MANONMANIAM SUNDARANAR UNIVERSITY

M.Sc.
INFORMATION TECHNOLOGY

SYLLABUS

FROM THE ACADEMIC YEAR
2023 - 2024

TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK FOR POSTGRADUATE EDUCATION	
Programme	M.Sc. INFORMATION TECHNOLOGY
Programme Code	
Duration	2 years for PG
Programme Outcomes (Pos)	**PO1: Problem Solving Skill** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context. **PO2: Decision Making Skill** Foster analytical and critical thinking abilities for data-based decision-making. **PO3: Ethical Value** Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities. **PO4: Communication Skill** Ability to develop communication, managerial and interpersonal skills. **PO5: Individual and Team Leadership Skill** Capability to lead themselves and the team to achieve organizational goals. **PO6: Employability Skill** Inculcate contemporary business practices to enhance employability skills in the competitive environment. **PO7: Entrepreneurial Skill** Equip with skills and competencies to become an entrepreneur. **PO8: Contribution to Society** Succeed in career endeavors and contribute significantly to society. **PO 9 Multicultural competence** Possess knowledge of the values and beliefs of multiple cultures and a global perspective. **PO 10: Moral and ethical awareness/reasoning** Ability to embrace moral/ethical values in conducting one's life.
Programme Specific Outcomes (PSOs)	**PSO1 – Placement** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.

	PSO 2 - Entrepreneur To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations. **PSO3 – Research and Development** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World** To produce employable, ethical and innovative professionals to sustain in the dynamic business world. **PSO 5 – Contribution to the Society** To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

Template for P.G., Programmes

Semester–I	Credit	Hours	Semester-II	Credit	Hours	Semester-III	Credit	Hours	Semester–IV	Credit	Hours
Core-I	5	7	. Core-IV	5	6	Core-VII	5	6	Core-XI	5	6
Core-II	5	7	Core-V	5	6	Core-VIII	5	6	Core-XII	5	6
Core – III	4	6	Core – VI	4	6	Core – IX	5	6	Project with viva voce	7	10
Elective -I Discipline Centric	3	5	Elective – III Discipline Centric	3	4	Core – X	4	6	Elective - VI (Industry / Entrepreneurship) 20% Theory 80% Practical	3	4
Elective-II Generic:	3	5	Elective -IV Generic:	3	4	Elective - V Discipline Centric	3	3	Skill Enhancement course / Professional Competency Skill	2	4
			Skill Enhancement I	2	4	3.6 Skill Enhancement II	2	3	Extension Activity	1	
						3.7 Internship/ Industrial Activity	2	-			
	20	**30**		**22**	**30**		**26**	**30**		**23**	**30**
Total Credit Points -91											

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credits and Hours Distribution System for all Post – Graduate Courses including Lab Hours

First Year – Semester – I

Part	List of Courses	Credits	No. of Hours
	Core – I	5	7
	Core – II	5	7
	Core – III	4	6
	Elective – I	3	5
	Elective – II	3	5
		20	**30**

Semester-II

Part	List of Courses	Credits	No. of Hours
	Core – IV	5	6
	Core – V	5	6
	Core – VI	4	6
	Elective – III	3	4
	Elective – IV	3	4
	Skill Enhancement Course [SEC] – I	2	4
		22	**30**

Second Year – Semester – III

Part	List of Courses	Credits	No. of Hours
	Core – VII	5	6
	Core – VIII	5	6
	Core – IX	5	6
	Core (Industry Module) – X	4	6
	Elective – V	3	3
	Skill Enhancement Course – II	2	3
	Internship / Industrial Activity [Credits]	2	-
		26	**30**

Semester-IV

Part	List of Courses	Credits	No. of Hours
	Core – XI	5	6
	Core – XII	5	6
	Project with VIVA VOCE	7	10
	Elective – VI (Industry Entrepreneurship)	3	4
	Skill Enhancement Course – III / Professional Competency Skill	2	4
	Extension Activity	1	-
		23	**30**

Total 91 Credits for PG Courses

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)can be carried out accordingly, assigning the appropriate level in the grids:

	POs							PSOs		
	1	2	3	4	5	6	…	1	2	…
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										

