Chapter two: Agency, Act-identifications and Communicative Intent)
4. Smith, D (1991) *The Rise of Historical Sociology*, Temple University Press. (Read it in hard copy chapter one: Like a Phoenix Rising)

5. Rock, P. (1976). Some Problems of Interpretative Historiography. *The British Journal of Sociology*, 27(3), 353-369. Retrieved from <http://www.jstor.org/stable/589621>
6. Oliver, I. (1983). The 'Old' and the 'New' Hermeneutic in Sociological Theory. *The British Journal of Sociology*, 34(4), 519-553. (Retrieved from <http://www.jstor.org/stable/590937>)
7. Geertz, C (1973) *The Interpretation of Cultures*, Basic Books, Inc., Publishers, New York. (Read Chapter one: Thick Description: Toward an Interpretive Theory of Culture).
8. Bourdieu, P & Wacquant, L (1992). *An Invitation to Reflexive Sociology*, University of Chicago Press Books (Read Part Three: The Practice of Reflexive Sociology (The Paris Workshop) (Available Online)
9. Hall, S.(1994) *Cultural Studies: Two paradigm in A Reader in Contemporary Social Theory* Ed. Nicholas Dirks and others, Princeton University Press, Princeton, New Jersey (Read it in hard copy)

Unit IV

Interactionist and Phenomenological Orientation of Individual and Society.

In this module we examine how social theory has focused on the individual and the sphere of interaction as a way of understanding the individual and group in the diverse practices that go into the making of everyday life in this connection the module focuses on Interactionism, phenomenology, ethnomethodology and dramaturgy.

Essential Readings:

1. George Herbert Mead (Edited by Charles W. Morris) (1934) *Mind Self and Society from the Standpoint of a Social Behaviorist*, University of Chicago Press. (Read Part two on Mind).
2. Cooley, C.H. (1909) *Social Organization: A Study of the Larger Mind*. New York: Charles Scribner's Sons, pp. 2531. (*The part on Primary Groups from pg 2531*) Another essay by Charles Horton Cooley. "A Primary Culture for Democracy," *Publications of the American Sociological Society* 13, (1918): 110. Link: https://brocku.ca/MeadProject/Cooley/Cooley_1918b.html (Both these essays will have to be presented together)
3. Blumer, H. (1980). Mead and Blumer: The Convergent Methodological Perspectives of Social Behaviorism and Symbolic Interactionism. *American Sociological Review*, 45(3), 409-419. (Retrieved from <http://www.jstor.org/stable/2095174>)
4. Garfinkel, H (1967) *Studies in Ethnomethodology*, Polity Press. (Read chapter Four: Some Rules of Correct Decisions that Jurors Respect)
5. Willis, P (1977) *Learning to Labour: How Working Class Kids Get Working Class Jobs*, Columbia University Press. (Read selected portions as given in module)
6. Atkinson, P(1988) *Ethnomethodology: A Critical Review Annual Review of Sociology*, Vol. 14.
7. Goffman, E.(1956) *The presentation of self in everyday life*, University of Edinburgh Social Science Research Centre. (Read Chapter VI titled The Arts of Impression Management)
8. Gorman, R. (1975). Alfred Schutz An Exposition and Critique. *The British Journal of Sociology*, 26(1), 119. (Retrieved from <http://www.jstor.org/stable/589239>)

9. Costelloe, T. (1996). Between the Subject and Sociology: Alfred Schutz's Phenomenology of the LifeWorld. *Human Studies*, 19(3), 247-266. (Retrieved from <http://www.jstor.org/stable/2001111>)

Unit V

Post Structuralist Orientations of Modernity and Post Modernity

In this module we examine the role of structuralism and post structuralism in dealing with issues of social structure, subjectivity, power, agency as well as the critical interventions on themes of modernity and post modernity.

Essential Readings:

1. LéviStrauss, C. (2008). *Structural Anthropology*. Basic Books. (Read chapter Structural analysis in Linguistics and in Anthropology)
2. LéviStrauss, C. (2008). *Structural Anthropology*. Basic Books. (Read chapter The Structural study of myth).
3. Hugo G. N. (1971) Ideological Bases of LeviStrauss' Structuralism, *American Anthropologist* Vol. 73, No. 3,
4. Bourdieu, P (1977) *Outline of theory of Practice*, Cambridge University Press. (Read Section 1: Analyses in Part One)
5. Bourdieu, P (1977) *Outline of theory of Practice*, Cambridge University Press. (Read Part two: Structure and The Habitus)
5. Bourdieu, P. (1986) The forms of capital. In J. Richardson (Ed.) *Handbook of Theory and Research for the Sociology of Education* (New York, Greenwood), 241-258. (Read the essay titled: The Forms of Capital by Pierre Bourdieu)
6. Foucault, M (1989) *The Order of Things: An archaeology of the human sciences*, Routledge. (Read section 2: The Prose of the World in Part One).
7. Foucault, M (1991) *The Foucault Effect: Studies in governmentality*, ed. By Graham Burchell et al., University of Chicago Press. (Read chapter four: Governmentality)
8. Foucault, M (1991) *The Foucault Effect: Studies in governmentality*, ed. By Graham Burchell et al., University of Chicago Press. (Read chapter three: Questions of Method)
9. Giddens, A (1990) *The Consequences of Modernity*, Stanford University Press. (Read Part One)
10. Beck, U (1992) *Risk Society: Towards a New Modernity*, Sage Publications, United Kingdom. (Read Part One Living on the Volcano of CivilizationThe Contours of the Risk Society)
11. Harvey, David (1989) *The conditions of Postmodernity: An enquiry into the origins of cultural change*, Blackwell Publishers. (Read Part I)

Unit VI

Feminist and Gender Orientations.

This orientation will deal with the critical ways in which feminist thought has reshaped the theory and practice of sociological analysis in the past half century. In taking up a critique of modern capitalism and patriarchy, it also looks at issues of gender discrimination and human rights.

Essential Readings:

1. Pamela Abbot, P. & Wallace, C. (2005) *An Introduction to Sociology: Feminist Perspectives*, Routledge London (Read Chapter 1 and 2)
2. Nancy F. (2009) *Feminism, Capitalism and the Cunning of History*. *New Left Review* No. 56, March April.
3. Scott, J W (1986) *Gender: A Useful Category of Historical Analysis*. *The American Historical Review*. Vol. 91, No. 5, pp. 1053 1075.
4. Sinha M.(2000) *Refashioning Mother India: Feminism and Nationalism in Late Colonial India*," *Feminist Studies* Vol. 26, NO. 3, October 1
5. Sarkar, T.(1987) "Nationalist Iconography: Image of Women in 19th Century Bengali literature", *EPW*, 22, 47, Nov 21
6. Sangari, K., & Vaid, S. (1989) *Recasting Women: An Introduction in Recasting Women: Essays in Colonial History* ed. Sangari K. and Vaid S., Rutgers University Press, New Brunswick, New Jersey.
7. Uma Chakravarti (1995) *Gender, Caste and Labour Ideological and Material Structure of Widow hood*, *EPW*, Vol. XXX, No. 36, Sep. 09.
8. Ambedkar, B. R., & In Rege, S. (2013). *Against the madness of Manu: B.R. Ambedkar's writings on Brahmanical patriarchy*. (Read introductory chapters)
9. Velaskar, P. (2002) *Theorizing Dalit Women's Oppression*, Paper Presented at the workshop *Dalit Feminism* organized by IWAS and Women's Studies Unit TISS Mumbai.

Unit VII

Theorizing Indian Society

This orientation deals with the sociological analysis of Indian society. It critically examines the main themes of identity, social structure, power, ideology in shaping the contemporary sociological discourse of modern Indian society.

Essential Readings:

1. Dumont, L.& Pocock D.F.(1957) *For a sociology of India*" *Contributions to Indian Sociology*,
2. F.G. Bailey 1963; *Politics and Social Change: Orissa in 1959*
3. T.N. Madan 1966; *Family and Kinship: a Study of the Pandits of Rural Kashmir*
4. Patel, S (2006) *Beyond Binaries: A Case for Self Reflexive Sociologies*, *Current Sociology*, May 2006, vol. 54 no. 3, pp: 381395
5. Sarkar, B. K. (1985) *The Positive Background of Hindu Sociology*, Motilal Banarasidas, Varanasi. (Read chapter I and II)
6. Srinivas, M.N. (1987) *Development of Sociology in India: An Overview*, *Economic and Political Weekly*, Vol. 22, No. 4 (Jan. 24, 1987), pp. 135138.
7. Dhanagare, D.N. (1998) *Themes and Perspectives In Indian Sociology*. Rawat Publications, New Delhi. (Read chapters 3 and 8)
8. Mani, B. R. (2005). *Debrahmanising history: Dominance and resistance in Indian society*. Manohar Publishers & Distributors, New Delhi. (Read Part Introduction and part I)
9. Ambedkar, B. R. (1990). *Annihilation of Caste: An Undelivered Speech*. Arnold Publishers.

10. Omvedt, G. (1990) Dalits and the Democratic Revolution: Dr Ambedkar and the Dalit Movement in Colonial India, OUP, New Delhi. (Read Introduction and * Towards a Historical Materialist Analysis of the Origins and Development of Caste)
11. Guru, G (ed.) Humiliation: Claims and Context, OUP, New Delhi. (Read Introduction)

Manonmaniam Sundaranar University, Tirunelveli -12

Ph.D Sociology

With effect from 2021-22 onwards

Sl.No.	Course Work Papers	Credit
1.	Methodological Perspectives and Techniques of Social Research	4
2.	Advanced Sociological Theories	4
3.	Mini Project	4
4.	Environmental Sociology	4
5.	Gender and Society	4
6.	Industry and Society	4
7.	Social Gerontology	4
8.	Sociology of Health	4

Methodological Perspectives and Techniques of Social Research

Course Objectives:

- To introduce 'Sociology' as a science and different epistemological foundations in Social Sciences
- To familiarize the researchers with the meaning and scope of social research
- To make the researchers acquainted with quantitative and qualitative tools of research

Unit-I:

Introduction to Social Research, Research as a process Skills required for conducting research, Types of Research- Descriptive, Evaluative, Historical, Philosophical, Developmental, Co relational research, Ethnographic Research, Experimental research, Ex-Post Facto Research and Action research, Steps in Research,

Epistemological Foundations: Paradigm-meaning, Positivist and Non-positivist paradigms, Interpretivism, Feminist Methodology: Common Features and Feminist Epistemological implications-Post Modernism.

Unit-II:

Scientific Inquiry- concept, assumptions and their role. Formulation of Research - identification of a research problem, Review of related literature.

Research Design: Need for Research Design, Features. Types: Exploratory, Descriptive, Explanatory, Experimental and Evaluative

Hypothesis- Sampling: Population and sample, Sampling techniques- concept, types (random, purposive, stratified random, probability and non-probability).

Unit-III:

Quantitative Methods and Survey Research -Nature, scope & limitations of quantitative research methods- Sources of research data- primary and secondary sources-Techniques Survey, Questionnaire, Interview

Scaling Techniques, Reliability and Validity of Scales

Unit-IV:

Understanding Qualitative Research -Field and researcher in qualitative research- Doing qualitative Research- Observation, Case study, Content analysis, Narratives, Life history – Interview guide, Oral history - Doing Ethnography, Mixed Method Research Design – Triangulation Method.

Unit- V:

Data processing and Analysis strategies – Data Analysis with Statistical Packages.

Report Writing Structure and Components of scientific reports – Types of report – Technical reports and thesis – Significance – Different steps in the preparation – Layout, structure and Language of typical reports – Illustrations and tables – Bibliography, referencing and footnotes – Oral presentation – Planning – Preparation – Practice – Making presentation – Use of visual aids – Importance of effective communication – Organization of the Research Report Preliminaries, - Contents of Report, Bibliography, Appendices Style Manuals – Criteria for the evaluation of the Research Report.

Basic Readings:

Babbie, Earl. - *The Practice of Social Research*, (Second Edition). Belmont: Wadsworth Publishing, 1979.

Bailey, K.D. - *Methods of Social Research*. New York: The Free Press, 1982.

Goode, W.J. and Hatt, P.K. - *Methods of Social Research*. New York: McGraw Hill, 1952.

Holsti, O.R. - *Content Analysis for the Social Sciences and Humanities*. Addison-Wesley: Reading, Mass, 1969.

Kerlinger, F.R. - *Foundations of Behavioral Research*, (Second Edition). New York: Holt Rinehart and Winston, 1973.

Kothari, C.R. - *Research Methodology Methods and Techniques*. New Delhi: Wiley Estem Ltd., 1989.

Wilkinson, T.S. and Bhandarkar, P.I. - *Methodology and Techniques of Social Research*. Bombay: Himalaya Publishing House, 1979.

Weber, Max. - *The Methodology of Social Sciences*. New York: Glencol, 1949.

Moser, C.A. and Kalton, G. - *Survey Methods in Social Investigation*. New York: The Macmillan, 1958.

Simon, J.I. - *Basic Research Methods in Social Science*. New York: Random House, 1978.

Young, P.V. - *Scientific Social Surveys and Research*. New Delhi: Prentice Hall of India, 1984.

Schutt, R.K. - *Investigating the Social World: The Process and Practice of Research*, (Second Edition). Pine Forge Press, 1999.

Payne, S.L. - *The Art of Interviewing*. Princeton, N.J: Princeton University Press, 1951.

Durkheim, E. - *The Rules of Sociological Method*, New York: Glencol, 1938.

Seltiz, C. et al. - *Research Methods in Social relations*. New York, 1959.

Barker, T.L. - *Doing Social Research*. New York: McGraw-Hill, 1999.

Vaus, D.A. - *Surveys in Social Research*. New Delhi: Rawat Publications, 2003.

McTavisi, D.G. & Loether, H.J. - *Social Research: An Evolving Process*. London: Allyn and Bacon, 2002.

Singleton, R.A. & Straits, B.C. - *Approaches to Social Research*. New York: Oxford

University Press, 2005.

Silverman, D. - *Qualitative Methodology & Sociology*. England: Gower, 1985.

Mukherji, P.N. - *Methodology in Social Research*. New Delhi: Sage Publications, 2000.

Laws, S. - *Research for Development*. New Delhi: Vistaar Publications, 2003.

Schwartz, H. & Jacobs, J. - *Qualitative Sociology A Method to the Madness*. New York: Free Press, 1979.

Sarantakos, S. - *Social Research*. London: Macmillan Press Ltd. 1998.

Krishnaswami, O.R. – *Research Methodology in Social Sciences*. Delhi: Himalaya Publications. 2000

Suggested Readings

• Best, John W. & James Kahn *Research in Education* (2008). New York, Prentice Hall,

Alasuutari, Pertti, Leonard Bickman, and Julia Brannen. *The Sage Handbook of Social Research Methods*. London: SAGE, 2008.

Asthana, H S & B.Bhushan. *Statistics for social sciences (with SPSS applications)*. Delhi: PHI Learning Pvt. Ltd, 2016.

Béteille, Andre. *Sociology and Common Sense*. *Economic and Political Weekly*, 31.35/37 (1996.):2361-2365.

Bacon, F. *On the Interpretation of Nature and the Empire of Man*. In JECurtis & J W Petras. *The Sociology of Knowledge: A Reader*. London: Duckworth, 1970: 89-96.

Bose, P K. *Research Methodology*. New Delhi: Indian Council of Social Sciences Research, 1995.

Bryman, A. *Quality and Quantity in Social Research*. London: Pluto Press, 1988.

_____. *Quantitative Data Analysis for Social Sciences*. London: Routledge, 1990.

_____. *Social Research Methods*. New Delhi: Oxford University Press, 2012.

Blalock, Hubert M. *Social Statistics*. New York: McGraw-Hill Publishing Co., 1979.

Blalock, Hubert M. *Conceptualization and Measurement in the Social Sciences*. Beverly Hills California: Sage Publications, 1982.

Creswell, J W. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. New Delhi: Sage, 2011.

Denzin, Norman K and Yvonna S. Lincoln. *The SAGE Handbook of Qualitative Research*. New Delhi: Sage Publications, 2011.

Deshpande, Satish. *Contemporary India: A Sociological View*. New Delhi: Penguin, 2003.

Flick, U. *An Introduction to Qualitative Research*. London: Sage, 2006.

Fuller, Steve. *Kuhn vs Popper – The Struggle for the Soul of Science (Revolutions in Science)*. New York: Columbia University Press, 2004.

Geertz, C. *The Interpretation of Cultures*. New York: Basic Books, 1973.

Gibson, W J & A Brown. *Working with Qualitative Data*. London: Sage, 2009.

Giddens, A. *New Rules of Sociological Method*. Stanford: Stanford University Press, 1993.

Gray, D E. *Doing research in the real world*. London: Sage, 2014.

Hahn, C. *Doing Qualitative Research Using your Computer: A Practical Guide*. New Delhi: Sage, 2008.

Harding, S. *Feminism and Methodology*. Bloomington: Indiana University Press, 1987.

Madan, T N & A Beteille. *Encounter and Experience*. New Delhi: Vikas, 1975.

Madge, J. *The Tools of Social Science*. New York: Doubleday Anchor, 1965.

Mehrotra, N. *Women and Movement Politics: Some Methodological Reflections*. *The Eastern Anthropologist*, 58.2(2004):149-170.

Moser, S C & G Kalton. *Survey Methods in Social Investigation*. London: Heinmann, 1971.

Mueller, JH & K F Schuessler. *Statistical Reasoning in Sociology*. New Delhi: Oxford University Press, 1961. Mukherjee, P N. *Methodology in Social Research: Dilemmas and Perspectives*. New Delhi: Sage, 2000.

Needham, Joseph. *The Grand Titration: Science and Society in East and West*. London: Routledge, 2013.

Neuman, W L. *Social Research Methods: Qualitative and Quantitative Approaches*. Boston: Allyn and Bacon, 2000.

Olsen, W. *Data collection: Key Debates and Methods in Social Research*. London: Sage, 2012.

Popper, K R. *The Logic of Scientific Discovery*. New York: Harper & Row, 1968.

Rosaldo, R. *Culture and Truth: The Remaking of Social analysis*. Boston: Beacon Press, 1991.

Sallis, J. *Deconstruction and Philosophy: The Texts of Jacques Derrida*. Chicago: University of Chicago, 1987.

Scheyens, R & D Storey. *Development Field work: A Practical Guide*. New Delhi: Sage, 2003.

Singh, Yogendra. *Ideology and Theory in Indian Sociology*. New Delhi: Rawat Publications 2004, 1991.

Sjoberg, G & R Nett. *A Methodology for Social Research*. New York: Harper and Row, 1968.

Srinivas, M N & A M Shah. *The Field Worker and the Field*. New Delhi: Oxford University Press, 1979.

Srinivas, M N, A M Shah and E A Ramaswamy. *The Fieldworker and the Field*. New Delhi: Oxford University Press, 2004.

Srivastava, V K. *Field Work and Methodology*. New Delhi: Oxford University Press, 2004.

Wagner, W E. *Using IBM SPSS Statistics for Research Methods and Social Science Statistics*. Sage: California, 2013.

Wallerstein, Immanuel. *Open the Social Sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences*. Stanford: Stanford University Press, 1996.

Winch, Peter. *The Idea of a Social Science and Its Relation to Philosophy*. London: Routledge, 2007.

Yin, R. K. *Case Study Research: Design and Methods*. California: Sage, 1984.

ADVANCED SOCIOLOGICAL THEORIES

The Aim of this course is to enable the scholar to understand the theoretical inputs and different perspectives in Sociology relating to the society by the various schools of thoughts.

The main objectives of this course are to:

1. Give knowledge to students about the origin and development of sociological theories over a century since which it has been influenced by variety of socio-economic and political conditions.
2. Make them familiar with various Classical Sociologists and their concepts and perspectives.

Unit I

Introduction: Nature of Sociological Theory–Levels of theorization in sociology; Relationship between Theory and Research; Revisiting Classical Theories; Understanding modernity and the need for new social theories. Structural-functionalism; The emergence of functionalism; Neo-Functionalism and Structuralism: Revisiting Functionalism; Talcott Parsons-Functional dimensions of Social System; R. K. Merton-Codification, critique and reformulation of functional analysis, Middle Range Theories; Yogendra Singh-approaches to Indian Sociology;

Unit II

Interactionist perspective, Symbolic interactionism: Herbert Mead; Max Weber's Interpretive Sociology, Edmund Husserl, Phenomenological Theory: Alfred Schütz' Lifeworld; Peter Berger and Luckmann- The Social Construction of Reality; Ethnomethodology: Harold Garfinkel

Unit III

Socio-Historical Context of Emergence of Critical Theory; Frankfurt School- Contributions of Early Critical Theorists such as Georg Lukacs, Max Horkheimer's Critique of Modernity, Theodor Adorno and Herbert Marcuse; Neo-Marxism -Louis Althusser; Marx critique and dialectics of conflict: Ralf Dahrendorf ; Conflict functionalism: Lewis Coser The Power Elite: C. Wright Mills; Structuralism, Structure and Agency Anthropological structuralism: Levis Strauss; Anthony Gidden's Structuration Theory; Bourdieu and the Idea of Reflexive Sociology; Feminist and Gender Orientations: Feminist Theories, Southern Theory and Intersectionality.

Unit IV

Recent trends in Sociological Theorizing: Jürgen Habermas - Public Sphere, Theory of Communicative Action; Deconstruction: Jacques Derrida; M. Foucault–Knowledge and Power; Daniel Bell-Post-Industrial Society; Information Society and Surveillance; Challenges of Globalization and Possibility of Post-Modern Theory. Ashis Nandy- Cultural Subservience.

Unit V

Theorizing Indian Society: This orientation deals with the sociological analysis of Indian society. It critically examines the main themes of identity, social structure, power, ideology in shaping the contemporary sociological discourse of modern Indian society.

Basic Readings

1. Abraham, F., & Morgan, J. H. (2014). *Sociological Thought*. India: Trinity Press.
2. Coser, L. (2002). *Masters of Sociological Thought*, Jaipur, Delhi: Rawat Publications.
3. Ritzer, G. (2012). *Sociological Theory* (8thed.). New York: McGraw-Hill.
4. Ritzer, G. (2010). *Classical Sociological Theory* (6thed.). India: Tata McGraw-Education.
5. Abraham, M. F, (2014). *Contemporary Sociology: An Introduction to Concepts and Theories* (2nded). Oxford University Press.
6. Hooker, E. J. (2018). *The Little Book of Contemporary Sociological Theories*. India: Notion Press.
7. Turner, J.H. (2007). *The Structure of Sociological Theory*. Jaipur, India: Rawat Publication.
8. Doshi, S. L. (2005). *Modernity, Post Modernity and Neo-Sociological Theories*. India: Rawat Publication.
9. Durkheim, E. (2013). *Durkheim: The Rules of Sociological Method: And Selected Texts on Sociology and Its Method*. Palgrave Macmillan. (*Read Chapter One on Social Facts*)
10. Merton R. K., (1967) *On Theoretical Sociology*, the Free Press, New York (*Read Two Chapters On the History and Systematic of Sociological Theory and On Sociological Theories of Middle Range*)
11. Bourdieu, P. (1991). The peculiar history of scientific reason. In *Sociological forum*, Vol. 6, No. 1, pp. 326.
12. Mills, C. W. (2000). *The sociological imagination*. Oxford University Press. Read Chapters Two and Three titled 'The Grand Theory' and 'Abstracted Empiricism'.
13. Giddens, A (1993) *New Rules of Sociological Method: A Positive Critique of Interpretative Sociologies*, Stanford University Press.
14. Uma Chakravarti (1995) *Gender, Caste and Labour Ideological and Material Structure of Widow hood*, EPW, Vol. XXX, No. 36, Sep. 09.

Suggested Readings:

1. Marx M & Friedrich E. (1970) *The German Ideology*. Vol. 1. International Publishers Co,(Read Part One)
2. Polanyi, K (1947) *On Belief in Economic Determinism*, *Sociological Review* Vol. 39, No. 1
3. Jürgen Habermas (1991) *The structural transformation of the public sphere: An inquiry into a category of bourgeois society*. MIT Press. (Read Section I)
4. Gramsci, A. (1971) "The intellectuals and the Notes on Italian History and Passive Revolution in 'Selections from Prison Notebook', International Publications New York.

5. Smith, D (1991) *The Rise of Historical Sociology*, Temple University Press. (Read it in hard copy chapter one: Like a Phoenix Rising)
6. Oliver, I. (1983). The 'Old' and the 'New' Hermeneutic in Sociological Theory. *The British Journal of Sociology*, 34(4), 519-553. (Retrieved from <http://www.jstor.org/stable/590937>)
7. Geertz, C (1973) *The Interpretation of Cultures*, Basic Books, Inc., Publishers, New York. (Read Chapter one: Thick Description: Toward an Interpretive Theory of Culture).
8. Hall, S.(1994) *Cultural Studies: Two paradigm in A Reader in Contemporary Social Theory* Ed. Nicholas Dirks and others, Princeton University Press, Princeton, New Jersey (Read it in hard copy).
9. Cooley, C.H. (1909) *Social Organization: A Study of the Larger Mind*. New York: Charles Scribner's Sons, pp. 2531. (*The part on Primary Groups from pg 2531*).
10. Garfinkel, H (1967) *Studies in Ethnomethodology*, Polity Press. (Read chapter Four: Some Rules of Correct Decisions that Jurors Respect)
11. Atkinson, P(1988) *Ethnomethodology: A Critical Review Annual Review of Sociology*, Vol. 14.
12. Goffman, E.(1956) *The presentation of self in everyday life*, University of Edinburgh Social Science Research Centre. (Read Chapter VI titled The Arts of Impression Management)
13. Gorman, R. (1975). Alfred Schutz An Exposition and Critique. *The British Journal of Sociology*, 26(1), 119. (Retrieved from <http://www.jstor.org/stable/589239>)
14. Costelloe, T. (1996). Between the Subject and Sociology: Alfred Schutz's Phenomenology of the LifeWorld. *Human Studies*, 19(3), 247-266. (Retrieved from <http://www.jstor.org/stable/2001111>).
15. Hugo G. N. (1971) Ideological Bases of LeviStrauss' Structuralism, *American Anthropologist* Vol.73, No. 3,
16. Foucault, M (1991) *The Foucault Effect: Studies in governmentality*, ed. By Graham Burchell et al., University of Chicago Press. (Read chapter three: Questions of Method).
17. Beck, U (1992) *Risk Society: Towards a New Modernity*, Sage Publications, United Kingdom. (Read Part One Living on the Volcano of Civilization The Contours of the Risk Society).
18. Harvey, David (1989) *The conditions of Postmodernity: An enquiry into the origins of cultural change*, Blackwell Publishers. (Read Part I).
19. Nancy F. (2009) *Feminism, Capitalism and the Cunning of History*. *New Left Review* No. 56, March April.
20. Scott, J W (1986) *Gender: A Useful Category of Historical Analysis*. *The American Historical Review*. Vol. 91, No. 5, pp. 1053-1075.
21. Wallace Ruth A. and Alison Wolf: *Contemporary Sociological Theory: Continuing the Classical Tradition*(Second Edition) Prentice Hall, Englewood Cliffs, New Jersey, 1986.

22. Tim Delaney Contemporary Social Theory: Investigation and Application, Pearson Education, Delhi, ISBN 978-81-317-2012-7, 2008.
23. Alexander, Jeffrey C.:Twenty Lectures: Sociological Theory since World War II. New York: Columbia University Press, 1987.
24. Collins, Randall:Sociological Theory (Indian edition). Jaipur and New Delhi: Rawat, 1997.
25. Craib, Ian: Modern Social Theory: From Parsons to Habermas (2nd edition). London: Harvester Press, 1992.
26. Austin Harrington (Ed) Modern Social Theory: An Introduction, Oxford University Press, 2005.
27. Alexander, Jeffrey C (ed.). Neo-functionalism. London: Sage, 1985.
28. Appelrouth, Scott and D Edles. Classical and Contemporary Sociological Theory: Text and Readings.California: Pine Forge Press, 2008.
29. Bourdieu, Pierre. In Other Words: Essays Towards a Reflexive Sociology. Oxford: Polity Press, 1990.
30. Connerton, Paul (ed.). Critical Sociology. Harmondsworth: Penguin, 1976.
31. Emmanuel, S M & PA Gold. Modern philosophy, from Descartes to Nietzsche: An anthology. Malden, Mass: Blackwell Publishers, 2002.
32. Engels, F. The Origin of the Family, Private Property and the State. New Delhi: Peoples Publishing House, 2010.
33. Gouldner, Alvin. The Coming Crisis of Western Sociology. London: Heinemann, 1971.
34. Luckmann, Thomas(ed.). Phenomenology and Sociology: Selected Readings. New York: Penguin Books, 1978.
35. Mennell, Stephen. Sociological Theory: Uses and Unities. Surrey: Thomas Nelson and Sons, 2nd Edition, 1980.
36. Morrison, K. Marx, Durkheim, Weber: Formations of Modern Social Thought. London: Sage, 2006.
37. Nagel, Ernest. The Structure of Science: Problems in the Logic of Scientific Explanation, Hackett, 1969.
38. Nandy, Ashis. The Intimate Enemy: Loss and Recovery of Self Under Colonialism. Delhi: Oxford, 1983.
39. Parsons, Talcott (et.al.). Theories of Society: Foundations of Modern Sociological Theory. New York: Free Press, 1965.
40. Popper, Karl. The Logic of Scientific Discovery. London: Routledge,1959/2002.
41. Seidman, Steven and JC Alexander. (ed.). New Social Theory Reader: Contemporary Debates, London: Routledge, 2001.
42. Singh, Yogender. Image of Man: Ideology & Theory in Indian Sociology. New Delhi: Chanakya Publications, 1983.
43. Smith, Dorothy E.. Reading the Social: Critique, Theory and Investigations. Toronto: University of Toronto Press, 1999.

44. Strauss, Claude-Levi, *Savage Mind*. Chicago: The University of Chicago Press, 1962.
45. Timasheff, NS. *Sociological Theory*. New York: Random House, 1967.
46. Wright, Mills C. *The Sociological Imagination*. New York: Oxford University Press, 1959.
47. Zeitlin, IM. *Rethinking Sociology: A Critique of Contemporary Theory*. New Delhi: Rawat, 1998.

Mini Project

Environmental Sociology

Objectives

Environmental sociology examines the changing relationship between social systems and the environment, and explores how environmental issues come to be defined as social problems.

This course examines multiple perspectives within the field--including risk, political economy, consumer studies and social movements--to understand the range of explanations for environmental degradation and improvement.