Course Code	Course Name		Credits
Lecture Hours: (L) per week	**Tutorial Hours : (T) per week**	**Lab Practice Hours: (P)per week**	**Total: (L+T+P) per week**
Course Category :	**Year & Semester:**		**Admission Year:**
Pre-requisite			
Links to other Courses			
Learning Objectives: (for teachers: what they have to do in the class/lab/field)			
Course Outcomes: (for students: To know what they are going to learn) **CO1:** **CO2:** **CO3:** **CO4:** **CO5:**			
Recap: (not for examination) Motivation/previous lecture/ relevant portions required for the course) [This is done during 2 Tutorial hours)			

Units	Contents	Required Hours
I		**18**
II		**18**
III		**18**
IV		**18**
V		**18**
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)	
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill	

Learning Resources:
• **Recommended Texts** • **Reference Books** • **Web resources**
Board of Studies Date:

3. Learning and Teaching Activities

3.1 Topic wise Delivery method

Hour Count	Topic	Unit	Mode of Delivery

3.2 Workload

The information below is provided as a guide to assist students in engaging appropriately with the course requirements.

Activity	Quantity	Workload periods
Lectures	60	60
Tutorials	15	15
Assignments	5	5
Cycle Test or similar	2	4
Model Test or similar	1	3
University Exam Preparation	1	3
Total		90 periods

1. Tutorial Activities

Tutorial Count	Topic

2. Laboratory Activities

3. Field Study Activities

4. Assessment Activities

Assessment Principles:

Assessment for this course is based on the following principles:

1. Assessment must encourage and reinforce learning.
2. Assessment must measure achievement of the stated learning objectives.
3. Assessment must enable robust and fair judgments about student performance.
4. Assessment practice must be fair and equitable to students and give them the opportunity to demonstrate what they learned.
5. Assessment must maintain academic standards.

Assessment Details:

Assessment Item	Distributed Due Date	Weightage	Cumulative Weightage
Assignment 1	3rd week	2%	2%
Assignment 2	6th Week	2%	4%
Cycle Test – I	7th Week	6%	10%
Assignment 3	8th Week	2%	12%
Assignment 4	11th Week	2%	14%
Cycle Test – II	12th Week	6%	20%
Assignment 5	14th Week	2%	22%
Model Exam	15th Week	13%	35%
Attendance	All weeks as per the Academic Calendar	5%	40%
University Exam	17th Week	60%	100%

TEACHING METHODOLOGIES

Traditional Teaching methods like Chalk and Board, Virtual Class room, LCD projector, Smart Class, Video Conference, Guest Lectures.

Asking students to formulate a problem from a topic covered in a week's time

Assignment, Class Test, Slip test

Asking students to use state-of-the-art technologies/software to solve problems

Applications, Use of Mathematical software

Introducing students to applications before teaching the theory

Training students to engage in self-study without relying on faculty (for example – library and internet search, manual and handbook usage, etc.)

Library, Net Surfing, Manuals, NPTEL Course Materials published in the website

Other university websites.

Faculty Course File Structure

CONTENTS

a. Academic Schedule

b. Students Name List

c. Time Table

d. Syllabus

e. Lesson Plan

f. Staff Workload

g. Course Design(content, Course Outcomes(COs), Delivery method, mapping of COs with Programme Outcomes(POs), Assessment Pattern in terms of Revised Bloom's Taxonomy)

h. Sample CO Assessment Tools.

i. Faculty Course Assessment Report(FCAR)

j. Course Evaluation Sheet

k. Teaching Materials(PPT, OHP etc)

l. Lecture Notes

m. Home Assignment Questions

n. Tutorial Sheets

o. Remedial Class Record, if any.

p. Projects related to the Course

q. Laboratory Experiments related to the Courses

r. Internal Question Paper

s. External Question Paper

t. Sample Home Assignment Answer Sheets

u. Three best, three middle level and three average Answer sheets

v. Result Analysis (CO wise and whole class)

w. Question Bank for Higher studies Preparation

(GATE/Placement)

x. List of mentees and their academic achievements

Testing Pattern (25+75)

Internal Assessment

Theory Course: For theory courses there shall be three tests conducted by the faculty concerned and the average of the best two can be taken as the Continuous Internal Assessment (CIA) for a maximum of 25 marks. The duration of each test shall be one / one and a half hour.

Computer Laboratory Courses: For Computer Laboratory oriented Courses, there shall be three Laboratory tests. The average of the best two can be treated as the CIA for a maximum of 25 marks.

There is no improvement for CIA of both theory and laboratory, and, also for University End Semester Examination.