Learning Objectives:

1. Identify main theoretical perspectives and research problems that are considered part of the 'core' or 'classic' environmental sociology.
2. Examine emerging approaches and questions that characterize contemporary environmental sociology.
3. Generate new theoretical and analytical questions related to the causal mechanisms underlying environmental degradation and improvement.
4. Identify theoretical and methodological overlaps, contradictions and gaps in knowledge in the environmental sociology literature.
5. Synthesize multiple academic readings and promote the exchange of ideas.
6. Identify new research questions related to the study of the environment and propose ways to study those questions.

UNIT I: Environmental Sociology: A brief history and overview

Emergence of Environmental Sociology; Sociology's Response to Environmental Issues; Subject Matter and Recent Trends in Environmental Sociology; New Directions in Environmental Sociology; Environment in Classical Sociological Tradition; Environmental Sociology in India.

UNIT II: Theoretical Approaches in Environmental Sociology

Introduction to Theoretical Approaches in Environmental Sociology; Realism vs. Constructivism Debate; The Environmental Discourse; Eco-Philosophies: Deep, Social and Feminist; Treadmill of Production; Ecological Modernisation Theory; Ecological Modernisation as Social Theory; The Risk Society Thesis; Living and Coping with World Risk

UNIT III: Environmental Social Movements-

Environmentalism Around the World: Past and Present ; Multiple Environmentalisms: Material and Post-material concerns; Contemporary Environmental Movements; Environmental Movements in Global and Local Perspectives; New Social Movements and the Environmental Concerns; Political Ecology and Environmental Movements; Environmentalism and Environmental Movement in India; Ideological Trends in Indian Environmentalism;

UNIT IV : The Commons

Environmental History: Concept, Themes and Issues; Environmental History of India; Resource, Property and Resource Governance Regimes; Governing Common Pool Resources; Collective Action for Governing the Commons: Theoretical Approaches; Governing Forests as Common Property; (2) Governing Water as Common Property; (3) Common Property Regimes in India

UNIT V: Environmental Justice and Sustainability

The Concept of Sustainability; Environment and Sustainable Development; Environmental Democracy and Climate Change Week; Environmental (in)justice; Gender and Environmental

Debate - I; Gender and Environmental Debate – II (Feminist Political Ecology); Lifestyle change and consumer citizenship

Essential Readings

Buttel, F. H. (2000). Ecological modernization as social theory. *Geoforum*, 31(1), 57-65.

Agarwal, B. 1992. Gender & Environment Debate: Lessons from India, in *Feminist Studies*, 18, No.1 (Spring).

Cederlof, G. & K. Sivaramakrishnan. Ed. 2005. *Ecological Nationalisms: Nature, Livelihoods, & Identities in South Asia*. Permanent Black. Delhi.

Agarwal, B. 1992. Gender & Environment Debate: Lessons from India, in *Feminist Studies*, 18, No.1 (Spring).

Apffel-Marglin, F., S. Kumar & A. Mishra. Ed. 2010. *Interrogating Development: Insights from the Margins*. O.U.P. New Delhi.

Arnold, David and Guha, Ramchandra, (eds.): *Nature, Culture and Imperialism*, New Delhi: Oxford University Press, 1955.

Bardhan, P. & I. Ray. 2008. *The Contested Commons: Conversations between Economists & Anthropologists*. O.U.P., New Delhi.

Jodha N.S. 1986. Common property resources and rural poor in dry regions of India, *Economic and political weekly*. Vol. 21, No. 27, Jul. 5.

Mol, A. P. (2002). Ecological modernization and the global economy. *Global Environmental Politics*, 2(2), 92-115

Peet, R. & M. Watts. Ed. 1996. *Liberation Ecologies*. Routledge. London.

Prasad, A. 2004. *Environmentalism & The Left: Contemporary Debates & Future Agendas in Tribal Areas*. Leftword Books. New Delhi.

Ostrom, Elinor, 1990. *Governing the commons: The evolution of institutions for collective action* Cambridge University Press

CCGMA McKean, E Ostrom, 2000. *People and forests: Communities, institutions, and governance*, Mit Press

Giddens, A. (1996) - *Global Problems and Ecological Crisis in Introduction to Sociology (2nd Ed)*. New York: W.W. Norton and Co.

Goldblatt, D. (1996). *Social Theory and the Environment*. Cambridge: Polity Press.

Gosling, D. (2001). *Ecology in India and South Asia*. London: Routledge.

Hannigan, J. (1995). *Environmental Sociology*. London: Routledge.

Select Readings:

Baviskar, A. (1999). *In the Belly of the River: Tribal Conflicts over Development in the Narmada Valley*. Oxford University Press.

Bauman, Z. 2004. *Wasted Lives: Modernity & Its Outcasts*. Polity Press. U.K.

Beck, U. (2006). *Living in the world risk society: A Hobhouse Memorial Public Lecture given on Wednesday 15 February 2006 at the London School of Economics*. *Economy and Society*, 35(3), 329-345.

Buttel, F. H. (2000). *Ecological modernization as social theory*. *Geoforum*, 31(1), 57-65.

Carolyn Merchant (Ed.) *Ecology*, Rawat Publications, Jaipur, 1996.

Cederlof, G. & K. Sivaramakrishnan. Ed. 2005. *Ecological Nationalisms: Nature, Livelihoods, & Identities in South Asia*. Permanent Black. Delhi.

Chhatre, A. & V. Saberwal. 2006. *Democratizing Nature: Politics, Conservation & Development in India*. O.U.P. New Delhi.

Chaudhary, Sukant K. (ed) *Readings in Indian Sociology- Sociology of Environment- Volume*

VII

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Gender and Society

Unit 1

Conceptual Issues: Gender, Social Construction of Gender: Masculinity, masculinity and femininity as social constructs, Gender Socialization, Patriarchy: its manifestation: patriarchy and male power, Sexual division of Labour , Gender roles and Sex-Gender distinction.

Theories and Major Social Issues of Gender:

Theories of Gender Relations : Liberal, Radical and Socialist and Post-Modern Feminism;

Unit 2

Women, Biology and Society:

Views of Lionel Tiger & Robin Fox, George Murdock, Talcott Parsons & John Bowlby

Views of Ann Oakley, Bruno Bettelheim, Ernestine Friedle & Sherry B. Ortner

Unit 3

Understanding Intersections

a) Gender, Caste, Class & Religion

b) Gender, Sexualities and Society

c) Family, Work & Labour Market: Gender socialization in the family, education, employment and the media; Gender difference in occupations and rewards; Invisibility of Women Participation in Economic Activity; Women in Unorganized and Organized Sector;

d) Gender and Globalisation and Work

Women in Agriculture; Services and Professions; Women and the Labour Market; Importance of Women's Work changes in the social position of women; the impact of equal opportunities policies;

e) Understanding Contemporary Sexual Challenges: Sexual orientation; sexual violence against women, men and LGBTQ+; Sexuality, Health, and Human Rights; Sexuality And Social Movements

Unit 4

Gender, Development & Indian Nation State

a) Gender & Development - Concepts & Critiques Impact of Development Policies on Women's Empowerment

- b) Issues of Body, Health & Violence Against Women and Laws - Rape and Domestic Violence; Dowry deaths and Pornography; Violence and Media;
- c) Gender & Political power: Constitutional Provisions and State Initiatives to Uplift the Status of women. Law Relating Crimes Against Women

Unit 5

Women's Movement & Intersecting Movements

Gender, Ecology and Environment

- a) Women's Resistance Movements Organizations, Movement and Autonomy: An Overview of Women's Movement in India, From Chipko to Sati; Women in India: The Changing Status of Women in India: Colonial and Post Colonial, Status Indicators: Demographic, Social, Economic and Political
- b) Contemporary Women's Movement Challenges Before Women's Movement.

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INDUSTRY AND SOCIETY

Specific Objectives of the Paper:

1. To acquire sociological understanding of industry and society.
2. To get acquainted with dynamics of industrialization and its consequences.
3. Provide knowledge on Industrial Sociology and the Industrial relationship to the students.
4. Examine the direction and implications of trends in technological change, globalization, labour markets, work organization, managerial practices and employment relations.
5. Focus on the impacts that they have upon individuals and society.

Unit I

Industry and the Framework of Sociological Analysis

Nature of Industrial Sociology. Role and Personality, Generalised Goals and Role Playing. Social System, Social Change., Social Relations in Industry, Social Organisation in Industry-Bureaucracy, Scientific Management and Human Relations.

Unit II

Industry and Society

Industrialization in India, Industrial Policy Resolutions –1956; Science, Technology and Innovation Policy of India; Liberalization, Privatization; Globalization; Industrial Policy in India after 1991; Effects of industrialization on the community. Impact of industrialization on Caste Class and class conflict in industrial society; Industrialism and traditional family, Industry and Family Disorganisation. Dynamics of industrialism, Industrialism and future.

Unit III

Social Consequences of Industrialisation: Women and Labour, Feminization of Labour, Industrialisation and Urbanisation of Rural Areas. The case of Sterlite in Tuticorin. Tribal People in industrial Setting.

Unit IV

Research in Industrial Sociology: trends and Issues

Unit V

Visualizing the future: Models of industrialization-Collectivist, anarchist, free market, environmentalist, etc. Cultural issues, consumer society and sociological concerns
Restructuring of Industrial society under the impact of globalisation

Essential Readings:

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4. Kumar, K. (1991). *Prophecy and Progress: The Sociology of Industrial and Post Industrial Society*. Penguin: Delhi.
5. Appadurai, Arjun. (1996). *Modernity at Large: Cultural Dimensions of Globalisation*
6. Biswajit Ghosh. 2010. 'How to Govern Corporate Houses? Significance of Industrial Democracy and Social Unionism in the Context of Globalisation', in S. K Pramanick & R. Ganguli (Eds.) *Globalisation in India - New Frontiers and Emerging Challenges* (191-218). PHI Learning Private Limited, New Delhi.
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21. Tom Burns ed. 1973. *Industrial Man*, Penguin Books.
22. C.S. Venkataratnam. 2001. *Globalization & Labour –Management Relations*, Response Books (Sage).
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SOCIAL GERONTOLOGY

Objectives

At the end of the course, the scholars will be able

- To understand the complexity of the aging issues, forms and mechanisms of oppression and discrimination against Aged and the strategies for change that advance social and economic justice
- To study the traditional ways of accommodating the aged population in the main streams of family, community life and society as whole
- To see how far they could cope up within in the modern society with regard to social support and formal and informal networks.
- To develop strategies for creating a healthy atmosphere for the aged

Unit I: The Aged in Society

Concept, Status, Characteristics and Problems - Demographic and Socioeconomic Context. Needs, Rights and Obligations of Aged - Cultural and Subcultural Variations in Values regarding the Aged.

Unit II: Theoretical Perspectives

Historical perspective. Disengagement theory. Activity theory. The Structural Dependency theory. Modernisation theory.

Unit III: Formal and Informal Networks

Social Support systems for the elderly. Engagements and Levels of Connections in Community Life, Establishment of Relationships. Factors Affecting the Links. Declining Role of Communities - Institutional Relationships - Ties with Institutions in Everyday Life and during Emergencies, Levels of Confidence in Institutions- Old age homes- Day care centers. Family and Kinship Ties, Friendship and Neighbourhood Ties - Changing Family and Household Pattern - Relationships between Grandparents and Grandchildren. Types of Reciprocity. Multiple Generational Model - Extent, Direction and Content of Support. Competing Demands and Prioritizing Needs of Three Generations.

Unit IV: Successful Aging

Physical, Economic, Social and Cultural Capital for Successful Aging-Quality of Life/Adaptation Care to the Elderly: Personal Care, Healthcare, Household Care-Elderly as Support Providers: Nature and Extent of Support Extended by Elderly to the Family, Friends, Neighbours, Community and Society- Schemes available for aged.

UNIT V: Policies and Schemes for the Aged

National Policy on Older Persons (NPOP), National Council of Older Persons (NCOP), Integrated Programme for Older Persons (IPOP) and National Old age Pension Scheme (NOAP). The Maintenance and Welfare of Parents and Senior Citizens Act, 2007. Constitutional provisions and legal provisions for Old age people in India. Role of NGO's and Institutional care
International Development and Population aging, Aging, Pensions and Social Security in South Asia, Long term care, Health policy, Variations among policies and programmes, Factors affecting the development of policies, Policy dilemmas

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SOCIOLOGY OF HEALTH

Objectives

At the end of the course, the scholars will be able

- To know the theoretical paradigms relating to sociology of health from the micro socialanalysis of illness perception and help-seeking
- To learn the concepts of health and also to know that the health is primarily a socialscience subject than of medical science.
- To understand the problems of health in India with respect to social epidemiology as wellas social cultural context of health behaviour and health care delivery system in India

UNIT I

Sociology of Health Aspects and Health Care System: Health - Social, Emotional, Physical and Spiritual; Formation of Health Behavior and Treatment -Beliefs, Values, Attitudes and Practices, Social Groups and Access to Healthcare, Community Health and Social Medicine; Sociology of Health - Explosion of Health Care System, Relationship between Sociology and the Health Care Institutions; Stratification and Health Care - Social class and Mental illness, Social class and Physical illness

UNIT II

Social Epidemiology: Explaining Health Disparities, Vital and Public Health Concepts - Personal Hygiene, Environmental Sanitation, Immunization, Protected Water Supply, Drainage and Sanitation facilities; Demography - Epidemiological Model and Health Care; Epidemiology of Disease - Social Epidemiology and Ecology of Disease – Microbial Theory -Process of Transmission

UNIT III

Social and Cultural context of Health and Illness Behavior: Social Roots of Health and Disease - Early Socialization- Women's Health & Healthcare Decisions – Gendered Embodiment: Women as Care giver- The Traditional Support Networks and Involvement of Supportive Ties - Extended Families-Kin Network, Neighbours and Friends; Sick Role and Illness Behavior – The Parsonian viewpoint of the sick role-The Doctor-Patient Relationship- Alternative health care system

UNIT IV

Healthcare Delivery System: Traditional –Home Remedies, Family and Native Care, Community Healers, Role of Women and Elderly in Healthcare – Health care system in India - State Level Health Care System - Primary Health Centers

and Sub-centers, Providing Primary Healthcare in Rural Communities; Modern Hospitals - Doctor, Paramedical Personnel and Counseling Techniques; Health Education – Alternative Systems of Medicine and Integrated Approach.

UNIT V

State Intervention, Policies and Programs: Five Levels of Intervention: Rehabilitation, Effective Treatment and Disability Limitation, Early Diagnosis and Prompt Treatment, Specific Protection (Immunization); Health Promotion National Health Policy - Provision of Healthcare in Rural and Urban Communities“ Public Health Programs: Special Teams and Integrated Health and Family Welfare Approach, Multipurpose Health Workers; Medical Benefits - E.S.I., Maternity, Death benefits, Medical Insurance

References:

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Manonmaniam Sundaranar University
Ph.D Social Work Programme
Course Work Syllabus

S.No	Course Title	Credits	Hours / Week
1	Core- I : Advanced Social Work Research and Teaching Methodology	4	4
2	Core- II : Contemporary Social Work	4	4
3	Project Oriented Electives: 1. Human Resources Management 2. Family & Child Welfare 3. Community Development 4. Medical and psychiatric Social Work	4	4

**Course Title: ADVANCED SOCIAL WORK RESEARCH AND TEACHING
METHODOLOGY**

Core : 1

**L T P C
4 0 0 4**

Objectives:

- To strengthen the understanding of research methods.
- To help them conceptualize research projects.

Unit I

Basics of social Research: Natural and social science, Scientific Method: concept of research, components, concept, scope and ethics, approaches, characteristic and purposes, logic and techniques of research: ontology, epistemology, grounded theory. Theory, facts, concept constructs Variables and Hypothesizes, Research Problem, Identification and Formulation. **(10 L)**

Unit II

Social work Research: meaning, objectives, scope, process, integrating research and social work practice. **Research Design:** meaning, component and importance of typology of research design, cross sectional and longitudinal studies, case studies, participatory and rapid assessment procedure; single subject research process, types. **Qualitative research** meaning, scope, characteristics, strategies, criteria: methods of qualitative research: ethnography, focus group discussion, life history (oral and narrative) and content analysis – use and limitations. **(14 L)**

Unit III

Sources of data – Primary and secondary, online journals and resources, Research tools – interview schedule, guide, questionnaire & case study- Scaling techniques – L.L. Thurstone and Likert Scale - reliability and validity - Methods of data collection – observation, interview. Sampling – need, Types and procedures. Determination of sample size. Sampling error. Preparation of research proposal, Report writing, communicability of research, **Quantitative research:** Meaning, types, quantitative vs quantitative research triangulation and are protocols. **Action Research, Mixed methods Evidence based research. Evaluation Research in social work:** Multiple study design, impact study, cost benefit analysis, social impact analysis, use of evaluation research **(14 L)**

Unit IV

Data Analysis: Analysis of quantitative data: meaning, scope, and limitations of statistics. Data types, summation, organization and presentation of data, frequency distribution, tabulation and diagrammatical and graphical presentation. **Correlation:** Simple, Partial and Multiple. **Regression:** Linear, stepwise and multiple methods of hypothesis Testing parametric and non- parametric tests. Chi – square; time series analysis (students may be given a brief orientation /introduction on ANOVA, ANCOVA, MANOVA, index number, cluster analysis, factor analysis, path analysis and logistic regression) Packages for Data Analysis. **Analysis of qualitative data:** data reduction,

data display and conclusion, interpretation, explanation and theorization. **Research proposal and Reporting Research:** structure of research report – audience - writing quantitative and quantitative report, referencing. **(14 L)**

Unit – V Methodology of Teaching (8 L)

Teaching – Objectives of Teaching, phases of Teaching – Teaching methods: lecture method, discussion method, discovery learning, Inquiry, Problem solving method, project method. Seminar – Integrating ICT in teaching: Individualised instruction, ways for effective presentation with power points, documentation – Evaluation; formative, summative & continuous and comprehensive Evaluation. Later Adolescent Psychology; meaning, physical, cognitive, emotional, social and moral development – Teaching later adolescents.

(Total 60 L)

References

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2. Antony Giddens & Jonathan H Turner (1987) Social Theory today, (eds) Polity press in assn with basil Blac, Cambridge.
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4. Brymen, Alan & Duncan Cramer (1990) Qualitative Data Analysis for Social Scientists, Rutledge London
5. Champion,D.J. (2000) Basic Statistics for Social Research(Section, Chandler)
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7. DENzin Norman & Lincoln S Yuonna, Collecting and interpreting qualitative materials, sage publications, New Delhi
8. Denzin Norman (1978) The research Act, MCGraw Hill
9. Goode & Hatt (1952) Methods in social research, MCGraw Hill
10. Gupta S.P (1992) Elementary Statistical methods, sultan chand & sons, New Delhi
11. Klaus Klippendorff (1996) content analysis, An introduction to its methodology sage
12. Kothari .C.R(2013) Research methodology, methods and technique, New Age Pub.
13. Laldas D.K (2000) Practice of Social Research Rawat, Jajpur
14. Morgan David. L (1996) Focus Group, Annual Review of Sociology.
15. Ramachandran, P. (1993) Survey research for social work: A Primewr, TISS, Bombay
16. Richard. G..., et al, (2004) Scaling Procedure – issues and applications, sage publications New Delhi

17. Singleton, Royce JR., et al, (1986) Approaches to Social Research, Oxford University Press, New Delhi
18. Singh. K (2007) Qualitative Social research method, Sage publishers
19. Wilkinson & Bandarker (1984) Methodology and Techniques of Social Research, Himalaya , Bombay
20. Young Pauline V (1960) Scientific social surveys and research, Prentice Hall, New Jersey
21. Sampathkumar, K, Panneerselvam, A. & Santhanam, S. 1984. Introduction to educational technology 2nd revised ed. Sterling Publishers, New Delhi.
22. Sharma, S.R. 2003. Effective classroom teaching modern methods, tools and techniques. Mangal Deep publishers, Jaipur.
23. Vedanayagam, E.G. 1989. Teaching technology for college Teachers, Sterling publishers, New York.

Course Title: CONTEMPORARY SOCIALWORK

Core No: 2

L T P C
4 0 0 4

Objectives:

- To enable students to learn about the profession of social work and its importance.
- To develop the knowledge of students about fields of social work, its practice and application.
- To develop an insight in students about various theories of social work.

Unit I

Social Work – A profession in changing contexts – Macro-level contexts – Meso-level contexts – Micro-level contexts – values, ethics & empowerment. Social realities and responsibilities of professional social workers. Theories related to social group work and community development (10 L)

Unit II

New directions for social work: Interdependence – Reciprocity, Citizenship and social justice. Radical social work – roots – radical social work diaspora – feminist social work practice – issues. Intervention paradigms – the four forces of social work: Psycho dynamic paradigms, cognitive/behavioral/communication paradigms, experiential/Humanistic/Existential/paradigm, transpersonal paradigms. (10 L)

Unit III

The strengths approach to social work practice: Guidelines for strength assessment - assessment process: Defining the problem situation, framework for assessment, the strength model - Approach with individual, group and community –. Social problems relating to Ageing, Transgender, human rights, unemployment, gender issues, communal riots, drug abuse, de-addiction, alcoholism, child labour, poverty, illiteracy, crime and violence, juvenile delinquency, victims of trauma, substance abuse. (14 L)

Unit IV

Crisis Intervention - crisis and stress - techniques of crisis intervention - Crisis Intervention Model - Bereavement of loss – A frame work for understanding, coping with catastrophe. Task centered functions – Phases – Issues - psycho-social approach - Behavioral social work – Benefits and techniques - A frame work for social work practices - constructive social work approach - Application & limitations. (12 L)

Unit V

Models and Theories in social work: The problem solving model - The Psycho-social therapy model - Functional model – Behavior Modification Model — Task centered case work model – Holistic model - Therapeutic model - Psycho analytic theory - Marxist Theory -Feministic theory - Cognitive – behavioral theory – Psycho-dynamic theory – Ecosystem - system theory - Role theory - Gestalt theory, CBT to social work – Attachment theory & social relationship. (14 L)

(Total 60 L)

REFERENCES:

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2. Alexander, Leslie B.(1972) Social work's Freudian deluge: myth or reality?, Social Service review.
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11. Chris Becket, Essential theory for social work practice (2006) sage publishing Ltd, London
12. Chris Clack (1999), social work ethics, politics, principles and practice 9th Ed. Jo campling palgrave, Hampshire.
13. Devi Rameswari and Prakash Ravi (2004): social work methods, practices & perspectives – vol II, Mangal Deep Publication, Jaipur.
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15. Gautham .P.R (2012) Social work: Methods practices and perspectives, centurypress publishers –New Delhi
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17. Gupta, Sumithra, Social Welfare in India, chugh publications, Allahabad, 1989.
18. Hans, Nagpaul (1996) Social work practice in Urban India, Rewat Publications, Jaipur
19. Johnson.C.L (2012) Social work practice, PHI-New Delhi

20. Leonard Gibbs & Eileen Gambrill (1999) critical thinking for social workers (ed. Jo campling), Pgrave, Hamsphire.
21. Marion Bogo 2013, Social Work Practice: Concepts, Processes, and Interviewing, Columbia university press.
22. Mel Gray, Stephen Webb 2012, Social Work Theories and Methods, sage publication
23. Payne, Malcom., Modern social work theory : A critical introduction, Mac millan
24. Roberta R. Greene 2011, Human Behavior Theory and Social Work Practice of Social Work Applications, Transaction Publishers. Volume 1
25. Taylor. S. H (2013) Theory and practice of community social work- Rawat publishers New Delhi.
26. Vyas M.D (1993), Personality Development- Counseling therapy, Anmol Publications, New Delhi.
27. William Borden 2013, Reshaping Theory in Contemporary Social Work: Toward a Critical Pluralism in Clinical Practice, Columbia University Press

HUMAN RESOURCES MANAGEMENT

Project Oriented Elective No: 1

L T P C
4 0 0 4

Objectives:

- To develop the knowledge of students about fields of Human Resource Management, its importance, practice and application.
- To develop an insight in students about various theories & challenges of Human Resource Management

Unit I

HRM – concept, meaning and evolution of HRM and HRD. HR - challenges and opportunities, HR – policies, procedures and programmes - HR policies, procedures and programmes - HR planning, recruitment, selection, placement, psychometric tests, employee attrition and retention, career planning and development and strategic HRM.

(12 L)

Unit II

Compensation Management – wage and salary Administration, current trends in compensation Management. Training and Development – policy, training need analysis, designing, conduction and evaluation of training. Competency mapping, knowledge Management.

(12 L)

Unit III

Performance Appraisal and potential appraisal, performance, counseling, performance management, grievance handling, health and safety management – TQM (Total Quality Management), Quality at work life (QWL). Employee separation, HR Audit and HR Outsourcing.

(12 L)

Unit IV

Management of change: Process of managing organizational change, managing resistance to change, strategies and guidelines for imparting change approaches to planned change - process of organizational development, designing intervention and evaluation intervention. Team building – conflict management.

(12 L)

Unit V

Corporate Social Responsibility (CSR) – concept - need, importance, CSR in Indian context and in Global scenario, corporate community participation, role and skills of social policies and activities, CSR standards and norms, case of successful CSR initiatives.

(12 L)

(Total 60 L)

References:

1. Bhatia S.K, “Human Resource Management” – A competitive advantage, Deep and Deep publications Pvt. Ltd . New Delhi 2006.(658. 3B).
2. Dipak Kumar Bhattacharya, Human Resources Management. Excel Books, New Delhi 2002 (658.3D)
3. Jyothi P. and Venkatesh D.N, Human Resource Management. Oxford University Press New Delhi 2006 (658.3j)

FAMILY AND CHILD WELFARE

Project Oriented Elective No: 2

L T P C
4 0 0 4

Objectives:

- To help the students understand the Theoretical and conceptual framework of family and welfare issues.
- To understand and promote Child, women and youth welfare.

Unit I

Theoretical and conceptual framework to study family: origin and evolution of family and marriage. Ideology of family rights and responsibilities, normative family and marriage function and structure, ethnicity and socio-economic background, Social changes and changes in family and marriage function and structure, implications for the family and its members. Alternative family and marriage patterns and structure: dual earner/carrier family single parent families, female headed household childless family, methods for family assessment and its implications, modes of awareness building. **(12L)**

Unit II

Family Welfare: concept, family planning and family welfare planning, methods of family planning, critical review of International, National and state policies and programmes for family planning, life education population, education and sex education: concept, scope, need, techniques. History and definition of family violence, studying family violence. Theories of family violence. **(12L)**

Unit III

Child welfare: Concept, constitutional safeguard, International, National and state level policies, child rights - UN charter legislations related to child, Factors influencing child development, girl child socio-economic practices and their impact on girl child. Child in special circumstances - destitute child, delinquents child: child welfare board. Child abuse, and neglect, societies' role in abuse and neglect, child exposed to domestic violence. Critical review of child welfare programmes of UNICEF, WHO, ILO, Government of India and state government. **(12L)**

Unit IV

Challenges and Intervention in Youth welfare: Concept of youth, youth profile, socialization of youth, youth problems - behaviour, functional and emotional problems. Role of youth in freedom movement, social change, politics, youth movement and ideologist, youth unrest and youth development. Youth welfare: concept definition, philosophy and evolution of youth welfare programmes in India. Policies and Programmes for youth, and training for youth leadership, problems of rural, urban and

tribal youth and application of social work methods in working with youth groups.
(12L)

Unit – V

Women welfare & Gender Issues: Status of women, concept of reproductive health and rights, gender and women development, problems of rural, urban and tribal women, critical analysis of third gender and their rights, women trafficking, women in commercial sex, women in non formal/informal sector, women in slums, women and education, critical review of policies, programmes and legislation to women.
(12L)

(Total 60 L)

Reference:

1. Besharov, D.J. (1990), Recognizing child abuse: A guide for the concerned, The free press, New York.
2. Chalk , R. & King P.A. (eds) (1998), Violence in families: Assessing prevention and treatment programs,
3. Crosson-Tower, C. (2002), Understanding child abuse and neglect (5th Ed). Boston: Allyn & Bacon.
4. Crowell, N.A & Burgess A.W (eds) 1996), Understanding violence against women
5. D.C. National Academy press Washington
6. Dutton, D.(1995), The domestic assault of women; Psychological and criminal justice perspective, CA: UBC press, British.
7. Jayanthi, I and Thomas William A, (2017) Disaster and Tsunami: Psychosocial Impact, Kapaz Publication, New Delhi.
8. Migonon, S.I, Larson C.J., & Holmes, W.M. (2002) Family abuse: consequences, theories and responses, MA: Allyn & Bacon , Boston.

Community Development

Project Oriented Elective No: 3

L T P C
4 0 0 4

Objectives:

- To help the students understand various communities living in India.
- To understand the various programmes related to community development.

Unit - I Rural development-concept problem and issues

Rural community – rural urban differences and continuum – types of Indian village community concept and need of rural community development - approaches of rural development. Spatial planning approach - multipurpose approach, integrated development approach, area development approach - multilevel district planning, target sector approach – illiteracy – poverty - unemployment, underemployment, seasonal employment, untouchability, communal conflicts – political issues – impact of globalization. (14L)

UNIT – II Rural community Development Administration

Organizational set up and administration from national to block level – central rural development ministry and community development agencies and district level rural development agencies and district planning authorities – functions of block development officer and extension officer – role of voluntary agencies in rural community development. (12L)

UNIT - III Concept and problems of urban community

Definition, classification, characteristics and theories of urbanization, SLUM: definition, theories, causes and characteristics, housing Deviant behaviour, corruption, prostitution, beggary, sanitation, health congestion , pollution. (10L)

UNIT IV

History of urban local self-government in India, form of urban local self-government, organizational structure and functions. Problems of municipal administration in India. Process of organizing the communities. New trends in popular participation in Development. Relevance of Social work practice (10L)

UNIT - V Rural and urban community development programmes

Rural Development Programme: A very brief idea on IRDP, ITDP, TRYSEM, DWACRA - In-depth study on Centre and State current programmes.**Urban Development Programmes:** Urban development policies; Town planning and Related Legislations; Town planning Acts; Land Acquisition Act, programmers: A very Brief idea on IUDP, UBS; In-depth study on recent programmes: Swarna Jayanthi Shahari Rozgar Yozna: Development of women and children in urban areas; Urban self – Employment Scheme; National Slum Development Programmes; Urban Wage employment Programmes. (14L)

(Total 60 L)

REFERENCES:

1. Cerdic Pagh (1990) Housing and urbanization: A study of India, New Delhi. Sage.
2. Christopher and Thomas William, (2011) Community Organisation and Social Action, 2ed. Himalaya Publications, Mumbai.
3. Dahama O.P (1982). Extension and Rural welfare, Agra, Ram Prasad and sons.
4. Desai A.R. Rural sociology in India , Bombay Popular Prakashan.
5. Dube S.C (1958) India's changing villages, London Rutledge and Kegan Paul.
6. Dube M.K (2000) Rural and urban development New Delhi, common health
7. Gopala Krishna & Ansari V. (1985), Technological change for Rural Development in India.
8. Dana Chekki (1979). Community development: theory and method of planned change, New Delhi Vikas.
9. Mahajan V.S. (Ed).(1993). Employment through rural development onwards sustainability, New Delhi Deep and Deep.
10. Madras school of social proceedings of the national seminar on people's participation in community development, Madras.
11. Mihal S.P and Rafio Khan M. History of Rural Development in Modern India New Delhi Gandharan Institute of studies.
12. Mishra G.P. Dynamics of Rural Development in village India. New Delhi. Ashiash.
13. Rajeswar Dayar (1962) Community development programmes in India. Allahabad, Kitals Mahal.
14. Ram K. Verma (1996) Development Infrastructure for Rural Economy, Jaipur Print Hell.
15. Thakur B.N (1988) Sociology of rural development, New Delhi Classical.
16. Thoha, M. and Om Prakash (1989) integrated rural development (Vo I and Vo I) Bangalore sterling.
17. Thomas William A. and Christopher A.J. (2011) Rural Development: Concept and Recent Approaches, Rawat Publications, Jaipur.
18. Vasudeva Rao, D (1985) Fact and rural development, New Delhi Ashiash.
19. Vijay C.M (1984) Rural Community Administration in India, Jaipur prateek

Medical and Psychiatric Social work

Project Oriented Elective No: 4

L T P C
4 0 0 4

Objectives:

- To develop and understand issues relating to Mental Health, Illness, Psychiatric and Medical Social Work and to promote interventional strategies

Unit I

Mental health and illness: Concept of positive mental Health, Psychological well being, mental health and illness, attitude towards mental illness, epidemiological studies and socio demographic correlates of mental illness in India. **View points of illness:** biological, psycho-social and socio-cultural: causal factors in abnormal behavior, perspective on causation: biological and psycho-social causal factor. Anxiety disorders, dissociative (conversion) disorders, obsessive compulsive disorders, adjustment disorders and behavioral syndromes associated with psycho physiological disorders. Psychopathology of personality and behavior disorders, specific personality disorders, behavior disorders due to psychoactive substance use and alcoholism, sexual dysfunctions and disorders, psycho active substance use disorders. (16L)

Unit 2

Psychiatric social work: History, objectives, scope, nature and principles of psychiatric social work, role of psychiatric social worker in hospitals, day care centre, foster homes, community projects and educational institutions, half way home. Psychological based therapies: psycho dynamic therapy, behaviour therapy, cognitive behaviour thereby, humanistic experiential therapies and therapy for inter personal relationship. Applications of tools/scales to measure the psychiatric disorders and use of statistical package (practical exposure study). (14L)

Unit 3

Medical Social work: Concept, historical development, principles, need and scope. Dimensions of health; positive health and well being; determinants of health, right to health; indicators of health, parameters of community health, philosophy of health services. (10L)

Unit 4

Pathology of Disease: Causation, modes of transmission, disease control, concept of prevention and level of prevention, mode of intervention and changing patterns of disease. (10L)

Unit 5

Hospital planning and Administration: Management process and principles, hospital organization structure, hospital planning and challenges of the administration of hospital services, administration of outpatient and inpatient services, emergency services in hospitals, planning and management of ophthalmic services, radiotherapy and oncology centre, management of neonatal intensive care, administration of rural hospitals, role of hospitals in primary health. **(10L)**

(Total 60 L)

References:

1. Robert C. Carson James N. Butcher & James C. Coleman: Abnormal psychology and modern life (8th edition), Marfatia j.c: Psychiatric of Children Popular Prakhasan , Bombay, 1971.
2. Roberts N. Mental health and mental illness, Rutledge & Kegan Paul, London 1967.
3. Eden D.J. Mental handicap – an introduction George Allen and unnin , London, 1976.
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6. Banergee G.R.: Social service Departments in Hospitals – Is organizations and functions , TISS , Bombay, 1950
7. J.E Park, social and preventive Medicine
8. John Howells G. Modern perspective in international child
9. Psychiatry, Williams & wilkins , Vol. 2 & 3 1980
10. Verma, Ratna , Psychiatric social work in India, sage Pub., New Delhi, 1991
11. Skinner, sue Walrond: Developments in family therapy, Rutledge & Kegan Paul, London, 1981

**MANONMANIAM SUNDARANAR UNIVERSITY
TIRUNELVELI – 627 012**

**Syllabus for Ph.D., Course Work in Statistics
(With effect from the academic year 2018-2019 onwards)**

Following is the list of 14 courses carrying 4 credits each available to the Ph.D., candidates of statistics for selection according to their requirements:

Sl. No.	Course
1	Research Methodology
2	Advanced Sampling Techniques
3	Advanced Design of Experiments
4	Advanced Statistical Quality Control
5	Bayesian Inference
6	Statistical Inference in Econometrics
7	Stochastic Modeling and Its Applications
8	Markov Chains and Their Applications
9	Time Series Analysis and Its Applications
10	Advanced Operations Research
11	Reliability Theory and Its Applications
12	Data Mining Methods and Their Applications
13	Categorical Data Analysis
14	Mini Project

SYLLABUS

PAPER I: RESEARCH METHODOLOGY

Preamble: This course aims to guide the scholars towards achieving competence and proficiency in the theory of statistics and practice to research. This fundamental objective can be realized through helping the scholars to develop the subject of their research, encourage the formation of trained intellectual ability in higher level, critical analysis, rigor, and independence of thought, foster individual judgement, and skill in the application of research theory and methods, and develop skills required in writing research proposals, reports, and dissertation.

(12L)

Unit -I

Concept of Research – Importance of Research - Ethics in Research - Selection of Research Topics and Problems – Research in Statistics - Literature Survey and its Importance

(12L)

Unit- II

Preparation of Assignments, Thesis and Reports – Significance of Publications in Research – Journals in Statistics.

(12L)

Unit III

Measurable function and its properties - Measure and Integration - Monotone convergence theorem and Dominated convergence theorem - Fatou's lemma. Absolute continuity – Radon-Nikodym theorem – Singularity – Lebesgue Decomposition theorem – Fubini's theorem – Convergence types for measurable functions: almost everywhere, in mean and in measure and their relationships.

(12L)

Unit IV

Basic Concepts of probability-Conditional Probability and Expectation-Inversion theorem for characteristic functions-Helly's theorem- Prokhorov's theorem-Levy's continuity theorem and its variations.

(12L)

Unit V

Introduction to R – Using the help facility. R data types and objects, reading and writing data- import and export. Data structures: vectors, matrices, lists and data frames – Built –in data – Reading data from others sources – Merging data across data sources. Control structures: function, scoping rules, R dates and times- Grouping, loop and conditional execution – Ordered and unordered factors – Arrays and matrices – Classes and methods – graphical procedures – packages.

(Total: 60L)

BOOKS FOR STUDY

1. Kingman J.F.C and Taylor. J (1973): Introduction to Measure & Probability, Cambridge University Press.
2. Loeve M. (1963): Probability Theory, Van Nostrand, Princeton, Newyork.
3. Halmos P.R (1974): Measure theory, East-West Press, New Delhi.
4. Kothari, C.K. (2006): Research Methodology, Prentice-Hall of India (P) Limited, New Delhi.
5. MLA Handbook for writers of research papers, Modern Language Association, New York (2009).
6. Rowena Murry (2010): How to Write a Thesis, Tata McGraw, New Delhi.

PAPER II: ADVANCED SAMPLING TECHNIQUES

Preamble: Various methods of sampling widely used in practice are introduced in this course, which include PPS, SRS, Cluster, two-stage and two-phase sampling. The contents will enable the scholars to learn about the field survey, and the computational aspects of various estimators and their sampling errors.

Unit – I (12L)

Single stage cluster sampling: Clusters of equal sizes – Reasons for Cluster Sampling – A simple rule – Comparison of Precision Made from Survey Data – Variance in terms of Intracluster correlation – Variance and Cost Functions – Cluster Sampling for Proportions.

Cluster Units of unequal sizes – Selection with unequal probabilities with replacement – Optimum measure of size – The Horvitz-Thompson estimator – Brewer's Method – Murthy's Method – The Rao, Hartley, Cochran Method.

(12L)

Unit – II

Multi stage sampling-Two-Stage and three Stage Sampling – Finding means and variance in two-stage sampling – variance of the estimated mean in two-stage sampling. Sample estimation of the variance – estimation of proportions. Optimum Sampling and Subsampling Fractions.

(12L)

Unit – III

Double Sampling – Description – Double sampling for Startification – Optimum allocation – Estimation of variance in Double Sampling for Startification. Regression and Ratio Estimators.

(12L)

Unit – IV

Successive Sampling – Repetitive Surveys – Sampling on two occasions – Sampling on more than two occasions – Sampling for Time series.

(12L)

Unit – V

Sequential Sampling – definition – estimation of population size – comparative study – estimation of population mean – acceptable sequential estimators – Markov Sampling

(Total: 60L)

BOOKS FOR STUDY

1. Ardilly P and Yves T. (2006): Sampling Methods: Exercise and Solutions. Springer.
2. Cochran, W.G. (1977): Sampling Techniques, Third Edition, Wiley Eastern Ltd., New Delhi.
3. Daroga Singh and F.S. Choudry (1977): Theory and Analysis of Sample Survey Designs. Wiley Eastern Ltd., New Delhi.
4. Mukhopadyay, P. (1998): Theory and Methods of Survey Sampling. Narosa Publisher, New Delhi.
5. Murthy, M.N. (1977): Sampling Theory and Methods. Statistical Publishing Society, Kolkatta, India.
6. Raj, D. (1976): Sampling Theory, Tata McGraw Hill, New York.
7. Raj, D. and Chandhok, P. (1998). Sample Survey Theory. Narosa Publishing House, London.
8. Mukhopadyay, P. (2007). Survey Sampling. Narosa Publisher, New Delhi.
9. Mukhopadyay, P. (1998). Small area estimation in Survey Sampling. Narosa Publisher, New Delhi.

PAPER – III: ADVANCED DESIGN OF EXPERIMENTS

Preamble: This course introduces scholars to concepts and techniques of Classical and Bayesian design - experimental units, randomization, treatments, blocking and restrictions to randomization, and utility of designs. To be able to determine appropriate fixed, random, mixed models, general block designs, missing plot techniques, analysis of covariance, factorial experiments and split plot experimental designs and statistical analyses for the optimization of processes.

Unit – I (12L)

Construction of Orthogonal Latin Square of order s , s is a prime or prime power. Construction of Orthogonal arrays.

(12L)

Unit – II

Construction and analysis of confounded Symmetrical and Asymmetrical Factorial Experiments. Fractional Factorials and Main Effects plans – Method of construction of plans with factors at 2 levels, a series of orthogonal arrays of strength 3 (Resolution 4 Plans) with factors at 2 levels. Orthogonal main effects plans with factors at 3 and other levels. Construction and Analysis of Fractionally replicated Factorial Experiments Blocking in fractionally replicated designs.

(12L)

Unit – III

Construction and analysis of Quasi-Factorial Experiments Lattice designs – Simple Lattice – Kple Lattice, 'n' dimensional Lattice; Square Lattice – Rectangular Lattice. Construction and Analysis of Balanced Incomplete Block Designs.

BIBD, Partially balanced incomplete block designs, Revision and construction. Balanced / partially balanced 'n' array designs - Augmented designs.

(12L)

Unit – IV

Second and third order Rotatable designs – Central composite rotatable designs. Blocking in response surface designs.

Analysis of groups of Experiments – Sequential experiments analysis of long term experiments – Problems faced in the design and analysis of experiments for perennial crops. Construction and analysis of cross-over designs

(12L)

Unit – V

Diallel Crosses – Complete Diallel crosses, its analysis and efficiency factor, Optimal Diallel crosses plane. Robustness of Designs. Robustness of Diallel crosses plan.

(Total: 60L)

BOOKS FOR STUDY

1. Cochran, W.G and Cox, G.M. (1987): Experimental Designs, John Wiley, New York.
2. Das, M.N. and Giri, N.C. (1986): Design and analysis of experiments, Wiley Eastern Ltd. New Delhi.
3. Fisher, R.A. (1947): The Design of experiments, 4th edition, Oliver and Boyd, London.
4. Graybill, F.A. (1976): Theory and Application of the Linear Model, Wadsworth.
5. John, P.W.M.(1971): Statistical Design and analysis of experiments, Macmillan.
6. Joshi, D.D. (1987): Linear estimation and design of experiments. Wiley Eastern, New Delhi.
7. Rao, C.R.(1974): Linear Statistical inference and its applications, Wiley Eastern, 2nd edition.
8. Searle, S.R. (1971): Linear models, John Wiley, New York.

PAPER – IV: ADVANCED STATISTICAL QUALITY CONTROL

Preamble: This course facilitates an understanding of the principles of statistical quality control and reliability. Various types of control charts and techniques, acceptance sampling procedures, concepts of system reliability and maintenance policies are introduced, which will enable the scholars to understand the application of the concepts in industries.

(12L)

Unit – I:

Process Control: Control Charts by Variables and Attributes – Rational Subgroups - Basic Charts - Operating Characteristic and Average Run Length Functions – Designing Control Charts – Control Charts for Variable Sample Sizes and Varying Sampling Intervals – Control Charts for Short Production Runs. Cumulative Sum (CUSUM) Control Charts –V-mask Procedure – Tabular CUSUM Procedure. Moving Range, Moving Average, and Exponentially Weighted Moving Average Control Charts – Design and Robustness of Charts.

(12L)

Unit – II:

Tolerance Limits and Specification Limits – Setting Specification Limits – Estimation of Tolerance Limits. Acceptance Control Charts, Modified Control Charts. Capability Analysis: Process Capability Ratios - Process Capability Analysis using Histogram, Probability Plotting, Control Chart, Designed Experiments. Multivariate Control Chart: Hotelling's T^2 and Chi-square Control Charts, Multivariate Exponentially Weighted Moving Average Control Chart.

(12L)

Unit – III:

Product Control: Sampling Inspection by Attributes – Single, Double, Multiple, Repetitive Group, Sequential Sampling Plans – Operating Procedure, Plan Selection, Measures of Performance. Sampling Inspection by Variables – Assumption of Normality – Single, Double and Sampling Plans – Operating Procedures, Plan Selection Procedures, OC Functions.

(12L)

Unit – IV:

Attributes Sampling schemes – MIL-STD-105D - Normal, Reduced and Tightened Inspections - Plan selection. Variables Sampling Schemes – MIL-STD-414 – Procedures for Operation and Selection of Plans. Rectifying Sampling Schemes – Concept of ATI and AOQL - Dodge – Romig LTPD and AOQL Single and Double Sampling Plans Schemes – Selection of Parameters.

(12L)

Unit – V:

Sampling Plans for Continuous Production – Continuous Sampling Plans - CSP-1, CSP-2 and CSP-3 – Operation, Stopping Rules and Plan Selection – Measures of Performance. MIL-STD-1235 (ORD):

Special Purpose Plans: Skip-lot and Chain Sampling Plans - Operation and Selection - Measures of Performance. Switching Systems and TNT Sampling Schemes.

Reliability Sampling Plans – Type I and Type II Censoring – Reliability Criteria – Operation and Plan Selection – Measures of Performance.

(Total:60L)

BOOKS FOR STUDY

1. Bowker, A.N., and N.P.Goode (1952): Sampling Inspection by Variables. McGraw Hill, New York.

2. Costa, A.F.B.(1996): Joint \bar{X} and R Charts with Variable Sample Size and Sampling Intervals. Report No.142, Centre for Quality and Productivity Improvement, University of Wisconsin, Wisconsin.
3. Costa, A.F.B.(1997): X-bar Chart with Variable Sample Size and Sampling Intervals. Journal of Quality Technology, 29(2), 197-204.
4. Duncan, A.J.(1986): Quality Control and Industrial Statistics (Fifth Edition): Irwin, Homewood, Illinois.
5. Juran, J.M., and J.A.De Feo (2010): Juran's Quality Handbook – The Complete Guide to Performance Excellence. Tata McGraw Hill, New Delhi.
6. Montgomery, D.C.(2002): Statistical Quality Control – An Introduction (Sixth Edition): Wiley India, New Delhi. (Reprint, 2008).
7. Schneider, H.(1989): Failure Censored Variables Sampling Plans for Lognormal and Weibull Distributions. Technometrics, 31(2), 199-206.
8. Squeglia, N.L. (2009): Zero Acceptance Number Sampling Plans (Fifth Edition): ASQ Quality Press, Wisconsin.
9. Stephens, K.S.(2001): The Handbook of Applied Acceptance Sampling – Plans, Principles and Procedures. ASQ Quality Press, Wisconsin.
10. Stephens, K.S.(1995): How to Perform Skip-Lot and Chain Sampling (Second Edition): ASQ Quality Press, Wisconsin.

PAPER V: BAYESIAN INFERENCE

Preamble: This course explains the theory of Bayesian methods and their applications. From the contents of this course, the scholars will understand the difference between classical (frequentist) methods and Bayesian methods. The course will emphasize Bayesian data analysis through modern computer simulation methods. (12L)

Unit – I

Subjective probability – its interpretation and evaluation. Subjective determination of prior distributions. Improper prior, noninformative prior, invariant prior, Jeffreys noninformative prior and natural conjugate prior – family of distributions admitting natural conjugate prior. Models with hyperparameters and hierarchical priors. (12L)

Unit – II

Point estimation – Bayes estimators under various loss functions – generalization to convex loss functions. Evaluation of the estimate in terms of posterior risk – comparison with frequentist methods. (12L)

Unit – III

Interval estimation – credible interval, highest posterior density region. Comparison of interpretation of the confidence co-efficient of an interval by Bayesian and frequentist methods – simple problems. (12L)

Unit – IV

Bayesian testing of statistical hypotheses and model selection – specification of the appropriate form of the prior distribution for Bayesian hypothesis testing problem – prior odds, posterior odds, Bayes factor and their computations to various hypotheses testing problems – specification of Bayes tests. (12L)

Unit – V

Bayesian computation – Monte Carlo sampling and integration – Markov Chain Monte Carlo methods – Metropolis-Hastings algorithm, Gibbs sampling – theory and applications of these methods to high dimensional problems. Large

sample methods – limit of posterior distribution, asymptotic expansion of posterior distribution, Laplace approximation.

(Total: 60L)

BOOKS FOR STUDY

1. Berger, J.O. (1985): Statistical Decision Theory and Bayesian Analysis (Second Edition): Springer Verlag, New York.
2. Bernardo, J.M., and A.F.M. Smith(2000): Bayesian Theory. John Wiley & Sons, New York.
3. Gelman, A., J.B. Carlin, H.B. Stern and D.B. Rubin (2004): Bayesian Data Analysis (Second Edition): Chapman & Hall, London.
4. Ghosh, J.K., Mohan Delampady and T. Samanta (2006): An Introduction to Bayesian Analysis – Theory and Methods. Springer Verlag, New York. (Reprint, 2011).
5. Lee, P.M. (2012): Bayesian Statistics – An Introduction (Fourth Edition): John Wiley & Sons, London.
6. Leonard, T., and J.S.J. Hsu (1999): Bayesian Methods: An Analysis for Statisticians and Interdisciplinary Researchers. Cambridge University Press, London.
7. Robert, C.P. (1994): The Bayesian Choice: A Decision-Theoretic Motivation (Second Edition): Springer Verlag, New York.
8. Robert, C.P., and G. Casella (2004): Monte Carlo Statistical Methods (Second Edition): Springer Verlag, New York.

PAPER-VI: STATISTICAL INFERENCE IN ECONOMETRICS

Preamble: The objective of this course is to provide the basic principles of econometric models. This course will enable the scholars to use the models in the fields like engineering sciences, biological sciences, medical sciences, geo-sciences, agriculture sciences etc. It focuses on general linear models, generalized least square method and estimation of the parameters of the models.

(12L)

Unit-I

Inference on OLS Model, Estimation Subject to linear Constraints test for Structural change, use of dummy variable, serial correlation, nature of multi-collinearity, Estimation in the presence of perfect Multi-collinearity, specification error, lagged variables, qualitative dependent variables.

(12L)

Unit-II

Estimation of parameters in single equation model and classical least square model, Generalized least estimator, Autocorrelation and its consequences, Heteroscedasticity of disturbances and its testing, test for independence of disturbances, Stochastic regressors, use of instrumental variables.

(12L)

Unit-III

Concept of structure and model for simultaneous, Simultaneous Equation method of Estimation, Identification problem, limited information model, Indirect Least Square, Two Stage Least Square, LVRP method, Full Information method: Three Stage Least Square, and FIML Method.

(12L)

Unit-IV

Autoregressive model of first and second order, periodogram analysis, explosive models, Regression model for Time Series, concept relating to spectral density estimation.

(12L)

Unit-V

Multivariate Regression, classification analysis, Data Reduction Techniques: Discriminant function, principle components, Cluster analysis and canonical correlations.

(Total: 60L)

BOOKS FOR STUDY

1. Alvin C. Rencher (2002): Methods of Multivariate Analysis, John Wiley & Sons, New York.
2. Baltagi, B.H (2009): Econometrics, 5th Edition, Springer publisher, New York.
3. Goldberger (1964): Econometrics theory, Wiley Eastern, New Delhi.
4. Gujarati. D (2003): Basic Econometrics (4rd Ed.), McGraw Hill, New York.
5. Johnson, J (1984): Econometric methods (3rd Ed.), McGraw Hill, New York.
6. Anderson, T.W (1971): The Statistical Analysis of Series, John Wiley, New York.
7. Maddala, G.S and Kajari Lagari (2009): Introduction to Econometrics, John Wiley & Sons

PAPER - VII: STOCHASTIC MODELING AND ITS APPLICATIONS

Preamble: The contents of the course will explain various concepts of stochastic processes which have wider scope in many areas of scientific experiments and research. The course will focus on the theoretical concepts pertaining to classification of stochastic processes and their properties.

(12L)

Unit-I

Introduction of stochastic processes - Specifications of a stochastic processes - Markov chains -Classification of states and chains - Higher transition probabilities and its limiting behavior -Chapman Kolmogorov's equations - Stationary distribution - Ergodic theorem - Continuous time Markov processes - Poisson processes.

(12L)

Unit-II

Birth and death processes - Kolmogorov Feller differential equations of birth and death processes - Renewal theory - Renewal equation - Stopping time - Wald's equation - Elementary renewal theorem and its applications - Renewal reward processes - Residual and Excess life times - Markov renewal and Semi Markov processes.

(12L)

Unit-III

Introduction to Queueing Theory - Basic characteristics of a Queueing system and Problems in Queueing system-Probability Distributions as Models - Basic Concepts in Stochastic Queueing models - Kendall's notation for Queueing models-Little's Formulas - Stochastic process representation of Queueing theory-Steady state solutions for the queueing models.

(12L)

Unit-IV

Birth and Death Queueing models-State dependent service pattern-transient behavior of queues-Inventory models as a queueing models - Detailed study of single and multiple server queueing models - Advanced Markovian Queueing Models - Erlangian Bulk Queues - Retrial Queues - Queue with Priority Disciplines - Preemptive priority and Non - Preemptive priority queue - Queueing Networks-Vacation Queueing Models- Bernoulli Vacation Queueing Models.

(12L)

Unit-V

Higher transition probabilities – higher order Markov chains - Multivariate Markov chain models - Applications to queues and storage problems - Decision Problems in Queueing Theory - Simulation techniques in Queueing Models - Case Studies and Applications in Queueing theory.

(Total: 60L)

BOOKS FOR STUDY

1. Ching, W.K and Michael, K (2006): Markov Chains: Models, Algorithms and Applications, Springer Science Business Media, Inc.
2. Cox, D.R. and A.D. Miller (1977): The Theory of Stochastic Processes, Chapman & Hall.
3. Feller, W. (1968): An Introduction to Probability Theory and its applications, Vol I and II. John Wiley.
4. Gross, D. and Harris, C. M. (2008): Fundamentals of Queueing Theory, Fourth Edition, John Wiley & Sons.
5. Hiller, F.S and Lieberman, G.J. (2004): Introduction to Operations Research, Chapters 10 and 11- Holden-Day.
6. Hiller, F.S and Taylor, H.M. (1980): Second Course in Stochastic Processes, Academic Press.
7. Karlin, S. and Taylor, H.M (1968): A First Course in Stochastic Processes – Vol. I. Academic Press, New York.
8. Medhi, J. (2009): Stochastic Processes, 3rd Edition, New Age International Publishing Limited, New Delhi.
9. Medhi, J. (2003): Stochastic Processes in Queueing Theory, second edition, Academic Press.
10. Narayan Bhat, U. (2008): An Introduction to Queueing Theory-Modeling and Analysis in Applications, Birkhauser.

PAPER- VIII: MARKOV CHAINS AND THEIR APPLICATIONS

Preamble: This course deals with Markov processes in various areas of applications. Markov chains in discrete and continuous time with respect to state diagram, recurrence and transience, classification of states, periodicity, irreducibility, etc., and be able to calculate transition probabilities and intensities for pursuing higher studies leading to post-graduate or doctorate degrees

(12L)

Unit-I

Introduction of stochastic processes-Classification of stochastic processes - Markov chains -Classification of states and chains - Higher transition probabilities and its limiting behavior - Chapman Kolmogorov's equations - Stationary distribution - Ergodic theorem - One dimensional random walk and Gambler's ruin problems.

(12L)

Unit-II

Continuous time Markov processes - Poisson processes and related distributions - Birth and death processes - Kolmogorov Feller differential equations of birth and death processes - Applications to queues and storage problems and Wiener process as a limit of random walks.

(12L)

Unit-III

Introduction to molecular biology – Bioinformatics and sequence analysis – Sequence alignment – BLAST – Multiple sequence alignment – Clustering algorithms.

(12L)

Unit-IV

Protein and DNA sequence analysis: Pattern discovery and sequence classification in proteins and nucleic acids - Proteins & proteomics prediction of molecular function and structures –DNA and RNA structure prediction. (12L)

Unit-V

Introduction of Hidden Markov model: Evaluation problem of HMM –Viterbi algorithm - Baum Welch algorithm - HMM applications in DNA &RNA – Advantages and limitations of HMM - Profile HMMs for Biological sequence Analysis.

BOOKS FOR STUDY

1. Cinlar, E (1974): Introduction to Stochastic Processes, Prentice Hall Publisher.
2. Cox, D.R. and A.D. Miller (1977): The Theory of Stochastic Processes, Chapman & Hall.
3. Gauham. N., (2009). Bioinformatics Databases and Algorithms, Narosa Publishing House, New Delhi.
4. Igacimuthu, S., (2009). Basic Bioinformatics Publishing House PVT. LTD, New Delhi.
5. Karlin, S. and Taylor, H.M (1968): A First Course in Stochastic Processes – Vol. I. Academic Press, New York.
6. Medhi, J. (2009): Stochastic Processes, 3rd Edition, New Age International Publishing Limited, New Delhi.
7. Ross, S.M (1996): Stochastic Processes, 2nd Edition, John Wiley & Sons, New Delhi.
8. Shui Qing Ye., (2008). Bio informatics A Practical Approach, Chapman & Hall/CRC, Taylor & Francis Group LLC.

PAPER-IX: TIME SERIES ANALYSIS AND ITS APPLICATIONS

Preamble: The objective of this course is to provide time series models which are applicable in various fields such as signal processing, pattern recognition, econometrics, mathematical finance, weather forecasting, intelligent transport and trajectory forecasting, earthquake prediction, control engineering, astronomy, communications engineering. The scholars will be able to apply the time series models focusing on MA, AR, ARMA, ARIMA models, estimation of ARIMA model parameters and forecasting.

(12L)

Unit- I

Stationary time Series, Auto correlation and Partial auto correlation function, Correlogram analysis, Spectral properties of stationary models, periodogram analysis, and spectral density function.

(12L)

Unit- II

Detail study of stationary process: moving average, autoregressive, autoregressive moving average and autoregressive integrated moving average process, Box – Jenkins models.

(12L)

Unit- III

Estimation of mean, auto covariance and auto correlation function under large sample theory, choice of AR and MA periods, Estimation of ARIMA model parameters, forecasting with Box – Jenkins model, Residual analysis and diagnostic checking.

(12L)

Unit- IV

Conditional Heteroscedasticity Model-Characteristic of Volatility- Auto regressive conditional Heteroscedasticity (ARCH)- Testing of ARCH effect-Generalized Auto regressive conditional Heteroscedasticity (GARCH) and GARCH-M model.

(12L)

Unit- V

Multivariate time series – cross correlation function and their properties- Vector Auto regressive model- Vector moving average model - VARIMA model – co integrated VAR model and Vector error control model (VECM).

(Total: 60L)

BOOKS FOR STUDY

1. Box, G.E.P., Jenkins, G.M. and Reinsel, G.C (2004). Time Series Analysis- Forecasting and Control, Pearson Education, Singapore.
2. Brockwel, P.J and Davis. R.A (1987). Time Series: Theory and Methods, Springer – Verlag, New York.
3. Granger, C.W.J. and Newbold (1984). Forecasting Econometric Time Series, Academic Press, New York.
4. Montgomery, D.C. and Johnson, L.A. (1977) Forecasting and Time Series Analysis, McGraw Hill, New York.
5. Shum way, R. H. and Stoffer, David S. (2006) Time Series Analysis and Its Applications: With R Examples. Springer-Verlag.
6. Tsay, R (2009). Analysis of Financial Time series, Willey Interscience Publisher.

PAPER-X: ADVANCED OPERATIONS RESEARCH

Preamble: Operations research is the professional discipline that deals with the application of scientific methods in decision making. The objective of this course is to provide adequate coverage of mathematical techniques and models and to equip the scholars to apply them in industries such as airline industry (routing and flight planes, crew scheduling), manufacturing industry (inventory control, production scheduling, capacity planning), transportation (traffic control, network flow, location planning) etc.

(12L)

Unit – I

Non-Linear integer programming-Beale's algorithm. Zero-one programming problem. Integer polynomial programming – Geometric programming and its applications. Stochastic programming.

(12L)

Unit – II

Continuous State Dynamic Programming. Bellman's principle of dynamic programming. Forward and backward process of solving a dynamic programming problem. Stage coach problem. Advanced multi-period stochastic models. Use of dynamic programming in inventory problems.

(12L)

Unit – III

Stochastic inventory models-multiperiod models - solution through dynamic programming (s, S) inventory policies. Replacement problems – replacement of item failing according to probability law-block and age replacement policies.

(12L)

Unit – IV

Queueing models: Transient and busy period analysis in M/M/1 system – M/G/1 and G1/M/1 Queues – imbedded Markov chain approach to queueing problems.

(12L)

Unit – V

Job sequencing problem – Principle assumptions of sequencing problem – Solution of sequencing problem – Processing n jobs through two machines problem and Processing n jobs through three machines problem.

Priority Queueing models-Preemptive and Non-preemptive priority queueing models.