Written Examination : Theory Paper (Bloom's Taxonomy based)

Question paper Model

Intended Learning Skills	Maximum 75 Marks Passing Minimum: 50% Duration : Three Hours
	Part –A (**10x 2 = 20 Marks**) Answer ALL Questions **Each Question carries 2 marks**
Memory Recall / Example/ Counter Example / Knowledge about the Concepts/ Understanding	Two questions from each UNIT
	Question 1 to Question 10
	Part – B (5 x 5 = 25 Marks) **Answer ALL Questions** **Each questions carries 5 Marks**
Descriptions/ Application (problems)	**Either-or Type** Both parts of each question from the same UNIT
	Question 11(a) or 11(b) To **Question 15(a) or 15(b)**
	Part-C (3x 10 = 30 Marks) **Answer any THREE questions** **Each question carries 10 Marks**
Analysis /Synthesis / Evaluation	FIVE questions covering all the five units **Question 16 to Question 20**

Each question should carry the course outcome and cognitive level

1. [CO1 : K2] Question xxxx   2. [CO3 : K1] Question xxxx

Credit Distribution for PG Programme in Information Technology

M.Sc., Information Technology

Illustration – I

	First Year Semester-I	Credit	Hours per week(L/T/P)
Part A	Core - Python Programming	4	6
	Core - Applied Mathematics for Information Technology	4	6
	Core - Python Programming – Practical	3	4
	Core – Advanced Java & Networking– Practical	3	4
	Elective I(Generic / Discipline Specific) Data Structures/ Compiler Design	3	5
	Elective II(Generic / Discipline Specific) Machine Learning/ Human Computer Interaction	3	5
	Total	**20**	**30**

	Semester-II	Credit	Hours per week(L/T/P)
Part A	Core – Database Systems	4	5
	Core- Wireless Networking & Mobile Computing	4	5
	CC5 – RDBMS Lab	3	4
	CC6 - Open Source Technologies -Practical	3	4
	Elective III (Generic / Discipline Specific) Biometric Techniques/ / Advanced Digital Image Processing	3	4
	Elective-IV Distributed and Cloud Computing / Software Project Management	3	4
Part B	Skill Enhancement Course – **Social Network Analysis**	2	4
	Total	**22**	**30**

M.Sc. Information Technology

Title of the Course		**PYTHON PROGRAMMING**				
Paper Number		**CORE**				
Category	Core	**Year**	I	**Credits**	4	**Course Code**
		Semester	I			
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	
		5	1	-	6	
Pre-requisite		Basic understanding on object oriented programming concepts				
Objectives of the Course		To acquire programming skills in core Python and to develop database applications in Python				
Course Outline		**UNIT-I : Core Python:** Introduction - Python Basics: Comments - Statements and syntax - variable Assignment - Identifiers - **Python objects :** Built-in-types - Internal types - Standard Type operators - Standard type Built-in-functions. **Numbers :** Introduction to Numbers - Integers - Floating point numbers - Complex numbers - Operators - Built-in and factory functions – Conditionals and Loops -**Sequences :** Strings, Lists and Tuples				
		UNIT-II : Mapping and set types.- **Functions and functional programming**: Introduction - Calling functions - Creating functions - passing functions - Formal arguments - Variable - Length Arguments - Functional Programming - Variable Scope – Recursion				
		UNIT-III : Modules: Modules and Files – namespaces - Importing Modules - Features - Built-in functions. **Object Oriented Programming**: Introduction - Object Oriented Programming – Encapsulation Inheritance – Polymorphism - **Errors and Exceptions**: Introduction – Exceptions in Python.				
		UNIT-IV : GUI Programming: Introduction – **Using Widgets**: Core widgets- Generic widget properties – Labels – Buttons – Radio Buttons – Check Buttons – Text – Entry – List Boxes – Menus –Frame – Scroll Bars – Scale				
		UNIT-V: Database Programming: Connecting to a database using MongoDB - Creating Tables - INSERT-UPDATE - DELETE - READ operations.				
Extended Professional Component		Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)				
Skills acquired from this course		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill				

Recommended Text	1. Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition – (Unit I,II,III). 2. Charles Dierbach, (2015), "Introduction to Computer Science Using Python A Computational Problem-Solving Focus", Wiley India Edition- (Unit III- Object Oriented Programming) 3. Martin C Brown, (2018), "The Complete Reference Python", McGraw Hill Education (India)Private Limited – (Unit IV)
Reference Books	1. Mark Lutz, (2013), "Learning Python Powerful Object Oriented Programming", O"reillyMedia, 5 th Edition. 2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education PrivateLimited, First Edition. 3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computerscientist: learning with Python"
Website and e-Learning Source	1. http://interactivepython.org/courselib/static/pythonds 2. http://www.ibiblio.org/g2swap/byteofpython/read/ 3. http://www.diveintopython3.net/ 4. http://docs.python.org/3/tutorial/index.html