(Total: 60L)

BOOKS FOR STUDY

1. Gross.D and Harris.C.M. (1976): Fundamental of queueing theory, John Wiley.
2. Hadley,G. (1974): Non-linear and Dynamic programming, Addison-Wesley.
3. Hadley,G and Whitin, (1963): Analysis of Inventory system, Prentice Hall.
4. Hiller.F.S and Lieberman,G.J. (1974): Operations Research, Holden-Day.
5. Philips, D. T. Ravindran, A. and Solberg, J.T.(2007): Operations Research Principles and Practice.
6. Prabhu,N.U (2012): Queues and Inventories, John Wiley.
7. Rao,S.S. (1978): Operations Theory and application, Wiley Eastern.
8. Shambhlin and Stevens,Jr. (1974): Operations Research, McGraw Hill.

PAPER - XI: RELIABILITY THEORY AND ITS APPLICATIONS

Preamble: Basic principles of reliability theory will be emphasized. Scholars will get the exposure on practical utility of reliability models.

(12L)

UNIT I

Reliability concepts and measures – components and systems – coherent systems and their reliability – cuts and paths – modular decomposition – bounds on system reliability – structural reliability importance of components.

(12L)

UNIT II

Life time distributions – reliability function – hazard rate - common life time distributions – exponential, gamma, normal, Weibull, Rayleigh etc. – estimation of parameters and testing of hypotheses in these distributions.

(12L)

UNIT III

Notions of ageing – IFR, IFRA, NBU, DMRL and NBUE classes and their duals – implications – closures of these classes under formation of coherent systems.

(12L)

UNIT IV

Reliability estimation based on failure times under various censored life tests and tests with replacement of failed items – stress-strength reliability and its estimation.

(12L)

UNIT V

Reliability growth models – probability plotting techniques – Hollander-Proschan and Deshpande tests for exponentiality – tests for HPP vs NHPP with repairable systems. Basic ideas of accelerated life testing.

(Total: 60L)

BOOKS FOR STUDY

1. Bain L.J., and Engelhardt (1991): Statistical Analysis of Reliability and Life Testing Models. Marcel Dekker, New York.
2. Barlow, R.E., and Proschan,F. (1981): Statistical Theory of Reliability and Life Testing (Second Edition). Holt, Rinehart and Winston, New York.
3. Blischke,W.R., and Murthy,D.N.P. (2000): Reliability – Modeling, Prediction and Optimization. John Wiley & Sons, New York.
4. Lawless,J.F. (2003): Statistical Models and Methods for Lifetime Data (Second Edition). Wiley Interscience, Singapore.
5. Mann,N.R., Schafer,R.E. and Singpurwalla,N.D. (1974): Methods of Statistical Analysis of Reliability and Life Data. John Wiley & Sons, New York.
6. Nelson,W.B. (2004): Applied Life Data Analysis. John Wiley & Sons, New York.
7. Singpurwalla,N.D. (2006): Reliability and Risk – A Bayesian Perspective. John Wiley & Sons, New York.
8. Zacks,S. (1991): Introduction to Reliability Analysis. Springer Verlag, New York.

PAPER-XII: DATA MINING METHODS AND THEIR APPLICATIONS

Preamble: This course aims at facilitating the scholars to understand the basic concepts of data warehousing and data mining. Techniques involved in mining the data from the databases will be emphasized.

(12L)

Unit-I

Data mining- History-Definitions-Data Mining Functionalities- Classification of Data mining System- Major Issues in Data mining-Data warehouse and OLAP Technology-Multidimensional Data Model-Data warehouse Architecture- Data Warehouse Implementation.

(12L)

Unit-II

Data Preprocessing-Data Cleaning- Data Integration and Transformation- Data Reduction-Discretization and concept of Hierarchy Generation- Concept Description-characterization and comparison. Association Rule Mining- Mining Single Dimensional – Multilevel Association Rules-mining to correlation analysis-classification and prediction

(12L)

Unit-III

Overview on outliers – nature of Outliers - Outliers in Univariate Data - Outliers in Multivariate Data - Cluster Analysis, Cluster Vs Classification - impact of Outliers on clustering - clustering problems - Clustering Approaches.

(12L)

Unit-IV

Data-outliers in regression analysis and Time series - Regression and collinearity: Tools for handling multi- collinearity, methods based on singular value decomposition – Robust Regression- ridge regression. Properties of ridge estimator. Additive outlier – Multiplicative outlier and innovational outlier.

(12L)

Unit-V

Stationary time Series, Auto correlation and Partial auto correlation function, Correlogram analysis, Estimation of ARIMA model parameters, forecasting with Box – Jenkins model, Residual analysis and diagnostic checking.

(Total: 60L)

BOOKS FOR STUDY

1. Box, G.E.P., Jenkins, G.M. and Reinsel, G.C (2004). Time Series Analysis- Forecasting and Control, Pearson Education, Singapore.
2. Daniel T. Larose, (2006): Data Mining: Methods and Models, Wiley-Interscience, New Jersey.
3. Draper, N.R, and H. Smith,(1998): Applied regression analysis,(2nd Ed) John Wiley and sons, New York.
4. Hawkins, D.M, (1980): Identification of Outliers, Chapman and Hall, London.
5. Jiawei Han, Micheline Kamber, (2006): Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, second edition, San Francisco.
6. Krzysztof J.Cios, Wiltold Pedrycz, Roman W.Swiniarski, Lukasz A.Kurgan, (2007): Data Mining: A Knowledge Discovery Approach, Springer Science +Business Media, New York.
7. Montgomery, D.C. and Johnson, L.A. (1977) Forecasting and Time Series Analysis, McGraw Hill, New York.
8. Paolo Giudici, (2005): Applied Data Mining: Statistical Methods for Business and Industry, John Wiley & Sons Ltd, England.
9. Peter J. Rousseeuw and Annick M. Lorey, (1987): Robust Regression and Outlier Detection, John Wiley & Sons, United States.
10. Vic Barnett and Toby Lewis, (1978): Outliers in Statistical Data, John Wiley & sons.

PAPER - XIII: CATEGORICAL DATA ANALYSIS

Preamble: The objective of this course is to acquaint students with the basic ideas, applicability and methods of data analysis. This course enables the students to apply the various statistical techniques easily in practice.

Unit- I (12L)

Models for Binary Response Variables, Log Linear Models, Fitting Log linear and Logic Models-Building and applying Log Linear Models, Log- Linear- Logit Models for Ordinal Variables.

(12L)

Unit-II

Multinomial Reponse Models - Models for Matched Pairs- Analyzing Repeated Categorical Response Data - Asymptotic Theory for Parametric Models - Estimation Theory for Parametric Models.

Unit-III (12L)

Classical treatments of 2 and 3-way contingency tables, measures of association and nonparametric methods - Generalized linear models - Logistic regression for binary – multinomial and ordinal data - Log-linear models - Poisson regression- Modelling repeated measurements - generalized estimating equations.

Unit-IV (12L)

Introduction to contingency tables: 2×2 and $r \times c$ tables - tests for independence and homogeneity of proportions - Fishers exact test - Odds ratio and Logit, other measures of association - Introduction to 3-way tables – full independence and conditional independence - collapsing and Simpsons paradox.

(12L)

Unit-V

Polytomous logit models for ordinal and nominal response - Log-linear models (and graphical models) for multi-way tables - Causality, repeated measures, generalized least squares - mixed models, latent-class models, missing data, and algebraic statistics approach.

(Total: 60L)

BOOKS FOR STUDY

1. Agresti, Alan (1996). An Introduction to Categorical Data Analysis, Wiley.
2. Bergsma, W., Croon, M.A. and Hagenaaars, J.A. (2009). Marginal Models: For Dependent, Clustered, and Longitudinal Categorical Data. Springer.
3. Bishop, Y.M., Fienberg, S.E. and Holland, P.W. (1975). Discrete Multivariate Analysis: Theory and Practice, MIT Press.
4. Edwards, D. (2000). Introduction to Graphical Modeling (Second Edition). Springer.
5. Fienberg, S.E. (1980). The Analysis of Cross-Classified Categorical Data. MIT Press.
6. Wasserman, L. (2004). All of Statistics: A Concise Course in Statistical Inference. Springer.
7. Whittaker, J. (1990). Graphical Models in Applied Multivariate Statistics. Wiley.

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முன்முனைவர்ப் பட்டப் பாடத்திட்டம்
(COURSEWORK FOR DOCTORAL DEGREE)

தமிழியல் புலம்
TAMIL STUDIES
2018



மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
திருநெல்வேலி -12

முனைவர் பட்டத்திற்கான பாடத்திட்டச் செயல்நிலை வடிவமைப்பு

(Coursework for Doctoral degree)

தமிழியல் ஆய்வியல் புலம்

மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
திருநெல்வேலி -12

1. இப்பாடத்திட்டம் அடிப்படைத்தாள்கள், சிறப்புத்தாள்கள் ஆகிய இருவகையினம் கொண்டது. ஆய்வாளர்கள் தங்களது படிப்புக்கு முனைவர் பட்ட வழிகாட்டிக்குழு பரிந்துரைக்கும் தாள்களைத் தெரிவு செய்துகொள்ள வேண்டும். ஆய்வியல் நிறைஞர் பட்டம் பெறாதவர்கள் அடிப்படைத்தாள் பட்டியலிருந்து ஒரு தாளைக் கட்டாயம் தெரிவு செய்ய வேண்டும். ஆய்வியல் நிறைஞர் படிப்பு முடித்தவர்களுக்குத் தாள் தெரிவில் வரையறை இல்லை.

2. ஒவ்வொருதாளும் நான்கு மதிப்பலகுகளுடன் 5 கூறுகளைக் கொண்டமையும். மொத்தம் 100 மதிப்பெண்கள் கொண்டது.

3. **வினாத்தாள் அமைப்பு:** மொத்தம் 75 மதிப்பெண் கொண்ட புறமதிப்பீட்டுப் பருவத் தேர்வு. வினாத்தாள் பகுதி அ, பகுதி ஆ என இரண்டு பகுதிகளைக் கொண்டமையும்.

பகுதி அ - ஐந்து மதிப்பெண் கொண்ட 5 வினாக்கள் உள்மாற்று வினா அமைப்புடன் ஒரு பக்கவளவில் விடையளிக்கும் வகையில்.

பகுதி ஆ - 10 மதிப்பெண் கொண்ட 5 வினாக்கள் உள்மாற்று வினா அமைப்புடன் அமையும். எல்லாக் கூறுகளுக்கும் சம வாய்ப்பளிக்க வேண்டும்.

4. **மதிப்பெண்முறை:** அகமதிப்பீடு, புறமதிப்பீடு எனத் தொடர் மதிப்பீட்டு முறை பின்பற்றப்படும். அகமதிப்பீடு 25 மதிப்பெண்கள். 15 மதிப்பெண் கொண்ட ஒரு பருவக் கட்டுரை ஆய்வாளர்கள் அரங்கில் வாசித்தளிக்க வேண்டும். 10 மதிப்பெண்கள் கருத்தரங்குகள், பயிலரங்குகள் பங்கேற்பு ஆகியவற்றிற்கு வழங்க வேண்டும். ஒவ்வொரு தாள்க்கும் தனித்தனிக் கருத்தரங்குகள், பயிலரங்குகள் பங்கேற்பு தேவை. ஒரு நாள் கருத்தரங்கிற்கு/ பயிலரங்கிற்கு 2 மதிப்பெண் என்ற அடிப்படையில் வழங்கலாம். கருத்தரங்கில் கட்டுரை வழங்கினால் ஒரு கட்டுரைக்கு 5 மதிப்பெண் வழங்கலாம். அயல் நாட்டில் நிகழும் கருத்தரங்கில் பங்கேற்றால் 10 மதிப்பெண்கள் வழங்கலாம். பல்கலைக்கழகங்கள் அல்லது பல்கலைக்கழக நிதிநல்கைக் குழுவால் ஒப்புக்கொள்ளப்பட்ட நிறுவனங்களால் நடத்தப்பெறும் ஐந்துநாட்களுக்கு மேற்பட்ட தொடர் பயிலரங்கில் பங்கேற்றால் முன்முனைவர் பட்டத்திற்காகத் தெரிவு செய்யப்பெற்றுள்ள அனைத்துத் தாள்க்கும் 10 மதிப்பெண் வழங்கலாம். கருத்தரங்குகள் / பயிலரங்குகள் பங்கேற்பு ஆய்வுப் பதிவுக்குப் பின்னும் தேர்வு எழுதும் முன்னும் நிகழ்ந்தாகவும் புலத் தொடர்டையதாகவும் இருக்க வேண்டும். அனைத்திற்கும் சான்றிதழ்கள் இணைக்கப்பட வேண்டும்.

புறமதிப்பீட்டுத் தேர்வு 75 மதிப்பெண் கொண்டது. அகமதிப்பீடு மற்றும் புறமதிப்பீடு சேர்த்து மொத்தம் 100 மதிப்பெண்கள் ஒவ்வொருதாள்க்கும் உரியது.

தேர்ச்சிக்கு உள்மதிப்பீடு மற்றும் புறமதிப்பீடு ஆகிய இரண்டும் சேர்த்து மொத்தம் 50 மதிப்பெண்கள் பெற வேண்டும். உள்மதிப்பீடு மற்றும் புறமதிப்பீடுக்குத் தனித்தனியான தேர்ச்சி மதிப்பெண் வரையறை இல்லை.

5. தேர்வுமுறை: அகத்தேர்வுகளை நெறியாளர் நடத்தி மதிப்பெண் வழங்க வேண்டும். புறத்தேர்வைப் பல்கலைக்கழகத் தேர்வாணையம் ஆண்டுக்கு இருமுறை ஆய்வியல் நிறைஞர் பட்டப் படிப்புத் தேர்வின் போது நடத்தும். பல்கலைக்கழகத்தால் ஆய்வாளர்களுக்குப் பரிந்துரைக்கப்பட்டுள்ள முனைவர்ப்பட்ட வழிகாட்டிக்குமுனின் புறநிலைவல்லுநர் (நெறியாளரின் நிறுவனத்தைச் சாராதவர்) புறத்தேர்வின் மதிப்பீட்டாளராகச் செயல்படுவார். புறத்தேர்விற்கான வினாத்தாள் பல்கலைக்கழகத் தேர்வாணையத்தால் பெறப்படும்.

6. பயிற்றுமுறை: ஆய்வாளர்கள் வழிகாட்டிக்குமுனின் பரிந்துரையின் அடிப்படையில் தேர்வு செய்யும் தாள்களை நெறியாளர் பயிற்றுவிக்க வேண்டும். பல்கலைக்கழக விதிகளின்படி பயிற்றுவிக்கும் காலம், வருகைப்பதிவு ஆகியவற்றிற்கு நெறியாளர் பொறுப்பாவார். இவ்வேலைப்பளு காலமுறை வேலைப்பளுவில் கணக்கில் கொள்ளப்படமாட்டாது.

7. திட்ட ஏடு: வழிகாட்டிக்குமுனின் திட்ட ஏடு பரிந்துரைக்கப்படும் ஆய்வாளருக்குத் திட்ட ஏட்டுப்பணி பொருந்தும். இது ஒரு தாள்க்குச் சமமானது. திட்ட ஏட்டைப் பருவத் தேர்வு தொடங்கும் முன் ஆய்வுக் குழுவுக்குச் சமர்ப்பிக்க வேண்டும். நெறியாளரின் நெறிப்படுத்துதலின் கீழ் திட்ட ஏட்டுப்பணியை மேற்கொள்ள வேண்டும். திட்ட ஏடு கணினித் தட்டச்சில் 50 பக்கங்களுக்குக் குறையாமல் அமையவேண்டும். ஆய்வேட்டுடன் இத்திட்ட ஏட்டை ஆராய்ச்சிப் பிரிவில் சமர்ப்பிக்க வேண்டும்.

மதிப்பீட்டுமுறை: திட்ட ஏடு 100 மதிப்பெண்களைக் கொண்டது. அகமதிப்பீடு 50 புறமதிப்பீடு 50 என அமையும். அகமதிப்பீட்டு மதிப்பெண் நெறியாளரால் வழங்கப்படும். புறமதிப்பீடு பல்கலைக்கழகத்தால் ஆய்வாளர்களுக்குப் பரிந்துரைக்கப்பட்டுள்ள முனைவர்ப்பட்ட வழிகாட்டிக் குழுவினின் புறநிலை வல்லுநரால் (நெறியாளரின் நிறுவனத்தைச் சாராதவர்) மதிப்பீடு செய்யப்பட்டு மதிப்பெண்ணை ஆராய்ச்சிப் பிரிவு வழி தேர்வாணையருக்குச் சமர்ப்பிக்க வேண்டும். இப்பணியை முனைவர்ப்பட்டக் கலந்தாய்வுக் கூட்டத்தின் போது செய்யலாம்.

8.படிப்புக்காலம்: முன்முனைவர்ப்பட்டப் படிப்பிற்குரியத் தாள்களை முனைவர்ப்பட்டப் படிப்பிற்குப் பதிவு செய்த இரண்டாண்டுகளுக்குள் நிறைவு செய்ய வேண்டும். ஆய்வாளர்கள் தங்களுக்குப் பரிந்துரைக்கப்படும் தாள்களை ஒரே பருவத்திலும் பயிலலாம். தேர்ச்சித் தவறியவர்கள் மறு பருவத் தேர்வில் தேர்வு எழுதலாம்.

9 முனைவர்ப்பட்டப் பாடத்திட்டக் குழுவால் ஏற்கப் பெற்று கல்விசார் நிலைக் குழுவினின் ஒப்புதல் பெறப்பெற்ற தாள்கள் மட்டுமே முன்முனைவர்ப்பட்டத் தேர்வுக்கு அனுமதிக்கப்படும்.

ஐந்து பிரிவுகளைக் கொண்டதாக அமைகிறது. ஒவ்வொரு பிரிவிலும் நான்கு தாள்கள் உண்டு. மொத்தம் 20 தாள்கள்.

முதல் பிரிவில் ஒரு தாள் கட்டாயமாக எடுக்கப்பட வேண்டும். ஒரு பிரிவிலிருந்து இரண்டு தாள்களுக்கு மேல் எடுக்கக்கூடாது.

ஆய்வாளர் எடுக்கும் தாள்களை அவருக்கான முனைவர்ப்பட்ட வழிகாட்டிக் குழு ஒப்புதல் அளிக்க வேண்டும்.

பிரிவு:அ. இப்பிரிவில் ஒன்று கட்டாயம்

1. ஆராய்ச்சிநெறிமுறைகள்
2. திறனாய்வு: அடிப்படைகள், முறைகள், அணுகுமுறைகள்
3. இலக்கியக் கொள்கைகளும் கோட்பாடுகளும்
4. தமிழில் இலக்கிய வரலாறுகள்

பிரிவு: ஆ. இலக்கணவியல்தாள்கள்

(இலக்கணவியலில் ஆய்வு செய்பவர்கள் தேர்வு செய்ய வேண்டிய தாள்கள்)

5. தமிழ் இலக்கணவரலாறு
6. எழுத்திலக்கணக் கோட்பாடுகளும் முன்னோடிகளும்
7. சொல்லிலக்கணக் கோட்பாடுகளும் முன்னோடிகளும்
8. செய்யுளியல் கோட்பாடுகளும் முன்னோடிகளும்

பிரிவு:இ.இலக்கியவியல்தாள்கள்

(இலக்கிய ஆய்வுகள் செய்வோர் கற்க வேண்டிய அடிப்படைத் தாள்கள்)

9. தமிழில் கவிதையியல் பார்வைகள்
10. தமிழில் கதையியல் பார்வைகள்
11. தமிழில் அரங்கியல் பார்வைகள்
12. இலக்கிய வடிவங்களும் வகைகளும்

பிரிவு: ஈ.பண்பாட்டியல் தாள்கள்

(இலக்கியத்தையும் பண்பாட்டையும் இணைத்துப் பேசும் ஆய்வுகளையும் நாட்டார் பண்பாட்டாய்வுகளைத் தேர்வு செய்யும் ஆய்வாளர்கள் கற்க வேண்டிய அடிப்படைத் தாள்கள்)

13. இலக்கியமும் பண்பாட்டு மானிடவியலும்
14. தமிழ் வரலாறு: அரசியல், சமயம், தத்துவம், பொருளியல்
15. பண்பாட்டு இயக்கங்களும் தமிழ் இலக்கியங்களும்
16. ஊடகவியலும் பண்பாடும்

பிரிவு: உ. நாட்டார் வழக்காற்றியல் தாள்கள்

17. பனுவலாக்கக் கோட்பாடு
18. நிகழ்த்துதல் மரபுகளும் கோட்பாடும்
19. இனவரைவியல் களஆய்வு
20. திட்ட ஏடு

குறியீட்டு எண்	தாளின் பெயர்	மதிப்பலகு
பிரிவு அ	இப்பிரிவில் ஒன்று கட்டாயம்	
ACWTA01	ஆராய்ச்சி நெறிமுறைகள்	4
ACWTA02	திறனாய்வு: அடிப்படை, முறைகள், அணுகுமுறைகள்	4
ACWTA03	இலக்கியக் கொள்கைகளும் கோட்பாடுகளும்	4
ACWTA04	தமிழில் இலக்கிய வரலாறுகள்	4
பிரிவு ஆ	இலக்கணவியல் தாள்கள் (இலக்கணவியலில் ஆய்வு செய்பவர்கள் தேர்வு செய்ய வேண்டிய தாள்கள்)	
ACWTA05	தமிழ் இலக்கண வரலாறு	4
ACWTA06	எழுத்திலக்கணக் கோட்பாடுகளும் முன்னோடிகளும்	4
ACWTA07	சொல்லிலக்கணக் கோட்பாடுகளும் முன்னோடிகளும்	4
ACWTA08	செய்யுளியல் கோட்பாடுகளும் முன்னோடிகளும்	4
பிரிவு இ	இலக்கியவியல் தாள்கள் (இலக்கிய ஆய்வுகள் செய்வோர் கற்க வேண்டிய அடிப்படைத் தாள்கள்)	
ACWTA09	தமிழில் கவிதையியல் பார்வைகள்	4
ACWTA10	தமிழில் கதைவியல் பார்வைகள்	4
ACWTA11	தமிழில் அரங்கியல் பார்வைகள்	4
ACWTA12	இலக்கிய வடிவங்களும் வகைகளும்	4
பிரிவு ஈ	பண்பாட்டியல் தாள்கள் (இலக்கியம் / பண்பாடு / ஊடகம் ஆகியவற்றை இணைத்துப் பேசும் ஆய்வுகளைத் தேர்வு செய்யும் ஆய்வாளர்கள் கற்க வேண்டிய அடிப்படைத்தாள்கள்	
ACWTA13	இலக்கியமும் பண்பாட்டு மானிடவியலும்	4
ACWTA14	தமிழ் வரலாறு : அரசியல், சமயம், தத்துவம், பொருளியல்	4
ACWTA15	பண்பாட்டு இயக்கங்களும் தமிழ் இலக்கியங்களும்	4
ACWTA16	ஊடகவியலும் பண்பாடும்	4
பிரிவு உ	நாட்டார் வழக்காற்றுக்களைத் தேர்வு செய்யும் ஆய்வாளர்கள் கற்க வேண்டிய அடிப்படைத்தாள்கள்	
ACWTA17	பனுவலாக்கக் கோட்பாடு	4
ACWTA18	நிகழ்த்துதல் மரபுகளும் கோட்பாடும்	4
ACWTA19	இனவரைவியல் களஆய்வு	4
ACWTA P	திட்ட ஏடு	4

1. ஆராய்ச்சி நெறிமுறைகள் - மதிப்பலகு - 4

நோக்கம்

1. ஆய்வின் அடிப்படைகளைப் புரிந்துகொண்டு ஆய்வுச் சிந்தனைகளை நெறிப்படுத்தப் பழகுதல்

2. ஆய்வேட்டினை எழுதும் பயிற்சியில் தன்திறனை வெளிப்படுத்தப் பழகுதல்

அலகு: 1 ஆய்வியல் அறிமுகம் - ஆய்வின் இலக்கணம் - ஆய்வுப் பொருள் - வழிகாட்டி - ஆய்வாளர் பண்புகள் - தலைப்புத் தேர்வுகள் - தலைப்புப் பண்புகள் - வகைகள். ஆய்வுத் திட்டமிடல் - அடிப்படைக் கருத்துகள் - கருதுகோள்கள் - வகைகள் - இயல்புகள் - ஆய்வியலாளரின் பண்புகள் - ஆய்வின் வகைப்பாடுகள் கோட்பாட்டாய்வு - வகைப்படுத்துதல் ஆய்வு - பொருத்திக்காட்டல் ஆய்வு.

அலகு: 2 ஆய்வின் முதல் நிலை - கருவிகளைத் தொகுத்தல் - தரவு திரட்டுதலும் தரவு திரட்டுவதற்குரிய தரவு மூலங்களைக் கண்டறிதலும் - முதன்மை ஆதாரங்களும் துணைமை ஆதாரங்களும் எவை என அறிதல் - ஆய்வின் இரண்டாம் நிலை - தரவுகள் தொகுத்தல் - தொகுக்கும் முறை - குறிப்பெடுக்கும் முறை - வகைப்படுத்தும் முறை - துணைநூற்பட்டியல் - நோக்கீட்டு நூற்பட்டியல் - நூலடைவு

அலகு: 3 ஆய்வின் முன்றாம் நிலை - ஆய்வில் உத்திகளைக் கடைப்பிடிக்கும் முறை - நேர்காணல் - வினாநிரல் - வினாநிரல் வகைகள் - வினாநிரல் உருவாக்கும் முறை - களஆய்வு - களஆய்வு செய்முறை - முன் அனுபவம் எச்சரிக்கைகள் - வழிகாட்டிகள் முதலியன ஆய்வின் நான்காம் நிலை - தரவுகளை ஒருங்கிணைத்தல் - ஆய்வுச் சிக்கலை விடுவிக்க முன்மொழிதல் - உறுதி செய்தல்

அலகு: 4 ஆய்வேட்டின் உருவாக்கம் - புறநிலைக்கட்டமைப்பு, அகநிலைக்கட்டமைப்பு-ஆய்வுப் பொருண்மைக்கேற்ப இயல் வகுத்தமைத்தல் - இயல்களின் உட்பிரிவுகள் - இயலின் மையப் பொருண்மை - இயல் வரிசை முன்னுரையும் முடிவுரையும் ஆய்வேட்டின் நடை-பத்திப் பிரிப்பு மேற்கோள் காட்டல், நிறுத்தக் குறி, வினாக் குறி, உணர்ச்சிக் குறி, அரைப்புள்ளி, முக்காற் புள்ளி, முற்றுப்புள்ளி, மேற்கோள் குறி, ஒற்றை, இரட்டை மேற்கோள் குறிகள் - அடிக்கோட்டல்-அடைப்புக் குறியிடல் ஆகியன பற்றிய விளக்கம் - ஆய்வில் பிறர்கருத்தை ஏற்றலும் மறுத்தலும் - முன் ஆய்வுகளை மறைக்காமை - எழுத்துத் திருட்டின்மை - நேர்மை - பின்னிணைப்புகள் - படங்கள் வரைவுகள் - ஆவணங்கள் - நூற்பட்டியல்கள் - வினாநிரல்கள் - அறிக்கைகள் - ஆய்வில் நீக்க வேண்டிய குற்றங்கள் - நன்னூல் கூறும் பத்துக் குற்றங்களும் அழகுகளும்

அலகு: 5. நுண்வாசிப்புக்கான நூல்கள்:

1. ஆய்வுத்தளங்களும் தடங்களும்: தொகுப்பாசிரியர்கள்-பேரா. ஞா.ஸ்ஹபன், பேரா.அ.ராமசாமி, பதிப்புத்துறை: மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம், 2018

2. தமிழண்ணல், இலக்குமணன், ஆய்வியல் அறிமுகம், மீனாட்சிநிலையம், மதுரை

3. கு.வெ.பாலசுப்பிரமணியன், ஆராய்ச்சி நெறிமுறைகள், உமாநூல் வெளியீட்டகம், காமாட்சி அம்மன் கோவில் தெரு, தஞ்சாவூர், 2004

4. முத்துச்சண்முகம், சு.வேங்கடராமன்,2015: இலக்கிய ஆராய்ச்சி நெறிமுறைகள், முத்துப் பதிப்பகம், மதுரை

5. ஈ.சா. விசுவநாதன், ஆய்வு நெறிமுறைகள், தமிழ்ப் புத்தகாலயம், சென்னை, 1986

2. திறனாய்வுமுறைகளும் அணுகுமுறைகளும் - மதிப்பலகு - 4

நோக்கம்: திறனாய்வின் வகைகள் மற்றும் திறனாய்வு அணுகுமுறைகளை அறிதலும் ஆய்வில் பயன்படுத்தும் முறையை உணர்தலும்

அலகு: 1 திறனாய்வு விளக்கம் - சால் விளக்கம், அடிப்படைகள், அணுகுமுறை, நோக்கமும் பணியும், நடைமுறைகள், திறனாய்வாளன் தகுதிகள், திறனாய்வின் மூன்று மையங்கள்: பனுவல், எழுத்தாளர், வாசகர் - இலக்கிய வடிவங்கள் - - திறனாய்வாளரின் தகுதிகள்- இலக்கியத் திறனாய்வின் பயன்கள்- நோக்கமும் பணியும் - நடைமுறைகள்- விருப்பு வெறுப்பு - பன்முகவியம் - பல்துறைச்சார்பு - தவறான பயன்பாடு - நீளம் எல்லைகள்.

அலகு: 2 திறனாய்வு முறைகள் - விளக்கமுறை, ஒப்பீடு, மதிப்பீடு, ரசனை, பாராட்டு, இலக்கியவகைநிலையியல் - வேறுபாடுகள்.

அலகு:3. திறனாய்வு அணுகுமுறைகள் - அறநெறி, சமுதாயவியல், வரலாற்றியல், உளவியல், தொல்படிமவியல், மொழியியல், உருவவியல், தலித்தியம், பெண்ணியம்,

அலகு:4. தமிழ்த் திறனாய்வுவரலாறு - சிறுபத்திரிகை சார்ந்த விமரிசன வரலாறு கல்விப்புல ஆய்வு வரலாறு - ஆய்வு, மதிப்புரை, ஆய்வேடு, நோக்க வேறுபாடுகள்

அலகு:5 நுண் வாசிப்புக்கான நூல்கள்:

1. தி.சு. நடராசன், 2016, திறனாய்வுக் கலை: கொள்கைகளும் அணுகுமுறைகளும், நியூசெஞ்சுரி புக்ஹவுஸ், சென்னை.

2. அ.அ. மாணவாளன் - 20 ஆம்நூற்றாண்டு இலக்கியத் திறனாய்வு

3. க. பஞ்சாங்கம், 1982 , தமிழ் இலக்கியத் திறனாய்வு வரலாறு, அன்னம் பதிப்பகம்,

4. காமராசு.இரா. தமிழ்ச் சிற்றிதழ்களின் வழி உருவான நவீனத் திறனாய்வுப் போக்குகள், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

5. Barry, Peter 1995: BEGINNING THEORY: An Introduction to Literary and Cultural theory, Manchester University Press, Manchester and New York

3. இலக்கியக் கொள்கைகளும் கோட்பாடுகளும் - மதிப்பலகு - 4

நோக்கம்: இலக்கியத் தோற்றம், உருவாக்கம், வளர்ச்சி பற்றிய கொள்கைகளும் கோட்பாடுகளும் பற்றிய புரிதலை உண்டாக்குதல்.

அலகு:1. இலக்கியத் தோற்றம் - அரிஸ்டாடிலின் கவிதையில், பரதமுனிவரின் நாட்யசாஸ்திரம்.

அலகு: 2. தொல்காப்பியம் செய்யுளியல், உவமயியல், மரபியல்

அலகு:3. இமானுவேல் காண்ட்டின் அழகியல் கொள்கை, சிக்மண்ட் ப்ராய்டின் உளவியல் கொள்கை, கார்ல் மார்க்சின் உற்பத்திக் கொள்கை

அலகு:4. மொழியியல், அமைப்பியல், உருவவியல், சிதைவாக்கம் - கிழக்கு - மேற்கு பற்றிய பார்வைகள் - மரபுக்கோட்பாடு, நவீனத்துவக் கோட்பாடு, பின்நவீனத்துவக் கோட்பாடு, காலனிய- பின்காலனியப் பார்வைகள்

அலகு: 5. நுண் வாசிப்புக்கான நூல்கள்:

1. தி.சு. நடராசன், 2016, திறனாய்வுக் கலை: கொள்கைகளும் அணுகுமுறைகளும் , நியூசெஞ்சுரி புகழ்வுஸ், சென்னை.

2. அ.அ. மாணவாளன்- 20 ஆம்நூற்றாண்டு இலக்கியத் திறனாய்வு

3. கோபிசந்த் நோரங், 2005, அமைப்பு மையவாதம், பின் அமைப்பியல் வாதம் மற்றும் கீழைக் காவிய இயல், சாகித்ய அகாடெமி வெளியீடு.

4. க.பஞ்சாங்கம், 2011, இலக்கியமும் திறனாய்வுக் கோட்பாடுகளும், அன்னம்: தஞ்சாவூர்.

5. Lodge, David. 1987:Modern Criticism and Theory: A Reader, Longman: London

4. தமிழில் இலக்கிய வரலாறுகள் - மதிப்பலகு - 4

நோக்கம்: தமிழ் மொழியில் எழுதப்பெற்றுள்ள இலக்கிய வரலாறுகளையும் அவற்றின் நோக்கங்களையும் அறிதல்

அலகு: 1. இலக்கிய வரலாறு என்னும் கருத்துரு. பரப்பும் நகர்வும். தமிழில் இலக்கிய வரலாற்றின் வளர்ச்சி

அலகு: 2 இலக்கிய வரலாறு எழுதுதலின் சிக்கல்களும் அதன்விரிவுகளும்

அலகு:3. காலப் பகுப்பு முறைகள்- இலக்கிய வகைமைகளும் வளர்ச்சியும்

அலகு:4. இலக்கிய வரலாற்றாசிரியர்கள் - வெ.கனகசபைப்பிள்ளை, கே.எஸ்.சீனிவாசப்பிள்ளை, எம்.எஸ். பூரணலிங்கம்பிள்ளை, கா.சு.பிள்ளை, எ.எஸ். வையாபுரிப்பிள்ளை, ஆ. வேலுப்பிள்ளை, மயிலை சீனிவேங்கடசாமி, மு. அருணாசலம், தெ.பொ.மீனாட்சிசுந்தரன், மு.வரதராசன், ச.வே.சுப்பிரமணியன், சிட்டி, சிவபாதசுந்தரம், கா.சிவத்தம்பி, வல்லிக்கண்ணன், நா.வானமாமலை, ஆகியோர் எழுதிய இலக்கிய வரலாற்று நூல்கள்.

அலகு:5. நுண்வாசிப்புக்குரியன

1. கார்த்திகேச சிவத்தம்பி - தமிழில் இலக்கிய வரலாறு, நியூசெஞ்சுரி பக்ஹவுஸ், சென்னை.
2. சிற்பி பாலசுப்பிரமணியன், நீல. பத்மநாபன், தமிழ் இலக்கிய வரலாறு இரண்டு தொகுதிகள் - சாகித்திய அகாடெமி வெளியீடு.
3. பேரா. இரா.மதிவாணன், உ.சேரன், தமிழினி 2000 மாநாட்டுக் கட்டுரைகள், காலச்சுவடு, 2007 அறக்கட்டளை, நாகர்கோவில்
4. கா.சிவத்தம்பி, 2005, உலகத்தமிழிலக்கிய வரலாறு, (கி.பி.1851- 2000) உலகத்தமிழ் ஆராய்ச்சி நிலையம், அடையாறு, சென்னை.
5. ஆ.வேலுப்பிள்ளை, தமிழ் இலக்கியத்தில் காலமும் கருத்தும்,

5. தமிழ் இலக்கண வரலாறு - மதிப்பலகு - 4

நோக்கம்

1. தமிழ் இலக்கண வரலாற்றை அறிந்து கொள்ளுதல்
2. தமிழ் இலக்கண நூல்கள் குறித்த பார்வையை உருவாக்குதல்

அலகு:1. தமிழ் இலக்கண வரலாறு - அறிமுகம் - மறைந்துபோன இலக்கண நூல்கள் - எழுதப்பட்டுள்ள நிலை - சரியான வரலாறு இல்லாத நிலைமை - வெளிவந்துள்ள இலக்கண வரலாறு குறித்த நூல்கள்

அலகு:2 .ஒழுங்குப்படுத்தப்பட்ட முறையான வரலாற்றின் தேவை - தற்கால அறுவகையான இலக்கண வளர்ச்சி - அகராதிகள் - நிகண்டுகள் - உரைகள் போன்றவனவற்றின் வளர்ச்சி. இலக்கணநூல்கள் - தொல்காப்பியம் - வீரசோழியம் - இலக்கணவிளக்கம் - தொன்னூல் விளக்கம் - முத்துவீரியம் - சுவாமிநாதம் - நன்னூல் - அறுவகை இலக்கணம்

அலகு:3. எழுத்து, சொல் இலக்கணம் உணர்த்தும் நூல்கள் - நேமிநாதம் - நன்னூல் - பிரயோக விவேகம் - இலக்கணக் கொத்து - தமிழ்நூல் - தமிழ்க்காப்பு இயம்

அலகு: 4. பொருள் இலக்கண நூல்கள் - இறையனார் களவியல் - பன்னிருபடலம் - புறப்பொருள் வெண்பாமாலை - நம்பியகப்பொருள் - தமிழ் நெறி விளக்கம் - களவியற்காரிகை - மாறணகப்பொருள்- யாப்பு, அணி இலக்கண நூல்கள் - அவிநயம், யாப்பருங்கலம் - யாப்பருங்கலக்காரிகை - யாப்பிலக்கணம் - சிதம்பரச் செய்யுட் கோவை - மாறணப்பாவினம் - விருத்தப்பாவினம் - தண்டியலங்காரம் - மாறணலங்காரம் - அணியிலக்கணம் - பாட்டியல்

அலகு: 5. நுண்வாசிப்புக்குரியன.

1. சோம.இளவரசு: 2003: இலக்கண வரலாறு, மெய்யப்பன் பதிப்பகம், , சிதம்பரம்.
2. ஆ.வேலுப்பிள்ளை: 1979: தமிழ் வரலாற்றிலக்கணம். புாரி புத்தகப் பண்ணை, சென்னை

3. சிவத்தம்பி.கா, 1982: இலக்கணமும் சமூக உறவுகளும், நியூசெஞ்சுரி புக் ஹவுஸ், சென்னை.
4. இரா. இளங்குமரன், 1998: இலக்கணவரலாறு, மணிவாசகர் பதிப்பகம், சென்னை
5. அ.சண்முகதாஸ், 1982: தமிழ் மொழி இலக்கண இயல்புகள், முத்தமிழ் வெளியீட்டுக் கழகம், யாழ்ப்பணம்.
6. செ.வை.சண்முகம், 1994: இலக்கண உருவாக்கம், மணிவாசகர் நூலகம், சிதம்பரம்

6. எழுத்திலக்கணக்கோட்பாடுகளும்முன்னோடிகளும் - மதிப்பலகு - 4

நோக்கம்:

தமிழ் இலக்கணிகளும் மொழியியலாளர்களும் கூறும் எழுத்திலக்கணக் கூறுகளை அறிதலும் மேலாய்வு நோக்கி நகர்தலும்

அலகு: 1. தமிழ் இலக்கணம் - இலக்கண அமைப்பு விளக்கம், எழுத்திலக்கண அமைப்பு தமிழ் எழுத்திலக்கணத்தைப் பற்றிய தெளிவான - செறிவான அமைப்பு விளக்கத்தைத் தருதல். ஒலி - எழுத்து - அசை - மெய்மயக்கம் ஆகியவற்றைத் தொடர்புபடுத்தி, தமிழ் எழுத்தமைப்பினை விளக்குதல். சொல்திரிபு - சொல்லாக்கம் - சொல் தொடர் அமைப்புகளில் இடம்பெறும் புணர்ச்சி மாற்றங்களை உணர்தல்

அலகு: 2. தமிழ் ஒலிகள் - எழுத்துகள்: தொடர்பு, வகைப்பாடு (பிறப்பியல் - எழுத்தியல்: ஒலியியல் - ஒலியனியல்) - ஒலி - எழுத்து - அசை - மெய்மயக்கம்: எழுத்தமைப்பு விளக்கத்தில் இவற்றின் பங்கு (முதன்மை எழுத்து, சார்பெழுத்து, ஒற்றெழுத்து, உயிர்மெய் எழுத்து) மேற்கூற்று ஒலிகள் - வகைகள் - பங்கு.

அலகு 3 சொல் - பதம்: பகுபதம் - பகாப்பதம் சொல் திரிபு சொல்லாக்கத்தில் புணர்ச்சி: தேவையும் வகைப்பாடும் அக, புறப்புணர்ச்சி (உயிர்ஈற்று, மெய்ஈற்று, உருப்புணர்ச்சி, குற்றியலுகரப் புணர்ச்சி

அலகு 4 எழுத்திலக்கணத்தின் பண்பும் பயன்பாடும் - உச்சரிப்பு, வாசிப்பு,

அலகு.5. நுண் வாசிப்புக்குரியன:

1. செ.வை. சண்முகம், 1980 எழுத்திலக்கணக் கோட்பாடு, அனைத்திந்திய தமிழ் மொழியியற் கழகம், அண்ணாமலை நகர்.
- 2.மு.பாலகுமார், மொழியின் பொதுமைக் கூறுகள் கருத்தியல் விளக்கம், 2014: இந்தியத் தேசியத் தேர்வுப் பணி, மைசூர்.
- 3.தொல்காப்பிய மொழியியல் (தொகு), ச.அகத்தியலிங்கம், 1979, அண்ணாமலைப் பல்கலைக்கழகம்: அண்ணாமலைநகர்.
- 4.ஒலியனியல் - மலாயப் பல்கலைக்கழகம், கோலாலம்பூர் (கி.கருணாகரன்ருஇரா. கிருஷ்ணன்)
- 5.கு.பரமசிவம், இக்காலத் தமிழ் மரபு, 2011, அடையாளம்: திருச்சிமாவட்டம்.

7. சொல் இலக்கணக்கோட்பாடுகளும் முன்னோடிகளும் - மதிப்பலகு - 4

நோக்கம்: சொல், சொல்லமைப்பு, சொல்வகைகளைத் தெளிவுபடுத்தி, அவை மொழியமைப்பில் பெற்று விளங்கும் பங்கினை விளக்குதல். தமிழ் இலக்கணிகளும் மொழியியலாளர்களும் கூறும் சொல் இலக்கணக் கூறுகளை அறிதலும் மேலாய்வு நோக்கி நகர்தலும்

அலகு: 1 சொல் - சொல்லும் பொருளும் - சொல்லமைப்பு விளக்கம் - சொல்வகைகள்: பெயர்ச்சொல் - வினைச்சொல் - இடைச்சொல் , உரிச்சொல் (பெயரடை, வினையடை, இடைச்சொற்கள்)

அலகு: 2. பொருண்மை: சொற் பொருண்மை, இலக்கணப் பொருண்மை, சூழற் பொருண்மை (சமுதாயப்பொருண்மை) விளக்கமும் தேவையும் சொற் திரிபு - சொல்லாக்க முறைகள்: விளக்கம் அமைப்பு அடிப்படையில்.

அலகு 3 இலக்கணப் பிரிவுகள் - இலக்கணக் கூறுகள் (பெயரியல், வினையியல்..... வினைமுற்று, வேற்றுமை, பால் - எண்- இடம் பன்மை, எச்சம்.....)

அலகு 4 சொல்லமைப்பு - தொடரமைப்பு விளக்கம், தொடரியல் - தொடர், தொடர் வகைகள், தொடர் இயைபு, வாக்கிய அமைப்பும் வகைகளும் - உரைக்கோவை - செய்யுள் (கவிதைக்) கோவை அமைப்புகள் அமைப்பிணக்கம் - கருத்திணக்கம்: இயைபு தேவை. மாணாக்கருக்குப் பெயர்த் தொகுதிகள், பெயர்ச்சொல் தொகுதி, வினைத்தொகுதி, இடைச்சொல் தொகுதி, உரிச்சொல் தொகுதி போன்றன உருவாக்கும் பயிற்சித் தேர்வு கட்டாயம். களப்பணித் தொகுப்பு அல்லது நூல்வழித் தொகுப்புகள் வழங்கப்பட வேண்டும்.

அலகு 5. நுண் வாசிப்புக்குரியன.

1. செ.வை.சண்முகம், 1984: சொல்லிலக்கணக் கோட்பாடு, அனைத்திந்தியத் தமிழ் மொழியியற் கழகம், அண்ணாமலைநகர்.
2. ஆ.வேலுபிள்ளை, சாசனமும்தமிழும். 2011: குமரன் புத்தக இல்லம், கொழும்பு- சென்னை3.
3. ஆண்டியப்பன்.தே., 1977, “காப்பிய நெறி சொல்லியல்” முத்துப்பதிப்பகம், சென்னை.
4. அகத்தியலிங்கம், ச. (1999) பெயரியல் - வினையியல், மணிவாசகர் பதிப்பகம், சென்னை.
5. நு.:மான், 2007, அடிப்படைத் தமிழ் இலக்கணம், அடையாளம், புத்தாந்தம், திருச்சி.

8. செய்யுளியல் கோட்பாடுகளும்முன்னோடிகளும் - மதிப்பலகு - 4

நோக்கம்: தமிழின் செய்யுள் அமைப்பு உருவான முறைமையை அறிதலும் மேலாய்வு நோக்கி நகர்தலும்

அலகு:1. ஐந்திலக்கணம் அறிமுகம் - யாப்பு சொற் பொருள், விளக்கம்- மரபு இலக்கியமும் யாப்பும் - யாப்பிலக்கண நூல்கள் - தொல்காப்பியச் செய்யுளியல்.

அலகு:2. யாப்பியல் தனியாக வளர்ந்த விதம் - யாப்பருங்கலம், யாப்பருங்கலக்காரிகை - பாக்கள் - ஆசிரியப்பா, வெண்பா, கலிப்பா, வஞ்சிப்பா- பொதுவிலக்கணம் - வகைகள் - சான்றுகள்

அலகு:3.பாவினங்கள் - துறை, தாழிசை, விருத்தம் - குறிப்பாக ஆசிரியவிருத்தம், கலிவிருத்தம், கலித்துறை, கட்டளைக் கலித்துறை - சான்றுகள், அணிகள்: பாட்டியல்களின் வளர்ச்சியில் யாப்பு குறித்த சிந்தனைகள்

அலகு:4. உவமையியலும் அணியிலக்கண வளர்ச்சியும் - நவீனக்கவிதைகளில் யாப்பியல் கூறுகள் - இழந்தன, இருப்பன.

அலகு 5: நுண் வாசிப்புக்குரியன

1. கார்த்திகேசுவதம்பி., 2012, “தொல்காப்பியமும் கவிதையும், நியுசெஞ்சுரி ஹவுஸ், சென்னை.

2. ஜீன்லாரன்ஸ்.செ., பகவதி.கு., 1988, “தொல்காப்பிய இலக்கியக் கோட்பாடுகள்” உலகத்தமிழ் ஆராய்ச்சி நிறுவனம், சென்னை.

3. அகத்தியலிங்கம்.ச., 1999, “தொல்காப்பிய கவிதையியல்”, மணிவாசகர் பதிப்பகம், சென்னை.

4. சோ.ந. கந்தசாமி - தமிழ் யாப்பியலின் தோற்றமும் வளர்ச்சியும், தஞ்சாவூர்: தமிழ்ப் பல்கலைக்கழகம்.

5. ச.வே.சுப்பிரமணியன் - 1972 இலக்கணத்தொகையாப்பு - பாட்டியல்

9. தமிழில் கவிதையியல் பார்வைகள் - மதிப்பலகு - 4

நோக்கம்: நீண்ட தமிழ்க் கவிதைப் போக்கை அதன் கவிதையியல் சார்ந்து புரிந்து கொள்ளுதல்.

அலகு: 1 தமிழின் கவிதையியல் தொல்காப்பியப் பொருளதிகாரத்தில் இருந்து உருவாக்கப்படும் .உரிப் பொருள்களின் வகைப்பாடு அவற்றை வெளிப்படுத்த உதவும் நிலவியல் கூறுகளான கருப் பொருட்கள், அதன் பரப்பெல்லைகளான முதல் பற்றிய புரிதலோடு கவிதைகளைப் படித்தல். தொல்காப்பியம் வகைப்பாடு செய்யும் அகம், புறம், என்பதன் அடிப்படையில் சங்க இலக்கியத்தை வாசிக்கும் ஆய்வுகள்

அலகு: 2 அறக் கவிதைகளின் இயல்பு - கவிஞரின் இடம். கேட்போரின் இடம், நம்பிக்கை, சமயம், அரசு ஆகியவற்றின் விதிகள் அறங்களாக மாறுதல்- பக்திக் கவிதைகளின் நோக்கமும் கவியின் இடமும்.

அலகு:3 பின்னடைக்காலக் கவிதைகள் - பரணி, பிள்ளைத் தமிழ், உலா, கலம்பகம், அந்தாதி, மடல், கோவை, பள்ளு, நொண்டி நாடகம் ஆகியன பற்றிய இலக்கிய வகைமையெனப் பிரித்துக் கற்கச் செய்ய வேண்டும். தனிப்பாடல் திரட்டின் கவிதைச் சுவைகளைப் பொது நிலைக் கவிதையியலாகக் கற்பிக்கும் முறைமை..

அலகு 4 சமகாலத்தன்மை - தோற்றம் - நவீனத்துவவரவு அரசியல் பின்புலம் தேசியம், இனம், சர்வதேசியம், காலனியம், பின்காலனியம் போன்றவற்றை விளக்கிக் காட்டுதல். இவற்றோடு இணைந்து இலக்கிய இயக்கங்களின் வரவும் தாக்கமும் ஏற்பட்ட நிலையையும் விளக்குதல். புதுக்கவிதையின் தோற்றம் - அகவயக் கவிதைகள், புறவயக் கவிதைகள், தலத்திய பெண்ணியக் கவிதைகளுக்கிடையேயான ஒற்றுமை, வேற்றுமைகள். பின்நவீன கவிதைப் போக்கை அறிமுகம்செய்துகொள்ளுதல்.

அலகு 5 நுண் வாசிப்பு:

1. வ.சுப.மாணிக்கம், தமிழ்க்காதல், மெய்யப்பன் பதிப்பகம், சிதம்பரம்
2. பெ.மாதையன், 2011: தமிழ் செவ்வியல் இலக்கியங்கள்: காலமும் கருத்தும், என்.சி.பி.எச், சென்னை.
3. அ.மணவாளன், 2004: பக்தி இலக்கியம்: சாகித்ய அகாடெமி வெளியீடு, புதுடெல்லி.
4. கா.சிவத்தம்பி,2007: தமிழ்க் கவிதையியல், குமரன்பதிப்பகம்.
5. துரை.சீனிச்சாமி, 2010: இருபதாம் நூற்றாண்டுத் தமிழ்க் கவிதை: புதிய போக்குகள்,தோற்றம், வளர்ச்சி, ஐந்திணை பதிப்பகம்: சென்னை,
6. இராஜமார்த்தாண்டன், 2003: நவீன தமிழ்க் கவிதை வரலாறு, தமிழினி பதிப்பகம், சென்னை.

10. தமிழில் கதையியல் பார்வைகள் - மதிப்பலகு - 4

நோக்கம்: தமிழில் கதைசொல்லும் இலக்கியங்களின் உருவாக்கமும் வளர்ச்சியும் பற்றிய புரிதலை உருவாக்குதல்

அலகு.1 தொல்காப்பியச் செய்யுளியலில் கதை பற்றிய குறிப்புகள் - பிசி, உரையிட்ட பாட்டுடைச்செய்யுள். சிலப்பதிகாரம், மணிமேகலை கதை கூற்று முறைமைகள்.

அலகு:2 தண்டியலங்காரம் - காப்பிய இலக்கணம், அதனைப் பின்பற்றிய காப்பியங்கள்

அலகு: 3. செய்யுள் வழி சொல்லப்பட்ட கதைகளின் கட்டமைப்பு, உட்கூறுகள், மூலப்படிவங்கள். நாட்டார் கதைப்பாடல் மரபுகள்- தெய்வக்கதைகள், வரலாற்றுக்கதைகள், வட்டாரக்கதைப்பாடல்கள்,

அலகு: 4 நவீனகதைகூற்று முறைகள் - நாவல் வடிவம், சிறுகதை வடிவங்கள்

அலகு:5. நுண் வாசிப்பு: எஸ்.வையாபுரிப்பிள்ளை, தமிழ் இலக்கிய சரிதத்தில் காவியகாலம்

2. இராமலிங்கம்,மா., 1972: நாவல் இலக்கியம், தமிழ்ப் புத்தகலாயம், சென்னை,

3. சி.சு.செல்லப்பா, தமிழ் சிறுகதை பிறக்கிறது, காலச்சுவடு

4. அ.ராமசாமி, நாவலென்னும் பெருங்களம், நற்றிணை, 2016

5. கைலாசபதி,க., தமிழ் நாவல் இலக்கியம், 1977: நியூசெஞ்சுரி புகழ்ஹவுஸ்

6. சிவத்தம்பி, கா., 1978: நாவலும் வாழ்க்கையும், தமிழ்ப் புத்தகலாயம், சென்னை,

11. தமிழில் அரங்கியல் பார்வைகள் - மதிப்பலகு - 4

நோக்கம்: தமிழில் அரங்கியலாகவும் நாடகப் பனுவலாகவும் தோன்றிய நிகழ்த்துக் கலையியலை அறிதலும் ஆய்வு செய்தலும்

அலகு 1: அரங்கியல் - பிரதியியல் என்னும் இருநிலைகள் - அரிஸ்டாடில், நாட்டிய சாஸ்திரம் - நவீன நிகழ்த்துக் கோட்பாடுகள்.

அலகு 2. மெய்ப்பாட்டியல், சிலப்பதிகார அரங்கேற்றுக் காதை

அலகு 3 - பள்ளு, குறவஞ்சி, கீர்த்தனை, நொண்டி நாடகங்கள் பிரதியாக்க முறைமைகள் - இசை நாடகமரபு, பார்சி நாடகமரபு, சங்கரதாஸ் சுவாமிகள் நாடகப் பனுவல்கள் - நாட்டார் அரங்குகளின் நிகழ்த்துமுறைகளும் பனுவலாக்கங்களும்

அலகு 4. பம்மல் சம்பந்தர் - திராவிட இயக்க, இடதுசாரி இயக்க நாடகங்கள், சபா நாடகங்கள்,

நவீன நாடகங்களின் தோற்றம், கருத்தியல்கள் - இந்திய நாடகமென்னும் கருத்துரு. நாடகாசிரியர்கள்

அலகு. 5.நுண் வாசிப்புக்கான நூல்கள்

1.சி.மௌனகுரு, அரங்கியல், பூபாலசிங்கம் புத்தகசாலை, கொழும்பு

2. அ.ராமசாமி - தமிழில் நாடகவியல்: அடிப்படைகள், ஆளுமைகள், போக்குகள், நியூசெஞ்சுரி, புக ஹவுஸ், 2018

3. ஆறு அழகப்பன், 2011: தமிழ் நாடகத்தின் தோற்றமும் வளர்ச்சியும், பாரி நிலையம், பிராட்வே, சென்னை,

4. இக்காலத் தமிழ் நாடகப் போக்குகள் - உலகத் தமிழ் ஆராய்ச்சி நிறுவனம்.

5. சே.இராமானுஜம், 1994: மேடைப் படைப்பாக்கம், அடித்தளங்கள், தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

12. இலக்கிய வடிவங்களும் வகைமைகளும் - மதிப்பலகு - 4

நோக்கம்: இந்தத் தாள் தமிழில் தோன்றிய இலக்கிய வடிவங்கள், வகைகள் பற்றிய ஆய்வுக்குரிய அடிப்படைகளை வழங்கும்.

அலகு.1: வடிவம், வகை - வேறுபாடுகள், அடிப்படைகள், வரையறைகள், பின்பற்றலும் மீறலும் -வகைமைப் பார்வைகள்- உலகதழுவிய பார்வைகளான செவ்வியம், புனைவியம், இயற்பண்பியம், நடப்பியம், நடப்பியல் அல்லாதன. உணர்வு வெளிப்பாடன பார்வைகள்.

அலகு.2. செய்யுளியல் தரும் வடிவங்கள் - தொடர் நிலைச் செய்யுள்கள், பெருங்காப்பியம், காப்பியம், தொகைக் கதைகள். புராணம், இதிகாசம். தொன்மங்கள்-அகமும் நீட்சியும் , புறமும் நீட்சியும் -காலந்தோறும்.

அலகு.3. பிரபந்தங்கள், சிற்றிலக்கியங்கள், வரையறைகள், பின்பற்றலும் மீறலும்

அலகு.4. கால அடிப்படை, அரசுகள் அடிப்படை, தனித்த ஆளுமைகள் அடிப்படை ஐரோப்பியத் தாக்கமும் இலக்கிய வகைமை வளர்ச்சியும்.

அலகு.5. நுண்வாசிப்புக்குரியன:

1 இரா.இளங்குமரன், இலக்கிய வகை அகராதி, மணிவாசகர் பதிப்பகம், சிதம்பரம், 1985

2.ச.வே.சுப்பிரமணியன்- இலக்கிய வகையும் வடிவமும், மணிவாசகர், 1984

3.ச.வே.சுப்பிரமணியன், திராவிட மொழி இலக்கியங்கள், மணிவாசகர், 1984

4.கா.சிவத்தம்பி, தமிழில் இலக்கிய வரலாறு, நியூசெஞ்சுரி புக ஹவுஸ், சென்னை

5. தண்டாயுதம், இரா இருபதாம் நூற்றாண்டுத் தமிழ் இலக்கியம்,1973.தமிழ்ப் புத்தகலாயம், சென்னை,

13. இலக்கியமும் பண்பாட்டு மானிடவியலும் - மதிப்பலகு - 4

நோக்கம்:

1. இலக்கிய மானிடவியல் புலத்தை அறிமுகம் செய்தல்
2. இலக்கிய வாசிப்பிற்கு மானிடவியலின் தேவையை உணர்த்துதல்
3. மானிடவியல் அடிப்படையில் இலக்கியங்களை அர்த்தப்படுத்த கற்பித்தல்

அலகு: 1. மானிடவியல் அறிமுகம் - முழுதாளவிய அணுமுறை - மானிடவியலின் நான்கு பரிணாமங்கள் பண்பாடு - விளக்கம் - வரையறைகள் - உண்மையியல் வகை - கருத்தியல் வகை - பண்பாட்டுச் சார்புடைமைக்கொள்கை - பண்பாட்டின் உட்கூறுகள் - பண்பாட்டுக் கூறு - பண்பாட்டுக் கலவை - பண்பாட்டு நிறுவனம் - உட்கூறுகளின் தன்மைகள் - பொருள் சார் கூறுகள் - அறிதல் சார் கூறுகள் - நெறியியல் சார் கூறுகள். பண்பாட்டியல் அமைப்பு - பொருள் சார் பண்பாடும், பொருள் சாராப் பண்பாடும் - உகந்த நிலைப் பண்பாடும் உண்மைப் பண்பாடும் - உள்ளாந்த பண்பாடும் வெளிப்படைப் பண்பாடும் - உட்பண்பாடும் எதிர் பண்பாடும் - பண்பாட்டுப் பொருண்மை - பொதுமைகள்.

அலகு: 2. இலக்கிய மானிடவியல் அறிமுகம் - இனவரைவியலின் அடிப்படைகள் - இனவரைவியலாளரும் படைப்பாளியும் படைப்பும் இனவரைவியலும் - நாவலும் இனவரைவியலும். - இலக்கிய இனவரைவியல் - இனவரையலின் வகைகள் - இனவரைவியலின் இயல்பு - இலக்கியத்தில் இனவரைவியலை அடையாளம் காணுதல் - இலக்கியத் தரவை மானிடவியல் தரவாகக் கொள்ளுதல் - விளக்கமளித்தல் (இலக்கிய இனவரைவியல் கட்டுரை)

அலகு: 3. பண்பாட்டு மாற்றம் - பண்பாட்டு மாற்றத்தின் முறைகள் - கண்டுபிடிப்புகள் - பண்பாட்டுப் பேறு - நவீனமயமாதல், தொழில்மயமாதல் - நகரமயமாதல் - உயர்குடி ஆக்கம்-இந்துமயமாதலும் பிறசமயம் தழுவலும் - பண்பாட்டுப் பரவல் - பண்பாட்டுப் பரவல் கொள்கைகள். - படிமலர்ச்சிக் கோட்பாடும் இலக்கியமும் - படிமலர்ச்சிக் கோட்பாட்டின் அடிப்படைகள் - கொள்கைகள் - மொழியின் படிமலர்ச்சி - இலக்கியப் படிமலர்ச்சி.