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Explain the basic concepts in python language.
CLO2	Apply the various data types and identify the usage of control statements, loops,functions and modules in python for processing the data
CLO3	Analyze and solve problems using basic constructs and techniques of python.
CLO4	Assess the approaches used in the development of interactive application.
CLO5	To build real time programs using python

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	3	2	2
CLO2	3	3	3	3	3	2
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3
Weightage of course contribute to each PSO	15	13	15	15	13	15

Title of the Course	APPLIED MATHEMATICS FOR INFORMATION TECHNOLOGY						
Paper Number	**CORE**						
Category	Core		I	**Credits**	4	**Course Code**	
		Semester	I				
Instructional Hours per week		**Lecture**		**Tutorial**	**Lab Practice**	**Total**	
		5		1	--	6	
Objectives of the Course	1. Learn and recall allied level mathematics for application problems. 2. To understand the role of linear algebra and matrix in computer science problem solving. 3. Learn and understand unit step function and Dirac delta function. To study orthogonal functions and Fourier transforms and understand their use in computational problems. 4. Learn the concepts of number theory for cryptography. 5. Critically analyze and implement programs for the methods studied for a set of selected example problems.						
Course Outline	**UNIT-I** Set theory: Operations on sets – Basic set identities – Relations and orderings – Functions						
	UNIT-II : Linear algebra Part I: Linear vector spaces - Linear operators – vectors in n-dimensions – matrix representation of vectors and operators in a basis – linear independence, dimension – inner product – Orthonormal basis –Eigenvalues and eigenfunctions of operators/matrices – Eigen basis, Diagonalizing matrix – Quadratic forms – Complex matrices and forms - Hermitian and Unitary operators/matrices.						
	UNIT-III : Linear algebra Part II: Cayley-Hamilton Theorem - Gram-Schmidt process –Eigen values using QR transformations – QR factorization - generalized eigenvectors — singular value decomposition and applications - pseudo inverse – least square approximations -Toeplitz matrices and some applications.						

	UNIT-IV : Laplace Transforms : Solution of linear differential equations with constant coefficients- – Unit step function and Dirac delta function. Sturm-Liouville theory: Second order linear differential equations . Strum-Liouville theory: Orthogonality of eigenfunctions – Illustration with Legendre, Laguerre, Hermite, Chebyshev differential equations - expansion of polynomials. Fourier Transforms: Fourier sine and cosine transforms – Fourier transform - convolution theorem - Discrete Fourier transform and Fast Fourier transform.
	UNIT-V: Number Theory: Modular arithmetic - Fermat's and Euler's theorem – Testing for primality - Chinese remainder theorem – Discrete logarithms – Groups – Rings – Fields - Finite fields – GF(p) - Polynomial arithmetic – Finite fields of the form GF(2n).
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) (is a part of internal component only, Not to be included in the External Examination question paper)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. J P Tremblay and R Manohar, *Discrete Mathematical Structures with Applications to Computer Science,* International Edition (McGraw-Hill, Singapore, 1987; Tata McGraw-Hill, New Delhi, 1997).
Reference Books	1. K.Trivedi, "Probability and Statistics with Reliability, Queuing and Computer Science Applications", Wiley, 2016. 2. M. Mitzenmacher and E.Upfal, Probability and Computing :Randomized Algorithms and Probabilistic Analysis", Cambridge University Press, 2005. 3. Alan Tucker, "Applied Combinatorics",6th Edition,Wiley2012.
Website and e-Learning Source	https://nptel.ac.in/courses/106/106/106106183/ https://nptel.ac.in/courses/111/105/111105035/ https://nptel.ac.in/courses/111/102/111102133/ https://nptel.ac.in/courses/106/103/106103015/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO 1: Apply mathematical concept for Information Technology problem solving.
        CLO 2: Design mathematical models for real time projects and applications.
CLO 3: Analyze each learning model from a different algorithmic approach
CLO 4: Acquire knowledge of relations, functions and mathematical logic
CLO 5: Understand the basic concepts of Graph Theory

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	2