அலகு: 4. மானிடவியல் அடிப்படையில் திணைக் கோட்பாடு - திணைக் கோட்பாட்டின் சமூக அடிப்படைகள் - திணை அமைப்பும் படிநிலை வளர்ச்சியும் - திணை அமைப்பும் இனவரைவியலும் - தொல்காப்பியமும் இனவரைவியல் கவிதையியலும் - மானிடவியல் அடிப்படையில் சங்க இலக்கியம் - உணவு உற்பத்தியும் பரிமாற்ற உறவுகளும் - பதுக்கைகளும் பெருங்கற்படைச் சின்னங்களும் - இரும்புப் பண்பாடு - சங்க இலக்கியத்தில் பேய்கள் - தாலியும் குலக்குறிச் சின்னமும்.

அலகு: 5. நுணுக்க வாசிப்பு: பக்தவத்சல பாரதியின; இலக்கிய மானிடவியல், ஆ.தனஞ்செயனின; தமிழ் இலக்கிய மானிடவியல், ஆ.சிவ சுப்பிரமணியனின; இனவரைவியலும் நாவலும், கா.சிவத்தம்பியின் திணைக் கோட்பாட்டின் சமூக அடிப்படைகள், கா.சுப்பிரமணியனின; சங்ககாலச் சமுதாய வாழ்க்கையில் மந்திரம், சமயம் ஆகியவற்றின் பங்கு.

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8. பக்தவத்சல பாரதி,2014: இலக்கிய மானிடவியல், தமிழ் சமூகத்தின் செல் நெறிகளின் நிதானிய பண்பாட்டியல் பார்வை, புத்தாந்தம்: அடையாளம்.

14. தமிழ்வரலாறு: அரசியல், சமயம், தத்துவம்,பொருளியல் - மதிப்பலகு - 4

நோக்கம்: பண்பாட்டியல் நோக்கில் தமிழின் வரலாற்றையும் காரணிகளையும் ஆய்வு செய்வதற்கான தூண்டுகோல்களை அளித்தல்

அலகு : 1; இலக்கியம் வரலாற்று ஆவணமாதல் - வரலாறு என்றால் என்ன - வரலாற்று எழுதியல் முறைகள் : அரசியல் வரலாறு, பண்பாட்டு வரலாறு, சமூக வரலாறு, கீழிலிருந்து வரலாறு எழுதுதல், அடித்தள மக்கள் வரலாறு, வாய்மொழி வரலாறு – வரலாறு, புதிய வரலாறு - தமிழக வரலாற்று எழுதியலில் இலக்கியத்தின் பங்கு.

அலகு : 2 சங்க இலக்கியம் - வரலாறும் பண்பாடும் -சங்ககாலம் - இனக்குழு சமுதாயத்தின் அழிவு - அரசு உருவாக்கம் - வேந்தர், வேளிர, குறுநில மன்னர், சீறார்மன்னர்; - சமூகவியல் : திணையின் முக்கியத்துவம் - உடை, பழக்கவழக்கங்கள், உணவு உற்பத்தி முறை, வணிகம், விழாக்கள் - குடியிருப்புகள் : நகரம், ஊர், நாடு, சேரி, குடி, இருக்கை, - பண்பாட்டு நிறுவனங்கள் - உறவுமுறை - குடும்பஅமைப்பு - திருமணம் - சமயம் : வைதிகம், சிராவகம்.

அலகு : 3 இடைக்கால இலக்கியமும் வரலாறும் பண்பாடும்.நாயன்மார்கள், ஆழ்வார்கள் - பக்தி இலக்கியங்கள் - பாடல் பெற்ற தலங்கள்-சோழர்காலக் கோயிற்கலைகள் - பெரியபுராணம், கம்பராமாயணம் - உலா, பரணி இலக்கியங்களில் வரலாறு - நாயக்கர்காலத் தமிழகம் - பாண்டிக்கோவை, திருவிளையாடற்புராணம் - சமூகப் பண்பாட்டு முரண்கள் - வைதீகம், அவைதீகம் - சைவம், வைணவம் - வலங்கை, இடங்கை - சித்தர்களின் மாற்றுப் பண்பாட்டு மரபு - திருமந்திரம், பதினெண் சித்தர்; பாடல்கள்.

அலகு : 4 நாட்டுப்புற இலக்கியம் - வரலாறும் பண்பாடும். நாட்டுப்புற இலக்கியங்கள் வரலாற்று ஆவணமாதல் - வாய்மொழி வரலாறு - அடித்தள மக்கள் வரலாறு - நாட்டுப்புறக் கதைப்பாடல்கள் - கட்டபொம்மு கதை, தேசிங்குராசா கதை, ஐவர்; ராசாக்கள் கதை - கான்சாகிபு சண்டை - இராமப்பயன் அம்மாளை - ஆங்கிலேயர்; காலம் - பஞ்சாபீஸ்

பரிமளச்சிந்து - தாது வருஷத்து கரிப்புக்கும்மி, பஞ்ச லட்சண திருமுகவிலாசம், நாகூர்; புகையிரத சிங்கார ரயில் சிந்து, கண்டி தேயிலைத் தோட்டப்பாட்டு.

அலகு : 5 நுணுக;க வாசிப;பு: மயிலை சீனி வேங்கடசாமியின் களப்பிரர்ஆட்சியில் தமிழகம், க.கைலாசபதியின் பண்டைத் தமிழர் வாழ்வும் வழிபாடும், கா.இராஜனின; தொல்லியல் நோக்கில் சங்ககாலம், அ. ராமசாமியின; நாயக்கர்காலம், நொபொரு கராஷிமாவின் தென்னகச் சமூகம்: வரலாற்றுப் புரிதலை நோக்கி.

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15. பண்பாட்டு இயக்கங்களும் தமிழ் இலக்கியங்களும் - மதிப்பலகு - 4

நோக்கம்:

1. தமிழ் இலக்கியங்களை இயக்கங்களின் அடிப்படையில் புரிதல் ஆய்வு செய்யத் தூண்டுதல்
2. இயக்கங்கள் எவ்வாறு இலக்கியங்களைப் பாதித்துள்ளன என்பதை உணர்தல்
3. இயக்கங்களின் வளர்ச்சிக்கு இலக்கியங்கள் எவ்வாறு உதவின என்பதை அறிதல்

அலகு:1. சமண, பௌத்தச் சிந்தனைகள் இலக்கியங்களை உருவாக்கிய நிலை. திருக்குறள் முதலான நீதிநூல்களின் கருத்தியல்கள்- சிலப்பதிகாரம், மணிமேகலை ஆகியவற்றிலுள்ள வாதங்கள்

அலகு:2. சைவ, வைணவ சமயங்கள் நடத்திய பக்தி இயக்கங்கள். அதன் தொடர்ச்சியாக உருவான இலக்கியங்கள். பெரியபுராணம், திருவிளையாடற் புராணம், பாரதம் போன்ற பெருங்கதைகள்.

அலகு: 3 தேசிய இயக்கம்: தோற்றமும் வளர்ச்சியும் - சமூகச் சூழலும் தேவையும் - தாக்கம். பாரதி, கவிமணி, நாமக்கல்லூர், ம.பொ.சி.

அலகு:4 தமிழ் இயக்கமும் பகுத்தறிவு இயக்கமும் தோற்றமும் வளர்ச்சியும் - சமூகச் சூழலும் தேவையும் - தாக்கம். திராவிட இயக்கம் : தோற்றமும் வளர்ச்சியும் - சூழலும் தேவையும் - தாக்கம். மறைமலைஅடிகள், பாவாணர், பெரியார், பாரதிதாசன், அண்ணாதுரை, கலைஞர், திராவிட இயக்கப் புனைகதையாளர்கள்- பொதுவுடைமை இயக்கம் தோற்றமும் வளர்ச்சியும் - சூழலும் தேவையும் - அடித்தள மக்கள் இயக்கங்கள் சூழலும் தேவையும்- தலித்தியமும் பெண்ணியமும்.

அலகு:5 நுணுக்க வாசிப்பு: கோ.கேசவனின்; திராவிட இயக்கமும் மொழிக் கொள்கையும் தொ.மு.சி.ரகுநாதன் மற்றும் பொன்னீலனின், முற்போக்கு இலக்கிய இயக்கங்கள், ரவிக்குமாரின் தலித் கலை, இலக்கியம், அரசியல், ஞா.ஸ்டீபனின் பண்பாட்டு வேர்களைத் தேடி. தி.சு.நடராசனின் தமிழின் பண்பாட்டு வெளிகள்.

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16. ஊடகங்களும்பண்பாட்டுருவாக்கம் - மதிப்பலகு - 4

நோக்கம்: தகவல் தொடர்பு பொருண்மைகளை அறிமுகம்செய்தல் - ஊடகங்களின் வகைகளையும் வளர்ச்சியினையும் ஆராய்தல் - சமூகப் பயன்பாட்டிற்கு நவீன ஊடகங்களின் பங்களிப்பினைக் கற்பித்தல்.

அலகு: 1 தகவல் தொடர்பு பொருண்மைகள் - மொழியின் கண்டுபிடிப்புப் பற்றிய நான்கு கோட்பாடுகள் - தகவல் தொடர்பின் பண்புகள் கூறுகள் - ஊடகம் - தகவல் தொடர்புத் தடைகள் - தகவல் தொடர்பும் மனிதஉறவுகளும் - தகவல் தொடர்பின் வகைகள் - தகவல் தொடர்பு ஊடகங்களின் வகைகள் - தகவலியல் மாதிரிகள் - தகவல் தொடர்பின் தாக்கம் - ஊடகங்களின் பணிகள்.

அலகு: 2 இதழியல் - அச்சு ஊடக வரலாறு - தாய்மொழிப் பத்திரிகைச் சட்டம் - இந்திய விடுதலை இயக்கமும் இதழ்களும் - முன்னோடிப் பத்திரிகைகளும் பத்திரிகையாளர்களும் - பத்திரிகை நிறுவனத்தின் பணிகள் - மெய்ப்புத்திருத்தம்- இதழ்களின் பகுப்பும் அமைப்பும்.

அலகு: 3 வானொலி - வானொலியின் வரலாறு - அகில இந்திய வானொலி - வானொலிக் கோட்பாடுகள் - வானொலி ஒலிபரப்புகள் - பிரசார்பாரதி மசோதா - இணைய வானொலியும் செயற்பாடும்.

அலகு: 4 தொலைக்காட்சி - தொலைக்காட்சியின் வரலாறு - இந்தியத் தொலைக்காட்சியின் வளர்ச்சி - நோக்கங்கள் - நிகழ்ச்சித் தயாரிப்பு- தொலைக்காட்சி நிகழ்ச்சிகள் - விளம்பரங்கள் - தொலைக்காட்சியின் பிறதகவல் தொடர்புச் சாதனங்கள் - பன்னாட்டுத் தடங்கள் - இணைய தொலைக்காட்சியும் செயற்பாடும். அறிவியல் தொழில்நுட்பத்தின் இன்றைய வளர்ச்சி நிலைகள். கணினி இணையம், வீடியோ, செல்பேசி, மின்னஞ்சல், செயற்கைகோள், செயற்கைகோளின் செயற்பாடுகள் - தொடர்பியலும் இதழியலும் - பயன்களும் தனித்தன்மைகளும் - தொடர்பியல் சாதனங்களும் மக்கள்கருத்தும் - மக்கள்தொடர்பு அலுவலரின் பணிகள் - தொடர்புத் துறையின் அமைப்பும் பிற்பணிகளும்.

அலகு: 5 நுணுக்க வாசிப்பு: மா.சு.சம்பந்தனின் அச்சம் பதிப்பும், இரா.பாவேந்தனின் தமிழில் அறிவியல் இதழ்கள், சாரு நிவேதிதாவின் சினிமா: அலைந்து திரிபவனின் அழகியல், சமத்துவனின் தொலைக்காட்சி உலகம், பூரணச்சந்திரனின் தொடர்பியல், சமூகம், வாழ்க்கை.

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4. தமிழ் அச்சுப் பண்பாடு சிறப்பிதழ்: மாற்றுவெளி ஆய்விதழ் -15 டிசம்பர் 2014.
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7. குருசாமிமா.பா. 1998: இதழியல் கலைகுரு, தேன்மொழி பதிப்பகம், திருச்செந்தூர்
8. அருள்தளபதிமா – தகவல் தொழில்நுட்பமும் மின்வெளி உலகமும் - காம்பெக் பதிப்பகம், கே.கே. நகர், சென்னை.
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17. பனுவலாக்கக் கோட்பாடு - மதிப்பலகு - 4

அலகு:1 பனுவல், மரபு, நிகழ்த்துதல், வாய்மொழி மரபும் எழுத்து மரபும், வாய்மொழி இலக்கியம், நிகழ்த்துக்கலைகள், சடங்கு நிகழ்த்துதல் நம்பிக்கைகள், புழங்குபொருள் பண்பாடு.

அலகு 2: வாய்மொழி வாய்ப்பாட்டு கோட்பாடு: மில்மன் பாரி, ஏபி லார்டு, ஜான் மைல்ஸ் .:போலி – கலேவாலா: எலியாஸ் லோன்ராட், ஜீலியஸ் குரோன், கார்லே குரோன் - அண்ணன்மார் நிகழ்த்துதல் - லாரி ஹாங்கோ சிரி காப்பியம்.

அலகு 3: வாய்மொழி பாடல் கட்டமைப்பினைப் புரிந்துகொள்ளுதல் - காப்பிய இடியோலெக்ட்டும் காப்பியப் பதிவேடும் - திரிபு வடிவங்களின் வகைப்பாடுகள் - இடைப்பனுவல்கள் - மரபின் தொகுதி – நிகழ்த்துதல் முறைமைகளும் நிகழ்த்துதல் தனித்தன்மைகளும் - ஆவணப்படுத்துதல் முறைமைகள் (சொல்வதை எழுதுதல், பாடுதல், சூழலில் பாடுதல்) – கருவி வழக்காறுகளும் வாய்மொழி இலக்கிய விமர்சனமும் - மனப்பனுவலும் மனப்படிமங்களும் - பனுவலின் நிலைத்தன்மையும் வேறுபாடும்

(பல்வடிவங்கள், கூற்றுகள், வாய்பாடுகள்) – பாடல் கட்டமைப்பின் புறவயக்கூறுகள் (விவரணை, கதையாடலின் குறித்த பகுதி) அகவயக்கூறுகள், நிகழ்த்துதல் உத்திகளும் கட்டமைப்பு வழிமுறைகளும் - பனுவல் தன்மையும் பாடகரின் குரலும்.

அலகு 4: பனுவலாக்கம் : பிரதி, நிகழ்த்துதல் பிரதி, மற்றொன்று விரித்தல், நிகழ்த்தப்பட்ட பிரதி – சமூகப் பண்பாட்டு சூழல்கள், நிகழ்வுகள், தொன்மமும் படிமுறைகளும் (சடங்குகள், தெய்வமாடுதல்), பொருட்கள் (உணவு, படையல்) பனுவல் குறித்த நம்பிக்கைகள், பனுவலாக்கம் ஓர் ஆய்வுமுறையியல், பனுவலாக்க முறையியல் - உரையாடலில் முறையியல் - காப்பியப் பனுவல்களைக் கற்றுக்கொள்ளுதலும் கட்டமைத்தலும் - அன்றாடச் சூழல்களில் பாடுதல் - களஆய்வு காப்பிய தொல்லியல், thick corpus, organic variation, பொருள் கொள்ளுதல்.

அலகு 5: நுணுக்க வாசிப்பு: கைலாசபதியின் தமிழ் வீரநிலைக் கவிதை, வே.மாணிக்கத்தின் கதைப்பாடல்களில் கட்டபொம்மன், தே.லூர்துவின் சூழலியல் அடிப்படையில் பழமொழிகள், தே.லூர்துவின் நாட்டார்வழக்காற்றியல் கோட்பாடுகள், ஞா.ஸ்ஐபனின் அமைப்பியல் கோட்பாடும் ஆய்வுகளும்.

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11. ஸ்டீபன் ஞா. 2010: அமைப்பியல் கோட்பாடும் ஆய்வுகளும், சென்னை: நியூசெஞ்சுவரி பப்ளிகேஷன்ஸ்.

18. நிகழ்த்துதல் மரபுகளும் கோட்பாடும் - மதிப்பலகு - 4

அலகு 1: நிகழ்த்துதல்: கருத்தாக்கம், வரையறை, வகைப்பாடு. நிகழ்த்துதல் பண்புகள், நிகழ்த்துநர் பார்வையாளர் ஊடாட்டம். நிகழ்த்துதல் கட்டமைப்பு: சூழல், பனுவல், நிகழ்த்துதல் நிகழ்த்துதல் கூறுகள்: வாய்மொழிக் கூறுகள் (பேச்சு, உரையாடல், பாடுதல், கதைசொல்லுதல், உணர்வு வெளிப்பாடு – அழகை, சிரிப்பு) உடல் மொழிக்கூறுகள்: (பாவனை, உணர்வு வெளிப்பாடு – மௌனம், கண், முகபாவனை, உடல்மொழி) நிகழ்த்துதல் கருத்தாக்கம் : தொல்காப்பியம் (மெய்ப்பாட்டியல்), ரிச்சர்டு பெளமனின் வாய்மொழிக்கலை, ரிச்சர்டு செக்னர், விக்டர் டர்னர். நிகழ்த்துதல் அணுகுமுறையும் நாட்டார் வழக்காற்றியலும்

அலகு 2: வாய்மொழி நிகழ்த்துதல் : ரிச்சர்டு பெளமன், பிரெண்டா பெக் (அண்ணன்மார் கதை). லின்டா டே (கதைசொல்லுதல்) ஜான் மைல்ஸ் .:போலி (வாய்மொழி மரபு)

அலகு 3: சடங்கு நிகழ்த்துதல் : அணுகுமுறைகள்: ரிச்சர்டு .:ப்ராஸ்கா (தெருக்கூத்து), சுந்தர் காளி (இரணியன் நாடகம்), ஸ்டீவர்ட் பிளாக்பர்ன் (வில்லுப்பாட்டு, தோல்பாவைக்கூத்து), லாரி ஹாங்கோ (சிரி காப்பியம்): சாமுவேல் சுதானந்தா (ஓயிலாட்டம்) கலைகள் : மரபு, பனுவல், நிகழ்த்துமிடம், சூழல், தொழில்முறைக்குழுக்கள், நிகழ்த்துமுறை, பாங்கு, சமூகப்பண்பாட்டு சூழல்.

அலகு 4: நாடக மரபுகளும் நிகழ்த்துதல்களும் : கூத்துமரபு, இசை நாடக மரபு, பொழுதுபோக்கு நிகழ்த்துதல் மரபுகள் (ஆடல் - பாடல்)

அலகு 5: நுணுக்க வாசிப்பு: சுந்தர்காளியின் திருமுகமும் சுயமுகமும், தொ.பரமசிவனின் அழகர் கோயில், நா.இராமச்சந்திரனின் துடியான சாமிகள், ஆ.தனஞ்செயனின் குலக்குறியியலும் மீனவர் வழக்காறுகளும், சே.இராமானுஜத்தின் நாடகப் படைப்பாக்கம்.

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19. இனவரைவியல் கள ஆய்வு - மதிப்பலகு - 4

அலகு 1: கள ஆய்வு : முன் - களஆய்வுத் தயாரிப்பும் தகவலாளர்களுடன் உறவினை ஏற்படுத்துதலும். களஆய்வு என்றால் என்ன? மானிடவியல், நாட்டார் வழக்காற்றியல் புலம் சார்ந்து எழும் கள ஆய்வுப் பிரச்சனைகள் - முந்தைய ஆய்வுகளும் பதிவுகளும் - எழுத்து, ஒலி, ஒளி வடிவ ஆவணங்கள் தகவலாளர்களைத் தேர்ந்தெடுத்தல் - தகவலாளர்களுடன் உறவினை ஏற்படுத்துதல். களவிழுமியங்கள் அகத்தார் - புறத்தார் பார்வை சார்ந்த அணுகுமுறைகள்

அலகு 2: சேகரிப்புத் திட்டம்: கள ஆய்வு அணுகுமுறைகள் - உற்றுநோக்கல், பங்கேற்பு உற்றுநோக்கல், நேர்காணல். சூழல் வகைகள் - இயற்கை, செயற்கை, தூண்டப்பட்ட இயற்கை எது தகவல்? தகவல்களைப் பதிவு செய்யும் முறைமைகள் நாட்டார் வழக்காற்று தகவல் வகைகள் - முதன்மை நிலை - இரண்டாம் நிலை கள ஆய்வில் எழும் சிக்கல்கள் கள ஆய்வு சேகரிப்புத் திட்டவரைவு மாதிரியை எழுதுதல் - சேகரிப்புத் திட்டங்களின் வகைகள்

அலகு 3: இனவரைவியல்: இனவரைவியல் என்றால் என்ன? நேர்காட்சிவாதம், எதார்த்தவாதம் இனவரைவியல் - ஓர் ஆய்வியல் அணுகுமுறை- ஓர் ஆய்வியல் வகைமை இனவரைவியல் எழுதுதல் - இனவரைவியல் பனுவல் - பனுவல்களை ஒழுங்குபடுத்துதல் இனவரைவியலுக்கான பார்வையாளர்களும் பனுவல்களும்

அலகு 4: விமர்சன இனவரைவியல்: புதிய இனவரைவியல் - பேச்சின் இனவரைவியல் - இனவரைவியல் புதிய அணுகுமுறைகள் - தமிழக பண்பாட்டுச் சூழலில் இனவரைவியல் - காலனியச் சூழல், இந்தியவியல் புதிய இனவரைவியலாளர்கள், தெற்கு ஆசியப்பார்வை.

அலகு 5: நுணுக்க வாசிப்பு : தே.லூர்துவின் நாட்டார் வழக்காற்றியல் களஆய்வு, ஆறு.இராமநாதனின் நாட்டுப்புறவியல் களஆய்வு நெறிமுறைகள், அ.க.பெருமாளின் நாட்டாரியல் வழிகாட்டி, சி.ஜே.புல்லரின் தேவியின் திருப்பணியாளர்கள், இரா.சந்திரசேகரின் நாட்டுப்புறவியல் கள ஆய்வு.

பார்வை நூல்கள்

1. தே.லூர்து, நாட்டார் வழக்காற்றியல் களஆய்வு, பாளையங்கோட்டை: பாரிவேள் பதிப்பகம்,
2. எட்கர் தர்ஸ்டன், தென்னிந்தியக் குலங்களும் குடிகளும், தஞ்சாவூர்: தமிழ்ப் பல்கலைக்கழகம்,
3. பக்தவத்சல பாரதி, தமிழகத்தில் நாடோடிகள், புதுச்சேரி: வல்லினம்,
4. பெருமாள், அ.க. 1985: நாட்டாரியல் வழிகாட்டி, நாகர்கோவில்: பிரிண்டர்ஸ் பிரைவேட் லிமிடெட்.
5. புல்லர், சி.ஜே., 1999: தேவியின் திருப்பணியாளர்கள், பாளையங்கோட்டை: நாட்டார் வழக்காற்றியல் ஆய்வு மையம்.
6. சந்திரசேகர்.இரா. முற்றும் பலர் (ப.ஆ.), 2003: கோயம்புத்தூர்: பாரதியார் பல்கலைக்கழகம்.
7. ஸ்டீபன், ஞா. 1998: கொக்கரை: காணிக்காரர் வாழ்வும் பண்பாடும், நாகர்கோவில்: திணை வெளியீடு.
8. இராமநாதன், ஆறு. 2003: நாட்டுப்புறவியல் களஆய்வு நெறிமுறைகள், திருவனந்தபுரம்: தென்னிந்திய மொழிகளின் நாட்டுப்புறவியல் கழகம்.

20. திட்ட ஏடு - மதிப்பலகு - 4

ஆய்வுக்குழுவால் திட்ட ஏடு பரிந்துரைக்கப்படும் ஆய்வாளருக்குத் திட்டஏட்டுப் பணி பொருந்தும். இது ஒரு தாளுக்குச் சமமானது. திட்டஏட்டைப் பருவத் தேர்வு தொடங்கும் முன் ஆய்வுக் குழுவுக்குச் சமர்ப்பிக்க வேண்டும். நெறியாளரின் நெறிப்படுத்துதலின்கீழ் திட்ட ஏட்டுப்பணியை மேற்கொள்ள வேண்டும். திட்டஏடு கணினி தட்டச்சில் 50 பக்கங்களுக்குக் குறையாமல் அமைய வேண்டும். ஆய்வேட்டுடன் இத்திட்ட ஏட்டை ஆராய்ச்சிப் பிரிவில் சமர்ப்பிக்க வேண்டும்.

தமிழியல் துறை
மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்
திருநெல்வேலி -12

பாடத்திட்ட அமைப்பு: 1. இலக்கிய மானிடவியலில் சான்றிதழ்

Sem	Sub No.	Category of Subject	Sub. Title	Contact Hrs/Week	L Hrs/Week	T Hrs/Week	P Hrs/Week	Credits
I	1.	Core - 1	பண்பாட்டு மானிடவியல்	4	4	-	-	4
	2.	Core - 2	இலக்கிய மானிடவியல்	4	4	-	-	4
	3.	Allied	பண்பாட்டு இயக்கங்களும் இலக்கியங்களும்	4	4	-	-	4

மொத்த மதிப்பலகு: 12

பாடத்திட்ட அமைப்பு: 2. நாட்டார் வழக்காற்றியலில் சான்றிதழ்

Sem	Sub No.	Category of Subject	Sub. Title	Contact Hrs/Week	L Hrs/Week	T Hrs/Week	P Hrs/Week	Credits
I	1.	Core - 1	நாட்டார் வழக்காற்றியல் அடிப்படைகளும் பணுவலாக்கக் கோட்பாடுகளும்.	4	4	-	-	4
	2.	Core - 2	நிகழ்த்துதல் மரபுகளும் கோட்பாடுகளும்.	4	4	-	-	4
	3.	Allied	இனவரைவியல் கள ஆய்வு	4	4	-	-	4

மொத்த மதிப்பலகு: 12

பாடத்திட்டம்

1. இலக்கிய மானிடவியலில் சான்றிதழ்

1. பண்பாட்டு மானிடவியல்

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நோக்கம்:

1. மானிடவியல் புலத்தை அறிமுகம் செய்தல்
2. மானிடவியலின் அடிப்படைகளை அறிதல்
3. இலக்கிய ஆய்வுக்கு மானிடவியலின் தேவையை உணர்த்துதல்

கற்றல் பயன்:

1. இலக்கிய ஆய்வுகளுக்குப் பல்புலம் சார்ந்த அறிவு இன்றியமையாதது என்பதை அறிந்தவராய் இருத்தல்.
2. இலக்கிய ஆய்வுகளுக்கு மானிடவியல் அறிவைப் பயன்படுத்தும் திறன் பெற்றிருத்தல்

அலகு: 1; பண்பாடு: (12 மணிநேரம்) விளக்கம் – வரையறைகள் – பண்பாடுகளின் பன்மியம் – பண்பாட்டின் இயல்புகள் – பண்பாட்டின் உட்கூறுகள்: பண்பாட்டுக் கூறு – பண்பாட்டுக் கலவை – பண்பாட்டு நிறுவனம் – உட்கூறுகளின் தன்மைகள் – பொருள்சார் கூறுகள் – அறிதல்சார் கூறுகள் – நெறியியல்சார் கூறுகள்.

அலகு: 2; பண்பாட்டியல் அமைப்பு: (12 மணிநேரம்) பொருள்சார் பண்பாடும், பொருள் சாராப் பண்பாடும் – கலை வடிவங்கள் – மனவடிவங்கள் – உகந்தநிலைப் பண்பாடும் உண்மைப் பண்பாடும் – உள்ளார்ந்த பண்பாடும் வெளிப்படைப் பண்பாடும் – உட்பண்பாடும் எதிர்ப் பண்பாடும் – பண்பாட்டுப் பொதுமைகள் – உளவழி ஒற்றுமை – பண்பாட்டு ஒன்றியம்.

அலகு: 3; பண்பாட்டியல் அணுகுமுறைகள்: (14 மணிநேரம்) செயற்பாட்டியல் கொள்கை: மாலினோவஸ்கி, இராட்கிளிஃப் பிரௌன், அமைப்பியல் கொள்கை – மீவியல் கருத்தாக்கம் – விளிம்புக் கருத்தாக்கம் – அறிதல்சார் கொள்கை – குறியீட்டுக் கொள்கை – சார்புமுறை – இனமைய வாதம் – நடத்தைசார் முறை – பண்பாடும் ஆளுமையும் – உளவியல் கொள்கை – வரலாற்றுமைய வாதம்

அலகு: 4; பண்பாட்டுப் படிமலர்ச்சி: (12 மணிநேரம்) தொன்மைப் படிமலர்ச்சி – புதுப் படிமலர்ச்சி – உலகளாவியப் படிமலர்ச்சி – பலவழிப் படிமலர்ச்சி – ஆங்கிலேயப் பரவற் கொள்கை – ஆஸ்திரிய – ஜெருமானியப் பரவற்கொள்கை – அமெரிக்கப் பரவற் கொள்கை.

அலகு: 5; பண்பாட்டு மாற்றம்: (10 மணிநேரம்) பண்பாட்டு மாற்றத்தின் முறைகள் – கண்டுபிடிப்புகள் – பண்பாட்டுப் பேறு – நவீனமயமாதல், தொழில்மயமாதல் – நகரமயமாதல் – உயர்குடி ஆக்கம் – இந்துமயமாதலும் பிறசமயம் தழுவலும் – பண்பாட்டுப் பரவல் – பண்பாட்டுப் பரவல் கொள்கைகள்.

பாட நூல்:

பக்தவத்சலபாரதி சீ., 1990: பண்பாட்டு மானிடவியல், திருச்சி: புத்தாந்தம், அடையாளம் பதிப்பகம்.

பார்வை நூல்கள்:

1. பக்தவத்சலபாரதி சீ., 1990: பண்பாட்டு மானிடவியல், திருச்சி : புத்தாந்தம், அடையாளம் பதிப்பகம்.
2. சண்முகலிங்கன் என்., & பக்தவத்சலபாரதி சீ., 2004: இலங்கை – இந்திய மானிடவியல், சிதம்பரம்: மெய்யப்பன் பதிப்பகம்,
3. செல்லப்பெருமாள் ஆ., (ப.ஆ) 1991: நாட்டார் வழக்காற்றியல், தொகுதி-3, பாளையங்கோட்டை: மானிடவியல் சிறப்பிதழ்.
4. ஜான் மோன்கன், பீட்டர் ஜஸ்ட், 2005: சமூகப் பண்பாட்டு மானிடவியல்: மிகச் சுருக்கமான அறிமுகம், திருச்சி: புத்தாந்தம், அடையாளம் பதிப்பகம்.
5. பக்தவத்சல பாரதி சீ., 2012: மானிடவியல் கோட்பாடுகள், திருச்சி: புத்தாந்தம், அடையாளம் பதிப்பகம்.

2. இலக்கிய மானிடவியல்

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நோக்கம்:

1. இலக்கிய மானிடவியல் புலத்தை அறிமுகம் செய்தல்
2. இலக்கிய வாசிப்பிற்கு மானிடவியலின் தேவையை உணர்த்துதல்
3. மானிடவியல் அடிப்படையில் இலக்கியங்களை அர்த்தப்படுத்த கற்பித்தல்

கற்றல் பயன்:

1. இலக்கியத்தை மானிடவியல் அறிவைக் கொண்டு திறனாய்வு செய்யும் திறன் பெற்றிருத்தல்.
2. இலக்கியத்தை மானிடவியல் தரவாகப் பயன்படுத்தும் நுட்பங்களை அறிந்திருத்தல்

அலகு: 1; இலக்கிய மானிடவியல் அறிமுகம்: (12 மணிநேரம்) இனவரைவியலின் அடிப்படைகள் – இனவரைவியலாளரும் படைப்பாளியும் படைப்பும் இனவரைவியலும் – நாவலும் இனவரைவியலும்.

அலகு: 2; இலக்கிய இனவரைவியல்: (14 மணிநேரம்) இனவரைவியலின் வகைகள் – இனவரைவியலின் இயல்பு – இலக்கியத்தில் இனவரைவியலை அடையாளம் காணுதல் – இலக்கியத் தரவை மானிடவியல் தரவாகக் கொள்ளுதல் – விளக்கமளித்தல் (இலக்கிய இனவரைவியல் கட்டுரை)

அலகு: 3; படிமலர்ச்சிக் கோட்பாடும் இலக்கியமும்: (10 மணிநேரம்) படிமலர்ச்சிக் கோட்பாட்டின் அடிப்படைகள் – கொள்கைகள் – மொழியின் படிமலர்ச்சி – இலக்கியப் படிமலர்ச்சி.

அலகு: 4; மானிடவியல் அடிப்படையில் திணைக் கோட்பாடு: (12 மணிநேரம்) திணைக் கோட்பாட்டின் சமூக அடிப்படைகள் – திணை அமைப்பும் படிநிலை வளர்ச்சியும் – திணை அமைப்பும் இனவரைவியலும் – தொல்காப்பியமும் இனவரைவியல் கவிதையியலும் .

அலகு: 5; மானிடவியல் அடிப்படையில் சங்க இலக்கியம்: (12 மணிநேரம்) உணவு உற்பத்தியும் பரிமாற்ற உறவுகளும் – பதுக்கைகளும் பெருங்கற்படைச் சின்னங்களும் – இரும்புப் பண்பாடு – சங்க இலக்கியத்தில் பேய்கள் – தாலியும் குலக்குறிச் சின்னமும்.

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4. சிவத்தம்பி கார்த்திகேசு, 1998: பண்டையத் தமிழ்ச் சமூகம்: வரலாற்றுப் புரிதலை நோக்கி, சென்னை: மக்கள் வெளியீடு.

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8. பக்தவத்சல பாரதி சீ., 2014: இலக்கிய மானிடவியல், தமிழ்ச் சமூகத்தின் செல்நெறிகளின் மீதான பண்பாட்டியல் பார்வை, திருச்சி: புத்தாந்தம், அடையாளம் பதிப்பகம்.

3. பண்பாட்டு இயக்கங்களும் இலக்கியங்களும்

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நோக்கம்:

1. சமகாலத் தமிழ் இலக்கியங்களை இயக்கங்களின் அடிப்படையில் புரிதல்
2. இயக்கங்கள் எவ்வாறு இலக்கியங்களைப் பாதித்துள்ளன என்பதை உணர்தல்
3. இயக்கங்களின் வளர்ச்சிக்கு இலக்கியங்கள் எவ்வாறு உதவின என்பதை அறிதல்

கற்றல் பயன்:

இயக்கங்களுக்கும் இலக்கியங்களுக்குமான உறவுகளை அறிந்தவராதல்.

அலகு: 1: தமிழ் இயக்கம்: (12 மணிநேரம்) தோற்றமும் வளர்ச்சியும் – சமூகச் சூழலும் தேவையும் – தாக்கம் – மறைமலையடிகள்: தனித்தமிழ் மாட்சி, அறிவுரைக்கொத்து (பக். 96-109) – திரு.வி.க: தாய்மொழி (தமிழ்ச்சோலை – பக். 19-26) – பாரதிதாசன்: தமிழியக்கம்.

அலகு: 2: தேசிய இயக்கம்: (14 மணிநேரம்) தோற்றமும் வளர்ச்சியும் – சூழலும் தேவையும் – தாக்கம் – இளசை மணியன்: பாரதி தரிசனம் (பக். 282-285) – ம.பொ.சி.: சுதந்திரம் மக்கள் சுக வாழ்வுக்கே. பயங்கரவாதமும் காந்திய சகாப்பதமும் (பக். 130- 138) – நா.வானமாமலை: தமிழர் நாட்டுப்பாடல்கள், வெள்ளையர் கொள்ளை, நம்துரை (பக். 370-372)

அலகு: 3 திராவிட இயக்கம் : (12 மணிநேரம்) தோற்றமும் வளர்ச்சியும் – சூழலும் தேவையும் – தாக்கம் – பெரியார் ஈ.வெ.ரா.: பெண் ஏன் அடிமையானாள் – சி.என். அண்ணாதுரை: வேலைக்காரி (நாடகம்) – பாரதிதாசன்: இராப்பத்து கவிதைகள், மூன்று முதல் ஆறு வரை.

அலகு: 4 பொதுவுடைமை இயக்கம்: (12 மணிநேரம்) தோற்றமும் வளர்ச்சியும் – சூழலும் தேவையும் – தாக்கம் - ஜீவா: ஜீவாவின் பாடல்கள், காலுக்குச் செருப்பில்லை (பாடல்) (பக். 21-22) – தொ.மு.சி.ரகுநாதன்: மீண்டும் மீண்டும் பிறப்பேன் (தொ.மு.சி.ரகுநாதன் கவிதைகள்), சோலை சுந்தரப் பெருமாள்: செந்நெல் (நாவல்) - கந்தர்வன்: சிறைகள் (கயிறு கவிதை மட்டும்).

அலகு: 5 அடித்தள மக்கள்: (10 மணிநேரம்) இயக்கங்கள் சூழலும் தேவையும் – தாக்கம் – சிவகாமி: ஆனந்தாயி (நாவல்) – பக்தவத்சலன்: தோள் சீலைப் போராட்டம் (ஆராய்ச்சி 1973:3, பக். 83-93) – தொ.பரமசிவன்: ஆலய நுழைவுப் போராட்டம் (பண்பாட்டு வேர்களைத் தேடி, பக்.157-172).

பார்வை நூல்கள்

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4. ஜார்ஜ் டி.எச்., 1992: குமரி மாவட்டப் பெண்ணுரிமைப் போராட்டம், சென்னை: மணி பதிப்பகம்.
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2. நாட்டார் வழக்காற்றியலில் சான்றிதழ்

1. நாட்டார் வழக்காற்றியல் அடிப்படைகளும் பனுவலாக்கக் கோட்பாடுகளும்

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நோக்கம்

1. நாட்டார்வழக்காற்றியல் புலத்தை ஒரு சமூக அறிவியல் புலமாகக் கற்பித்தல்
2. வழக்காறுகளைச் சூழல் அடிப்படையில் அணுகும் பார்வையை வளர்த்தல்

கற்றல் பயன்

1. வழக்காறுகளையும் மக்களையும் பிரித்துப் பார்க்க இயலாது என்ற புரிதலைப் பெற்றிருத்தல்.
2. வழக்காறுகள் அவை வாழும் சமூகத்தில் அர்த்தமுடையவை என்ற புரிதலைப் பெற்றிருத்தல்.
3. நாட்டார்வழக்காற்றியலுக்கெனத் தனித்தக் கோட்பாடுகளும் கொள்கைகளும் உள்ளன என்ற புரிதலைப் பெற்றிருத்தல்.

அலகு: 1; புல அறிமுகம்: கலைச்சொற்கள் விளக்கம் - அடிப்படைக்கலைக் சொற்கள் - கலைச்சொல் சிக்கல்கள் - நாட்டார் யார்? - வழக்காறு என்றால் என்ன - 21 வரையறைகள். அடிப்படைக் கருத்தாக்கங்கள்: போலி வழக்காறுகள் (ப.11) - திரிபு வடிவங்கள் (ப.150) - கருவி வழக்காறுகள் (பக்.154,155) - கதைக்கூறு (ப.161) - கதை வகை (ப.163) - இழைவுக் கூறு (ப.213) - பனுவல் - சூழல் - பயன்பாடு.

அலகு:2 பனுவல், மரபு, நிகழ்த்துதல், வாய்மொழி மரபும் எழுத்து மரபும், வாய்மொழி இலக்கியம், நிகழ்த்துக்கலைகள், சடங்கு நிகழ்த்துதல் நம்பிக்கைகள், புழங்குபொருள் பண்பாடு.

அலகு 3: வாய்மொழி வாய்ப்பாட்டு கோட்பாடு: மில்மன் பாரி, ஏபி லார்டு, ஜான் மைல்ஸ் ஃபோலி - கலேவாலா: எலியாஸ் லோன்ராட், ஜீலியஸ் குரோன், கார்லே குரோன் - அண்ணன்மார் நிகழ்த்துதல் - லாரி ஹாங்கோ சிரி காப்பியம்.

அலகு 4: வாய்மொழி பாடல் கட்டமைப்பினைப் புரிந்துகொள்ளுதல் - காப்பிய இடியோலெக்ட்டும் காப்பியப் பதிவேடும் - திரிபு வடிவங்களின் வகைப்பாடுகள் - இடைப்பனுவல்கள் - மரபின் தொகுதி - நிகழ்த்துதல் முறைமைகளும் நிகழ்த்துதல் தனித்தன்மைகளும் - ஆவணப்படுத்துதல் முறைமைகள் (சொல்வதை எழுதுதல், பாடுதல், சூழலில்

பாடுதல்) - கருவி வழக்காறுகளும் வாய்மொழி இலக்கிய விமர்சனமும் - மனப்பனுவலும் மனப்படிமங்களும் - பனுவலின் நிலைத்தன்மையும் வேறுபாடும் (பல்வடிவங்கள், கூற்றுகள், வாய்பாடுகள்) - பாடல் கட்டமைப்பின் புறவயக்கூறுகள் (விவரணை, கதையாடலின் குறித்த பகுதி) அகவயக்கூறுகள், நிகழ்த்துதல் உத்திகளும் கட்டமைப்பு வழிமுறைகளும் - பனுவல் தன்மையும் பாடகரின் குரலும்.

அலகு 5: பனுவலாக்கம் : பிரதி, நிகழ்த்துதல் பிரதி, மற்றொன்று விரித்தல், நிகழ்த்தப்பட்ட பிரதி - சமூகப் பண்பாட்டு சூழல்கள், நிகழ்வுகள், தொன்மமும் படிமுறைகளும் (சடங்குகள், தெய்வமாடுதல்), பொருட்கள் (உணவு, படையல்) பனுவல் குறித்த நம்பிக்கைகள், பனுவலாக்கம் ஓர் ஆய்வுமுறையியல், பனுவலாக்க முறையியல் - உரையாடலில் முறையியல் - காப்பியப் பனுவல்களைக் கற்றுக்கொள்ளுதலும் கட்டமைத்தலும்.

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9. லார்து தே. 2010: சூழலியல் அடிப்படையில் பழமொழிகள், பாளையங்கோட்டை: நாட்டார் வழக்காற்றியல் ஆய்வு மையம்.
10. லார்து தே. 2003: நாட்டார் வழக்காற்றியல் கோட்பாடுகள், பாளையங்கோட்டை: நாட்டார் வழக்காற்றியல் ஆய்வு மையம்.
11. ஸ்டீபன் ஞா. 2010: அமைப்பியல் கோட்பாடும் ஆய்வுகளும், சென்னை: நியுசெஞ்சுவரி பப்ளிகே'ன்ஸ்.

2. நிகழ்த்துதல் மரபுகளும் கோட்பாடும்

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அலகு 1: நிகழ்த்துதல்: கருத்தாக்கம், வரையறை, வகைப்பாடு. நிகழ்த்துதல் பண்புகள், நிகழ்த்துநர் பார்வையாளர் ஊடாட்டம். நிகழ்த்துதல் கட்டமைப்பு: சூழல், பனுவல், நிகழ்த்துதல் நிகழ்த்துதல் கூறுகள்: வாய்மொழிக் கூறுகள் (பேச்சு, உரையாடல், பாடுதல், கதைசொல்லுதல், உணர்வு வெளிப்பாடு – அழுகை, சிரிப்பு) உடல் மொழிக்கூறுகள்: (பாவனை, உணர்வு வெளிப்பாடு – மௌனம், கண், முகபாவனை, உடல்மொழி) நிகழ்த்துதல் கருத்தாக்கம் : தொல்காப்பியம் (மெய்ப்பாட்டியல்)இ ரிச்சர்டு பெளமனின் வாய்மொழிக்கலை, ரிச்சர்டு செக்னர், விக்டர் டர்னர். நிகழ்த்துதல் அணுகுமுறையும் நாட்டார் வழக்காற்றியலும்

அலகு 2: வாய்மொழி நிகழ்த்துதல் : ரிச்சர்டு பெளமன், பிரெண்டா பெக் (அண்ணன்மார் கதை). லின்டா டே (கதைசொல்லுதல்) ஜான் மைல்ஸ் ஃபோலி (வாய்மொழி மரபு)

அலகு 3: சடங்கு நிகழ்த்துதல் : அணுகுமுறைகள்: ரிச்சர்டு ஃப்ராஸ்கா (தெருக்கூத்து), சுந்தர் காளி (இரணியன் நாடகம்), ஸ்டூவர்ட் பிளாக்பரன் (வில்லுப்பாட்டு, தோல்பாவைக்கூத்து), லாரி ஹாங்கோ (சிரி காப்பியம்): சாமுவேல் சுதானந்தா (ஒயிலாட்டம்) கலைகள் : மரபு, பனுவல், நிகழ்த்துமிடம், சூழல், தொழில்முறைக்குழுக்கள், நிகழ்த்துமுறை, பாங்கு, சமூகப்பண்பாட்டு சூழல்.

அலகு 4: நாடக மரபுகளும் நிகழ்த்துதல்களும் : கூத்துமரபு, இசை நாடக மரபு, பொழுதுபோக்கு நிகழ்த்துதல் மரபுகள் (ஆடல் - பாடல்)

அலகு 5: நுணுக்க வாசிப்பு: சுந்தர்காளியின் திருமுகமும் சுயமுகமும், தொ.பரமசிவனின் அழகர் கோயில், நா.இராமச்சந்திரனின் துடியான சாமிகள், ஆ.தனஞ்செயனின் குலக்குறியியலும் மீனவர் வழக்காறுகளும், சே.இராமானுஜத்தின் நாடகப் படைப்பாக்கம்.

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3. இனவரைவியல் கள ஆய்வு

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அலகு 1: கள ஆய்வு : முன் - களஆய்வத் தயாரிப்பும் தகவலாளர்களுடன் உறவினை ஏற்படுத்துதலும். களஆய்வு என்றால் என்ன? மானிடவியல், நாட்டார் வழக்காற்றியல் புலம் சார்ந்து எழும் கள ஆய்வுப் பிரச்சனைகள் - முந்தைய ஆய்வுகளும் பதிவுகளும் - எழுத்து, ஒலி, ஒளி வடிவ ஆவணங்கள் தகவலாளர்களைத் தேர்ந்தெடுத்தல் - தகவலாளர்களுடன் உறவினை ஏற்படுத்துதல். களவிழுமியங்கள் அகத்தார் - புறத்தார் பார்வை சார்ந்த அணுகுமுறைகள்

அலகு 2: சேகரிப்புத் திட்டம்: கள ஆய்வு அணுகுமுறைகள் - உற்றுநோக்கல், பங்கேற்பு உற்றுநோக்கல், நேர்காணல். சூழல் வகைகள் - இயற்கை, செயற்கை, தூண்டப்பட்ட இயற்கை எது தகவல்? தகவல்களைப் பதிவு செய்யும் முறைமைகள் நாட்டார் வழக்காற்று தகவல் வகைகள் - முதன்மை நிலை - இரண்டாம் நிலை கள ஆய்வில் எழும் சிக்கல்கள் கள ஆய்வு சேகரிப்புத் திட்டவரைவு மாதிரியை எழுதுதல் - சேகரிப்புத் திட்டங்களின் வகைகள்

அலகு 3: இனவரைவியல்: இனவரைவியல் என்றால் என்ன? நேர்காட்சிவாதம், எதார்த்தவாதம் இனவரைவியல் - ஓர் ஆய்வியல் அணுகுமுறை- ஓர் ஆய்வியல் வகைமை இனவரைவியல் எழுதுதல் - இனவரைவியல் பனுவல் - பனுவல்களை ஒழுங்குபடுத்துதல் இனவரைவியலுக்கான பார்வையாளர்களும் பனுவல்களும்

அலகு 4: விமர்சன இனவரைவியல்: புதிய இனவரைவியல் - பேச்சின் இனவரைவியல் - இனவரைவியல் புதிய அணுகுமுறைகள் - தமிழக பண்பாட்டுச் சூழலில் இனவரைவியல் - காலனியச் சூழல், இந்தியவியல் புதிய இனவரைவியலாளர்கள், தெற்கு ஆசியப்பார்வை.

அலகு 5: நுணுக்க வாசிப்பு : தே.லூர்துவின் நாட்டார் வழக்காற்றியல் களஆய்வு, ஆறு.இராமநாதனின் நாட்டுப்புறவியல் களஆய்வு நெறிமுறைகள், அ.க.பெருமாளின் நாட்டாரியல் வழிகாட்டி, சி.ஜே.புல்லரின் தேவியின் திருப்பணியாளர்கள், இரா.சந்திரசேகரின் நாட்டுப்புறவியல் கள ஆய்வு.

பார்வை நூல்கள்

1. தே.லூர்து, நாட்டார் வழக்காற்றியல் களஆய்வு, பாளையங்கோட்டை: பாரிவேள் பதிப்பகம்,

2. எட்கர் தர்ஸ்டன், தென்னிந்தியக் குலங்களும் குடிகளும், தஞ்சாவூர்: தமிழ்ப் பல்கலைக்கழகம்,
3. பக்தவத்சல பாரதி, தமிழகத்தில் நாடோடிகள், புதுச்சேரி: வல்லினம்,
4. பெருமாள்,அ.க. 1985: நாட்டாரியல் வழிகாட்டி, நாகர்கோவில்: பிரிண்டர்ஸ் பிரைவேட் லிமிடெட்.
5. புல்லர், சி.ஜே., 1999: தேவியின் திருப்பணியாளர்கள், பாளையங்கோட்டை: நாட்டார் வழக்காற்றியல் ஆய்வு மையம்.
6. சந்திரசேகர்.இரா. மற்றும் பலர் (ப.ஆ.), 2003: கோயம்புத்தூர்: பாரதியார் பல்கலைக்கழகம்.
7. ஸ்டீபன்,ஞா. 1998: கொக்கரை: காணிக்காரர் வாழ்வும் பண்பாடும், நாகர்கோவில்: திணை வெளியீடு.
8. இராமநாதன்,ஆறு.2003: நாட்டுப்புறவியல் களஆய்வு நெறிமுறைகள், திருவனந்தபுரம்: தென்னிந்திய மொழிகளின் நாட்டுப்புறவியல் கழகம்.

MANONMANIAM SUNDARANAR UNIVERSITY, TIRUNELVELI

Ph. D Course Work Papers

ZOOLOGY

(with effect from the academic year 2017-18 onwards)

Course	Name of the course	Credit	Exam hrs/ week
CORE I	Advanced Research Methodology	4	4
CORE II	Fisheries and Aquaculture	4	4
CORE III	Advances in Entomology	4	4
CORE IV	Pollution and Toxicology	4	4
CORE-V	Pharmaceuticals and Neutraceuticals	4	4
CORE-VI	Freshwater habitat and Ecology	4	4
CORE-VII	Microbiology and Microbial Techniques	4	4
CORE-VIII	Immuno and Biochemical techniques	4	4
CORE-IX	Marine Biodiversity and Wildlife	4	4
CORE-X	Marine Bio-resources, Utilization, threats and Management	4	4
CORE-XI	Integrated Ocean Management	4	4
CORE-XII	Animal Biotechnology and Molecular Biology	4	4
XIII	Mini Project	4	

1: ADVANCED RESEARCH METHODOLOGY

L	P	T	C
4	0	0	4

Course objective:

To provide in-depth Knowledge on methods involved in preparation of working solutions, quantitative and also on the working principles of equipments involved in research.

Unit: I Preparation of solutions :Types of Solutions- Standard Solutions, Stock Solution, Saturated Solution, Solution of Acids; Expression of Concentration - Molarity (M), Molality (m), Preparation of One Molar (1 M) Solutions, Normality (N), Mass Percent % (w/w), Percentage by Volume or % (v/v), Volume/Weight (V/W), Parts per Million (ppm), Parts per Billion (ppb); pH; Buffers and their preparation. -12h

Unit: II. Microscopy and Microtechnique: Microscopy – Principle, working mechanism and applications of Light, Phase contrast, Fluorescent, Darkfield, SEM, TEM and STEM. Microtechnique – Preparation of Whole mountand sections, staining, mounting and preparation of permanent slides; Cyto and Histochemical techniques. - 8h

Unit: III. Quantitative and Molecular Techniques: Quantification of carbohydrate, protein, lipid, fatty acids and aminoacids (Proximate composition); Estimation of Hydrolytic and Detoxication enzymes. Molecular Techniques – Principle, mechanism and application of SDS PAGE, AGE, PCR, RT-PCR; Basic principle and application of Chromatography; Basic principle and application of Spectrophotometer and UV Spectrophotometer. -12h

Unit IV: Biostatistics: Parametric – Student T test, F Test, Z – Test, Correlation, Regression and Co-efficient, ANOVA (One-way, Two-way), MANOVA, ANCOVA; Non-parametric – Chi-square, Wilcoxon signed rank test, Mann-Whitney test, Kolmogorov-Smirnow tests; SPSS, Sigma Plot, MAT LAB, and MiniTab for Biological data analysis. -14h

Unit V: Manuscript, Thesis and Project Writing:Research Processing, writing of report, research paper and review articles, Writing Thesis and Project proposal; Proof correction – symbols, MS word review option and other tools; Plagiarism checking, Impact factor, *h* index, i10 index, citation index; Funding agencies in India –DST, DBT, CSIR, ICMR, DRDO, ICAR, MoEF &CC, MoEs, UGC, TNSCST, IFS and EU. -14h

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Reference Books:

1. Rodney F. Boyer 2012. Biochemistry Laboratory: Modern Theory and techniques, second edition, Prentice Hall
2. Rajan Katoch. 2011. Analytical Techniques in Biochemistry and Molecular Biology, Springer, New York.
3. Chander,D.E. and Rtoberston, R.W.2009. Bioimaging: Current concepts in light and electron microscopy. Jones & Bartlet Publishers Jandberry M.A., USA.
4. Gurumani.2008. Text book of Research methodology.

5. Hoppert M.2003. Microscopic Techniques in Biotechnology. Wile and VCH,G Book & Co, Germany.

2: FISHERIES AND AQUACULTURE

L	P	T	C
4	0	0	4

Course Objective:

To impart knowledge on kinds of fishery resources and aquaculture management.

- UNIT I : Fisheries resources: Inland Fisheries resources-Marine Fishery Resources:- Important finfish and shellfish resources in Demersal and pelagic systems;- Brackish water Fishery Resources- Reverine fisheries resources:- Fishery Resource management and conservation strategies. Fishing Gears and Grafts- Fishing equipment: Fish finder, GPS navigator, sonar, net sonde, gear monitoring equipment. – Harvesting and Post harvest Techniques. -12h
- .UNIT II: Aquaculture Scenario: Indian and Global Scenario of aquaculture – Ecological and social aspects of aquaculture development – Sustainable and Eco-friendly aquaculture. Cultivable fin and shell fishes – Taxonomy and Characteristics of cultivable fish species – Criteria for the selection of cultivable species – Nutritional value of cultivable fishes. -10h
- Unit III : Culture Techniques, Design & Construction of Fish ponds: Culture technologies – Extensive, semi intensive, intensive and super intensive culture practices-water quality management in fish ponds. Selection of suitable site for aquaculture – Design and construction of culture ponds. Preparation and management of culture ponds. -12h
- UNIT IV : Feed and feed Management : Live feed culture (Microalgal culture, culture of Artemia, Rotifer and copepods – significance of live feed culture –Artificial feed: Types of Artificial feed – Feed Formulation–Feed additives (binder, Preservatives, Immunostimulants-Feeding stimulant-Antioxidants and colorants)- Feeding Management. Probiotics and pre-biotics as feed additives and functional food-Feed storage. -14h
- Unit V : Fish diseases: Bacterial, viral, fungal and parasitic diseases in fin and shell fishes –Disease Diagnostics: (Conventional & Molecular methods) – Treatment

measures – Predators. Probiotics and Prebiotics in fish diseases management-
Gnotobiotics. -12h

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Reference Books:

1. Balugut, E.A.1989. Aquaculture system and practices. A selected review publishing House, New Delhi.
2. Michael, B.N. and Singholka, B. 1985. Freshwater Prawn Farming. A manual of culture of *Macrobrachium rosenbergii*. Daya Publishing House, New Delhi.
3. Pillai, TVR. and M. N. Kutty., 2005. Aquaculture: Principles and Practices, Wiley-Blackwell.
4. Bose, AN., Yang, C.T., and Misra, A. 1991. Coastal Aquaculture Engineering. Oxford and IBH Publishing Co., Pvt. Ltd., New Delhi.
5. Sinha, V.R.P. 1993. A Compendium of Aquaculture Technologies for Developing Countries. Center for Science and Technology and Oxford and IBH Publishing Co., Pvt., Ltd., New Delhi.
6. Robert R. Stickney., 2009. Aquaculture: An Introductory Text, CAB International Publishers.

3: ADVANCES OF ENTOMOLOGY

L	P	T	C
4	0	0	4

Course Objective:

To learn the advances in taxonomy, distribution, special organs in insect, offensive and defensive behaviour, entomological industries, biological values, and also Insect as human Pests and vector.

Unit I: Taxonomy, distribution, and special organs: Introduction to numerical and molecular taxonomy; phenetics, cladistics; Insect sampling, collection and preservation techniques; rearing devices; insects as indicators of levels of pollution, GIS in relation to insects; Special organs in Insects-scent, sound and light producing apparatus; trichobothria in adult and immature insects; thermoregulatory, visual, auditory and glandular organs, exocrine and endocrine organs. -12 h

Unit II: Offensive and defensive Behaviour: Camouflaging, death feigning, mimesis, mimicry, host finding, feeding and reproductive behaviour, escape, defence, offence and predation; dispersal and migration; dormancy; adaptive features against CO₂ and UV rays. -10h

Unit III: Entomological industries: Moriculture - mulberry varieties for irrigated, rain-fed, alkaline conditions; mulberry propagation and cultivation practice; Sericulture – rearing practice of silkworm, coloured silk, recycling of sericulture waste, value addition to sericulture. Apiculture- Modern bee keeping equipments, advanced technology for collection, and processing of honey, Tribulations of Pesticide in Apiculture, Lac-culture-Host plant (winger and summer crop) cultivation and management, and pest management, strains of lack insect, insect culture, methods of artificial inoculation, processing of natural lac, and commercialization. -12h

Unit IV: Biological values of insects: Feed (*Hermetia illucens*, *Musca domestica*), Bacillus and NPV production using insects, commercialized insects (*Acheta domesticus*), Edible insect (*Galleria mellonella*, *Tenebrio molitor*, *Acheta domesticus*, *Bombyx mori*, *Ruspolia differens*, *Locusta migratoria*) and their health benefits; Venom producing insects (bugs, beetles, flies, neuropterans, and especially parasitoid and solitary aculeate wasps), peptides (Melittin, Apamin, Mast Cell Degranulating Peptide, Bombolitins, Mastoparans) and their health value; chemical nature (Sericin, Fibroin) Fibrous and therapeutic value of silkworm silk; chemistry, nutraceutical, medicinal value of honey. -14h

Unit V: Insect as human Pests and vector: Insect types-phytophagous, zoophagous, oligophagous, saprophagous, vectors; Ants, termites, cockroaches, silver-fish, cricket,

powder-post beetle, carpet beetle, cloth-moths, psocids, lice, bed-bugs, fleas, mosquitoes, house flies, wasps, sand flies, stable flies, flesh flies, blow flies, tsetse flies, black flies and midges. -12h

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Reference Books:

1. Journal of Insects as Food and Feed, 2017; 3(4): 225-229
2. Bharat B. Bindroo Director, and Satish Verma. 2014. Sericulture technologies developed by CSRTI MYSORE, Central Silk Board – Ministry of Textiles – Govt. of India, Mysore, pp. 66.
3. D. Sharma, 1995. Honeybees and their management in India, Indian Council of Agricultural Research, Printed in India at Everest Press, New Delhi, pp. 175
4. Alok Kumar, AK Jaiswal, AK Singh, and RK Yogi (eds.)(2015). Advances in Lac Production, Processing, Product Development and Value Addition, ICAR-IINRG, Ranchi. 1-206 pp.

4: POLLUTION AND TOXICOLOGY

L	P	T	C
4	0	0	4

Course Objectives:

The objective of this course is to provide students with an understanding of the sources, links and biological effects of major classes of pollutants in the marine environment. The course will help prepare students for careers in academic programs, research centers and consulting firms by providing them with an in-depth understanding of causes, consequences and methods of assessment of marine pollution.

UNIT I :Basics in Marine Pollution: Marine Pollution – Definition of GESAMP - Major pollutants – sources, transport path, dynamics. Monitoring methods, bioindicators, bioaccumulators and hot spots. Toxicology : Lethal and Sub-lethal effects of pollutants to marine organisms bioconcentration, bioaccumulation and biomagnifications, methods of toxicity testing, factors influencing toxicity, synergistic and antagonistic effects, role of microcosms & mesocosms. -14h

UNIT II: Major Pollutants – Sewage and Detergent: Sewage; industrial, agricultural and domestic discharges. Composition of Sewage - impact on marine environment, treatment methods (primary, secondary and tertiary).Detergents – composition – eutrophication and ecological significance, interference in the sewage treatment system. -12h

UNIT III: Major pollutants – Heavy metals & pesticide: Heavy metal pollution – sources, distribution, fate, toxicity and diseases (Minamata, itai-itai etc.).Pesticide pollution, classification and composition – sources, transport, distribution, fate and ecological impacts in the marine environment – endocrine disrupters. -12h

UNIT IV: Major Pollutants – Oil: Oil pollution – composition, sources and fate of spilled oil, biodegradation, biological impact of oil on marine organisms.- 10h

Unit V: Minor Pollutants: Thermal pollution – sources – waste heat disposal, uses of waste heat, role of biocides (Chlorine), ecological impacts. Radioactive pollution, sources (natural and artificial), distribution, biological effects of radiation. Plastics and litter – impact of mining and dredging operations in the marine environment. -12h

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Reference Books

1. Johnston, R. (Ed.), 1976. Marine Pollution. Academic Press, London, 729 pp.
2. Pantin, S.A., 1982. Pollution and the Biological Resources of the Oceans. Butterworth Scientific Co., London.

3. Clark, R.B., 1992. Marine Pollution. 3rd Edition. Clavendon Press, Oxford,UK 172 pp.
4. Carl J.Sindermann, 1995. Ocean Pollution: Effects on Living Resources and Humans 7/176 – CRC Press, Baca Raten Tokyo275pp.
5. Michael J. Kennish., 1996. Estuarine and Marine Pollution. (524 pp.) 07/002 CRC Press, New York.
6. Michael J.Kennish, 1997. Pollution Impacts on Marine Biotic Communities (310pp) 7/77, CRC press, New York.
7. David J.Hoffman, Barnett A. Rattner, G.Allen Burton, Jr.JohanCaims, Jr., 1997. Hand Book of Ecotoxicology (755pp) – 7/018. Lewis publishers, Tokyo.
8. Trivedi, R.K.2001. Aquatic Toxicology and Toxicology (239 pp) 7/157 – ABD publishers, Jaipur
9. Michael C. Newman, Morris H. Roberts, Jr. Robert C. Hale, 2001. Coastal and Estuarine Risk assessment (347pp) 07/125 Lewis publishers, New York
10. Yasunori Murakami, Kei Nakayama, shin – Kitamura., 2008. Biological Response to Chemical pollutants. Terra pub, Tokyo, 372 pp.

5: PHARMACEUTICALS AND NUTRACEUTICALS

L	P	T	C
4	0	0	4

Course Objective: To provide knowledge on concept production and manufacturing of Nutraceuticals and also an pharmacology, pharmacogenetics and drug design.

UNIT I: Introduction & Concepts of nutraceuticals: definitions, synonymous terms, basis of claims for a compound as a nutraceutical, regulatory issues for nutraceuticals including CODEX- Concept of angiogenesis and the role of nutraceuticals/functional foods; Nutraceuticals for cardiovascular diseases, cancer, diabetes, cholesterol management, obesity, joint pain, immune enhancement, age-related macular degeneration, endurance performance and mood disorders – compounds and their mechanisms of action, dosage levels, contraindications if any etc. -14h

UNIT II: Production and Manufacturing aspects of nutraceuticals: Production and Manufactureing of lycopene, isoflavonoids, prebiotics and probiotics, glucosamine, phytosterols etc.; formulation of functional foods containing nutraceuticals – stability and analytical issues, labelling issues. -12h

UNIT III: Pharmacology: Introduction to Pharmacology, Sources of drugs, Dosage forms and routes of administration, mechanism of action, Combined effect of drugs, Factors modifying drug action, tolerance and dependence. -10h

UNIT IV: Pharmacogenetics. Absorption, Distribution, Metabolism and Excretion of drugs, Principles of Basic and Clinical pharmacokinetics, Adverse Drug Reactions and treatment of poisoning, ADME drug interactions, Bioassay of Drugs and Biological Standardization, Discovery and development of new drugs. -12h

UNIT V: Principles of Drug Design (Theoretical Aspects): Traditional analog (QSAR) and mechanism based approaches (Introduction to graph theory, applications of quantum mechanics, Computer Aided Drug Designing (CADD) and molecular modeling.-12h

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Reference Books:

1. Israel Goldberg (Ed.) (1999) Functional foods, designer foods, pharma foods, Nutraceuticals, Aspen publishers Inc., USA
2. L. Rapport and B. Lockwood (2002). Nutraceuticals, 2ndEdition, Pharmaceutical Press.

3. M. Maffei (Ed.) (2003) Dietary Supplements of Plant Origin, Taylor & Francis
4. Shahidi and Weerasinghe (Ed.) (2004) Nutraceutical beverages Chemistry, Nutrition and health Effects, , American Chemical Society.
5. Handbook of Nutraceuticals and Functional Foods Edited by Robert E.C. Wildman, Routledge Publishers.
6. Nutraceuticals by L. Rapport and B. Lockwood, Pharmaceutical Press.
7. Methods of Analysis for Functional Foods and Nutraceuticals Edited by W. Jeffrey, Hursts, Routledge Publishers.
8. Food is Medicine by P.J Cousion; Duncan Baird Publishers, London.
9. Haward.C. Ansel; Pharmaceutical calculations, 13th Ed, Lippincott Williams & Wilkins Publication, 2010
10. Cooper and Gunn ;Dispensing for Pharmaceutical Students, 12th Ed, CBS Publication
11. Leon Lachman and Lieberman; The theory and practice of pharmacy, 3rd Ed, CBS Publication, 1986
12. Lockheart; Packaging of Pharmaceuticals of Healthcare products, Marcel Decker, 1998.
13. Herburn Kenneth; Quality control of Packaging Materials, in Pharmaceutical Industry Marcel Dekker, 1990.
14. Michael Levin; Pharmaceutical Process Scale-Up, 2nd Ed, vol-157, CRS Press,2006.
15. Mitra; Ophthalmic Drug Delivery System, 1st Ed, Vol-58, Marcel Dekker, 1993.
16. Ray & May; Freeze Drying / Lyophilization of pharmaceutical & Biological Products,Marcel Dekker,

6: FRESH WATER HABITAT & ECOLOGY

L	P	T	C
4	0	0	4

Course objectives:

1. To learn the principles, applications and management of environmental science.
2. To study the interactions between energy, water and food and the how their sustainability will safeguard the future of humans and the ecosystem on the planet
3. To learn the variety of technologies currently employed and under development for production of bioenergy and bioproducts.

Unit I: Ecosystem: Ecological factors – structure and function of an ecosystem. Biogeochemical cycles: Basic types of biogeochemical cycles - gaseous cycle - carbon and nitrogen cycles, sedimentary cycles (P and S), recycling pathways and recycle index. Limiting Factors- basic concepts- Leibig's law of minimum, Shelford's law of tolerance. Fauna and their adaptations of aquatic, and terrestrial habitats. Properties of population-density, natality, mortality, age distribution, biotic-potential, environmental resistance and carrying capacity, population growth curves, emigration, immigration and migration, population fluctuation. -14h

Unit II: Bio-resources:Natural resources - Biorenewable resources - Plankton - fresh water ecosystem - Occurrence and distribution of planktons, Phytoplankton – cyanobacteria, algae, Zooplankton. Toxic and non – toxic algae (Cyanobacteria / blue green algae) - types of cyanobacteria, nature and diversity, isolation and identification. Biomass and algae for energy and bioproducts. Socio-economic aspects of bioresources. -12h

Unit III: Water Quality:Aquatic Ecosystem - Biological aspects and chemical aspects of various aquatic ecosystems, Physicochemical parameters – pH, temperature, nutrients (phosphates, nitrates contents), light, BOD, COD. Environmental pollution Sources – effect on animals – control methods, water pollution – eutrophication and algal blooms (HABs), surface scum, effects on animals and control methods. -10h

Unit IV: Biodiversity Conservation Tools: Global climate change factors – Human impact on earth and biodiversity; Invasive species, exotic species – Threat to animal biodiversity; Ecology of transgenic crops and animal interaction. GIS and satellite imaging in biodiversity assessment. Biotechnological methods of pollution detection, bioremediation, biotechnology and biodegradation, genetically engineered microbes in bio-treatment of waste, ecofriendly bioproducts for environmental health, bio-piracy, bio-pesticides and bio-fertilizers, organic farming and its merits. -12h

Unit V: Environmental Management: Wild life conservation and management: Significance, causes of extinction, concepts of threatened species, red data book, IUCN, WWF, CITES, Green Environment and Green peace; protected areas, biosphere reserves, national parks and sanctuaries in India, forests in India, desertification, deforestation, carbon trading; importance of mangroves in coastal ecosystems- conservation and management. -12h

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Reference books:

1. Ahluwalia, V. K. and Malhotra, S. (2006). Environmental science. Ane Books Pvt. Ltd.
2. Aravind Kumar. (2004). Text Book of Environmental Science. APH Associates, Inc. Publishers. Massachusetts.
3. Eugene P Odum. (2002). Fundamentals of Ecology. Natraj Publishers,
4. Odum, E.P., 2005. Fundamental of Ecology, Holt- Saunders International Edition, Japan.
5. Robert C. Brown and Tristan R. Brown. Biorenewable resources: engineering new products from agriculture, 2nd edition, Wiley Blackwell, 2014.
6. Sharma P.D. (2000). Environmental Biology. Rastogi Publications.
7. Velma I. Grover (ed.), Global Warming and Climate Change, Science Publishers (USA), 2008.

7: MICROBIOLOGY AND MICROBIAL TECHNIQUES

L	P	T	C
4	0	0	4

Course Objective: To learn the basic and applied aspects of bacteriology, virology, fungi, biological Importance and Utilization of microbes, and related technology

Unit I Bacteriology: General account of morphology & ultra structure; Archaea -Diversity, Occurrence, Major groups, characteristics and potential application; Plasmids & mobile genetic elements; Cultivation of bacteria-aerobic and anaerobic cultures, synchronous and asynchronous culture, batch, fed batch and continuous culture; Measurement of growth, factors affecting growth; Antibiotic/Drug resistance. -14h

Unit II Virology:Distinctive, properties of virus, morphology, architecture, capsid arrangement, types of envelope and their composition; Life cycles and replication of Ebola virus, Mimi virus, Oncogenic virus; Variations in structure of bacteriophages; Viral vaccines and antiviral agents. -12h

Unit III Fungi:Diversity, salient structural features, modes of reproduction, ecological significances, sex hormones, mycotoxins, fungal associations with plants (endophytes, mycorrhizal fungi), animals and humans; Secondary metabolites from fungi-Terpenes, Nonribosomal peptides, hydrophobins, peptaibols, indole, alkaloids, detailed emphasis on polyketides; Economic importance. -10h

Unit IV Biological Importance and Utilization:Important diseases in agricultural crops by bacteria (crown gall), viruses (CaMV) and fungi (rust of wheat) and their control (chemical & biological); Microbial diseases of aquacultural animals- finfish and shell fish. Microbial remediation - xenobiotics, municipal water, Solid and liquid based treatments, Industrial effluents, environmental pollutants (Petroleum hydrocarbons and pesticides).Microbial biofertilizer; plant growth promotion (PGPR); Food and beverages; Microbial insecticides, Biosurfactants, Biofuel, Bio-plastic, recombinant products (insulin, somatostatin, thaumatin), steroids (cortisone). -12h

Unit V Techniques:Preparation of Competent cells & Transformation of Plasmid DNA in E. coli; Gene Cloning using E. coli based plasmids, Isolation of RNA & its analysis, Isolation of exopolysaccharide producing microbes and purification of the polysaccharide, hydrolytic enzyme production by SSF (solid state fermentation) method, Isolation of Azospirillum/Rhizobium and detection of IAA produced by them. -12h

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Reference Books

1. Pelzar, MJJ., Chan, ECS and Kerig, NR. 1993. Microbiology – Concepts and Applications.
2. Prescott, LM., Harley, JD and Klein, DA. 1999. Microbiology, WEB Mc Graw – Hill.
3. Dubey, HC., 2004. A text book of fungi, bacteria and viruses, Vikas Publishing House.
4. Atlas, R.M. 1995. Principles of Microbiology. Mosby - Year Book Inc.
5. Ananthanaryanan, T. and Paniker, J.C.K. 2000. Text Book of Microbiology Oriental Longman Ltd., Madras
6. Rheinhemer, G. 1980. Aquatic Microbiology, John Wiley and Sons.
7. Davis, D., Dulbecco, R., Eisen, HN and Ginsberg, HS. 1980. Microbiology, Third Ed., Harper and Row Publishers, Hagertown.
8. George, W. Burns. 1980. The Science of Genetics: An introduction to Heredity, Fourth Edition, Mc Milan Publishing Co., Inc., New York.
9. Tewari et al., 2000. Advances in Microbial Technology, APH, New Delhi.
10. Rajni Gupta and Mukherji, 2001. Microbial Technology, APH, New Delhi.

8: IMMUNO AND BIOCHEMICAL TECHNIQUES

L	P	T	C
4	0	0	4

Course Objective: To Impart knowledge on the basic and applied aspects of immunology, immune-techniques and biochemical techniques.

Unit I: Antigen and antibody-1:Antigen and antibodies structure and functions, antigen receptors, accessory molecules of T lymphocytes; Development to lymphocytes – activation of lymphocytes, immune memory response, Immunofluorescence, Antibody isolation and purification methods, antisera production (Monoclonal and polyclonal), Vaccine production- Inactivated, Attenuated, Acellular, Toxoid, Conjugated, Subunit, and DNA. -14h

Unit II: Antigen and antibody-2:Antigen and antibody qualification and quantification-Single immunodiffusion, Double immunodiffusion; Radio-immuno assay; Agglutination-direct and indirect, Hemagglutination inhibition; Immunoprecipitation, Complement assays; Hemolytic assay, Functional assays, ELISPOT, Memory Lymphocyte Immunostimulation Assay (MELISA); Western plotting, Affinity purification. -12h

Unit III: Immuno chemistry and cytology;Immunohistochemistry- radioimmunoassay (RIA), Immunoaffinity Chromatography, Immunoelectrophoresis; Basic principles, working methods and applications of ELISA, Sandwich ELISA; Immuno-cytology- Immune cell isolation, Flow cytometry, Immunohistochemistry. -10h

Unit IV: Biochemical Techniques:Homogenization and centrifugation (Ultracentrifuge), Working principle, basic and applied methodology and applications of chromatography (paper, TLC, column, GC-MS, HPLC); Protein staining (Amidoblack, Commassie, Ponceau-red, Silver, Gold, Gelcode), Protein Imaging (Coomassie Blue Dyes, Silver stain, Fluorescent Stains and Dyes). -12h

Unit V: Biochemical Techniques:Isotopic tracer technique - Radioactive Isotopes, Geiger-Müller counter or G-M tube; Spectrophotometry- Lambert's law, Beer's law, Spectrophotometer, UV- Spectrophotometer; Working principle, basic and applied methodology and applications of Atomic Emission and Absorption; Oxygen and Carbon Dioxide Electrodes, Coulometry, Osmometry and Refractometry. -12h

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Reference Books:

1. Springer T.A. 1985. Hybridoma technology in Biosciences and Medicine, Plenum Press, New York.
2. Paul, W.E.M. 1989. Fundamentals of Immunobiology. Current Biology Ltd., London.
3. Janeway, C., Travers, P., Walport, M., Shlomchik, M. and M.J. Shlomchik. 2004. Immunobiology: The Immune System in Health and Disease. Garland Publication.
4. Kuby, J. 2006. Immunology (4th Edn.), Goldsby, R.A., Kindt, T.J., Osborne, B.A., W.H. Freeman and Company.
5. Roitt, I.M, 2006. Essential of Immunology (12th Edn.), ELBS, Blackwell Scientific Publication
6. Abbas, A. K., Lichtman, A. H. and S. Pillai. 2006. Cellular and molecular Immunology (6th Edn). W.B.Saunders Company.
7. Chakraborty, A.L. 2006. Immunology and Immunotechnology. Oxford University Press, New Delhi.

9: MARINE BIODIVERSITY AND WILDLIFE

L	P	T	C
4	0	0	4

Course Objective : This paper provides basic knowledge on the diversity of coastal and marine fauna and flora including wildlife.

Unit i: What is Marine Biodiversity - Types of Biodiversity – Species, ecosystem and Genetic biodiversity. Importance of Marine Biological Diversity – Products from marine life : Food, Medicine and Raw materials – seaweeds, seagrass, significance of three dimensional structure of mangrove plantation – primary productivity – Ecosystem services from sea. Conservation of biodiversity: areas of diversity, areas to be protected, larval and nursery grounds. Risk factors for populations: demography – sex ratio, anthropogenic uncertainty, low recruitment, mortality. - 14 h

Unit II: Threats to Marine biological diversity : Proximate threats – over exploitation of marine invertebrates (crustaceans and mollusks), vertebrate (fish), reptile (sea turtle), marine mammals (whale, dolphin, Physical alterations – mining, dredging, navigation, simplification, fragmentation, marinas, jetties, pollution – oil spillage, chemicals, radionucleocides, alien species – transfer through ballast water, global atmospheric change – global warming, rise in sea level. - 12 H

Unit III: Impediments to Marine conservation : Insufficient scientific information – available with traditional users of sea, scientists but not complete, inadequate transfer of information – improve vertical transfer to horizontal transfer, decision makers, cultural and biological diversity – fundamental ecological shift, tragedy of the commons, economic valuation – value of species and ecosystem that do not enter markets, internalization of externalities. - 10 h

Unit IV: Tools for conservation of marine biodiversity: political advocacy – Expanding knowledge base – science, research, planning, regulating threats, economic tools, protecting areas, active manipulation. - 10 h

Unit V: Biodiversity indices – univariate method – Shannon-Weiner index, Simpson index, similarity and dissimilarity index – Graphical/distributional techniques. Multivariate method-cluster analysis, non-metric multi dimensional scaling. Mathematical modeling – types – building a model-planning, implementation, evaluation, sensitivity analysis. Population and sampling, types of biological data, presentation, measures of central tendency and dispersion. Analysis of variance, correlation and regression - Computer applications in biostatistics. - 14 h

60 h

Reference books

1. Chapman, V. J., 1976. Mangrove vegetation. J. Gramer, Berlin.
2. Peter Mc Roy, C. and G. Helferich, 1977. Seagrass Ecosystems. A Scientific respective. Marcel Dekker Inc., Ney York.
3. Yale Eawson, E., 1966. Marine Botany : An introduction. Hole Reinhart and Winston Inc., New York.
4. Kaestner, A., 1967. Invertebrate Zoology. Vol. I to III. Wiley Interscience Publishers.
5. Carl E. Bond, 1979. Biology of Fisheries. W. B. Saunders Company, Philadelphia.
6. King, M., 1995. Fisheries Biology, Assessment and management, Fishing News Books.
7. Nikolshi, G. V., 1969. Theory of fish population dynamics as the biological background for rational exploitation and management of fishery resources. Otto Koeltz Science Publishers, Berlin.
8. Naskar K. and R. Mandal, 1999. Ecology and Biodiversity of Indian mangroves. Daya Publishers, 361.
9. Agarwal et al., 1996. Biodiversity and Environment, APH pp. 351.
10. Heywood, V. H,m 1995. Global Biodiversity Assessment, UNEP, pp. 1140.
11. Miller, R. I., 1994. Mapping the Diversity of Nature, Chapman & Hall, 218.
12. Zar,J.H. 1974, Biostatistical analysis, Prentice Hall, New Jercy, 620 p.

10: MARINE BIORESOURCES: UTILIZATION, THREATS AND MANAGEMENT

L	P	T	C
4	0	0	4

Course Objective : This paper provides knowledge on bioresource utilization, threats to biodiversity and its management for sustainable utilization.

Unit I: Marine bio-resources – diversity, distribution, importance and values of exploitation; Methods of exploitation - Marine bio-resources and community including institutional mechanism; Bioactive substances and toxins from the sea – sources, utilization and management. **- 12 h**

Unit II: Threats to ecosystem and resources – anthropogenic and natural – pollution – industrial & domestic, destructive & over fishing practices, coral mining, mangrove deforestation, seagrass beds denudation, trawling. **- 10 h**

Unit III: Climate change - SST - loss of habitat and fishery, sea level rise and resources, migration of fishes, adaptation and management; Diseases – causes, monitoring and management **- 10 h**

Unit IV: Conservation and management of marine resources – concepts, mechanisms and action plan; coastal ecosystem restoration - Artificial reefs, coral restoration, seagrass restoration and mangrove restoration; Bio-resources culture & sea ranching. **- 14 h**

Unit V: Government initiatives in bio-resource conservation and management – laws, regulation, outreach and enforcement; Role of NGOs, research institutions; Local community participation in bio-resource conservation and management; Management – species and ecosystem level; Importance of acts and regulations in bio-resource conservation. **- 14 h**

60 h

Text and reference books

1. Duxbury, A.C., A.B. Duxbury and K.A. Sverdrup. 2000. An introduction to the World's Oceans. 6th Edition. McGraw Hill Companies Inc.
2. Stowe, K., 1996. Exploring Ocean Science, John Wiley & Sons Inc.
3. Iversen, E.S., 1996. Living Marine Resources. Chapman & Hall, New York.
4. Firth, F.E., 1971. The Encyclopaedia of Marine Resources, Von Nostrand Reinhold, New York.
5. FAO Publication, 1999/45. Sri Lankan women and men as bioresource managers.

11: INTEGRATED OCEAN MANAGEMENT

L	P	T	C
4	0	0	4

Course Objective: To provide knowledge on the marine environment resources and the principle of integrated ocean management.

Unit I :The three major oceans – Historical evolution of ideas: Oceans as a common heritage of mankind. Scientific expeditions for ascertaining the wealth of the sea - The Exclusive Economic Zone - its significance – Importance of strategic straits. - 12 h.

Unit II: Ocean management – comparison between developing and developed countries and temperate and tropical countries - A critique of ocean management policies and programmes – Ocean Policy, research and Management with special reference to the Indian Ocean Region. The ‘Regional Seas’ programmes of the UN – its global significance – The Antarctic Treaty and its importance - 10 h.

Unit III: Endangered marine animals – CITES convention – Marine Biosphere Reserves – Marine Parks – Sanctuaries – Concept, implementation and management. Management action plan – ecosystem and species. MAB – UNESCO’s role in the establishment and functioning of Marine biospheres - Great Barrier Reef Marine Park Authority – concept and functional mechanism – Marine Biospheres, National Marine Parks and Sanctuaries in India – role and function. - 14 h.

Unit IV: Role of National and International networks / organizations such as GCRMN, ICRAN, CORDIO, ICRMN - agencies and organizations in ocean management – NESCO, UNEP, UNDP, FAO, UNU, IMO, IMLI (International Maritime Law Institute, Malta) WHO, WORLD BANK, IOI (Malta), ICS-UNIDO, IUCN, WWF, SACEP, ICES, SCOR, SCOPE, LOICZ, Law of the Sea Institute (Rhode Island), International Maritime Satellite Organization (INMARSAT), ICLARM, MoES, MoEF, Indian Coast Guard, Navy etc. - 14 h.

Unit V: Integrated Ocean Management - Change of resource utilization pattern – Capacity building – trans boundary issues – Climate change issues - International treaties – community based ocean management – livelihood associated conservation and management mechanism. - 10 h

60 h

Reference books:

1. Biliana Cicin-Sain, , Robert W. Knecht, , Dosoo Jang, Gregory, W. Fisk, University of Delaware Center for the Study of Marine Policy, Intergovernmental, Oceanographic Commission, Unesco, University of Delaware College of Marine Studies Integrated Coastal and Ocean Management: Concepts and Practices, Published 1998, Island Press, 543 pages
2. Yvan Breton, Integrated Coastal Zone Management of Coral Reefs: Decision Support , Published 2006, IDRC, 300 pages
3. Robert Kay, Jacqueline Alder, Coastal Planning and Management, Published 2005, Taylor & Francis, 380 pages
4. Bhaskar Nath, Environmental Management in Practice: Managing the Ecosystem, Published 1999, Routledge, 297 pages
Peter Jacques, Zachary A. Smith, Ocean politics and policy: a reference handbook, Published 2003, ABC-CLIO, 267 pages
5. Lawrence Juda, International Law and Ocean Use Management, 1996, Routledge, 345 pages

12: ANIMAL BIOTECHNOLOGY AND MOLECULAR BIOLOGY

L	P	T	C
4	0	0	4

Course Objectives:

1. To enable scholars to understand the principles and mechanisms of Molecular Biology and Biotechnology.
2. To learn about key technologies, such as recombinant DNA technologies, genomics and proteomics. Additionally, emphasis is on entrepreneurial aspects using Biotechnology and Synthetic Biology.

Unit I: Transgenic animals: Concepts of transgenic animal technology; strategies for the production of transgenic animals and their importance in biotechnology; stem cell cultures in the production of transgenic animals. In vitro fertilization and transgenic animals and applications of Transgenic animals in Biotechnology and future scope. -12h

Unit II: Embryology & Embryogenesis: Experimental embryology: Spemann's constriction experiments, organizers and embryonic induction – kinds of embryonic induction and organizers; transplantation experiments in amphibian. Teratology: Definition, causative agents and effects. In vitro fertilization and embryo transfer experiments in farm animals; cloning experiments in mammals (Sheep); Embryonic and adult stem cell, significance and applications, stem cell therapy. -14h

Unit III: Genetic engineering and genome projects: History, Procedure of genetic engineering, Restriction endonucleases, ligases, major steps in cutting and joining of DNA, Vectors - plasmids, cosmid, bacteriophage; probes, linkers, host cells, method of recombinant DNA formation, transformation, transfection and non bacterial transformation. Human genome project, goals and its implications on research and society. -12h

Unit IV: IPR, Bio-safety and Animal Ethics: Basic concepts of Intellectual property rights (IPR), Patents, Trademarks, Copyright & Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of GMOs IP as a factor in R&D; IPs of relevance to Biotechnology. Introduction - Historical background - Primary containment for biohazards; Bio-safety levels – Bio-safety levels of specific microorganisms, infectious agents and infected animals. Bio-safety guidelines related to genetically modified organisms (GMOs) & living modified organisms (LMOs). Bio-ethics problems and solutions; Institutional ethical committee. -14h

Unit V: Synthetic Biology: Synthetic biology - definition – designing, synthesis, sequencing and building engineered biological systems - Techniques – synthetic DNA – synthetic transcription factors – Therapeutics products and their applications – synthetic biology vs genetic engineering – bioethics and security - scope of synthetic biology.- -10h

60

Reference books:

1. Alberts et al, Molecular Biology of The Cell, 2nd Edition, Garland 2007.
2. Bareact, Indian Patent Act 1970 Acts & Rules, Universal Law Publishing Co. Pvt. Ltd., 2007
3. Benjamin Lewin. (2004). Genes VIII. Oxford University press, N.Y.
4. Bhatia S.C. Text book of Biotechnology, Atlantic publishing company, Florida. 2006.
5. Darren N. Nesbeth. Synthetic Biology Handbook, CRC press New York, 2016.
6. Gilbert, S. P. Developmental Biology, 8th Edition, Sinauer Associates Inc., 2006.
7. Lanza, R. Essentials of Stem Cell Biology, Academic Press, 2005.
8. Liljeruhm et al Synthetic biology: A lab manual. World Scientific Publishing co. Singapore, 2014.
9. Seragelglin. (1999). Biotechnology and Bio-safety. World Bank, Washington.

13: MINI PROJECT

Course Title:

- **Research and Publication Ethics (RPE)**-Course for awareness about the publication ethics and publication misconducts.

Course Level:

- 2 Credit course (30 hrs.)

Eligibility:

- M.Phil., Ph.D. students and interested faculty members (It will be made available to post graduate students at later date)

Fees:

- As per University Rules

Faculty:

- Interdisciplinary Studies

Qualifications of faculty members of the course:

- Ph.D. in relevant subject areas having more than 10 years' of teaching experience

About the course**Course Code: CPE- RPE****Overview**

- This course has total 6 units focusing on basics of philosophy of science and ethics, research integrity, publication ethics. Hands-on-sessions are designed to identify research misconduct and predatory publications. Indexing and citation databases, open access publications, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Pedagogy:

- Class room teaching, guest lectures, group discussions, and practical sessions.

Evaluation

- Continuous assessment will be done through tutorials, assignments, quizzes, and group discussions. Weightage will be given for active participation. Final written examination will be conducted at the end of the course.

Course structure

- The course comprises of six modules listed in table below. Each module has 4-5 units.

Modules	Unit title	Teaching Hours
Theory		
RPE01	Philosophy and Ethics	4
RPE02	Scientific Conduct	4
RPE03	Publication Ethics	7
Practice		
RPE04	Open Access Publishing	4
RPE05	Publication Misconduct	4
RPE06	Databases and Research Metrics	7
	Total	30

Syllabus in detail

THEORY

- RPE 01: PHILOSOPHY AND ETHICS (3 hrs.)**
 - Introduction to philosophy: definition, nature and scope, concept, branches
 - Ethics: definition, moral philosophy, nature of moral judgements and reactions
- RPE 02: SCIENTIFIC CONDUCT (5hrs.)**
 - Ethics with respect to science and research
 - Intellectual honesty and research integrity
 - Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
 - Redundant publications: duplicate and overlapping publications, salami slicing
 - Selective reporting and misrepresentation of data
- RPE 03: PUBLICATION ETHICS (7 hrs.)**
 - Publication ethics: definition, introduction and importance
 - Best practices / standards setting initiatives and guidelines: COPE, WAME, etc.
 - Conflicts of interest
 - Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types
 - Violation of publication ethics, authorship and contributorship
 - Identification of publication misconduct, complaints and appeals
 - Predatory publishers and journals

PRACTICE

- **RPE 04: OPEN ACCESS PUBLISHING(4 hrs.)**
 1. Open access publications and initiatives
 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
 3. Software tool to identify predatory publications developed by SPPU
 4. Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

- **RPE 05: PUBLICATION MISCONDUCT (4hrs.)**
 - A. Group Discussions (2 hrs.)**
 1. Subject specific ethical issues, FFP, authorship
 2. Conflicts of interest
 3. Complaints and appeals: examples and fraud from India and abroad

 - B. Software tools (2 hrs.)**

Use of plagiarism software like Turnitin, Urkund and other open source software tools

- **RPE 06: DATABASES AND RESEARCH METRICS (7hrs.)**
 - A. Databases (4 hrs.)**
 1. Indexing databases
 2. Citation databases: Web of Science, Scopus, etc.

 - B. Research Metrics (3 hrs.)**
 1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IPP, Cite Score
 2. Metrics: h-index, g index, i10 index, altmetrics

References

- Bird, A. (2006). *Philosophy of Science*. Routledge.
- MacIntyre, Alasdair (1967) *A Short History of Ethics*. London.
- P. Chaddah, (2018) *Ethics in Competitive Research: Do not get scooped; do not get plagiarized*, ISBN:978-9387480865
- National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition*. National Academies Press.
- Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences*, 1-10. Retrieved from <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm>
- Beall, J. (2012). Predatory publishers are corrupting open access. *Nature*, 489(7415), 179-179. <https://doi.org/10.1038/489179a>
- Indian National Science Academy (INSA), *Ethics in Science Education, Research and Governance*(2019) , ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf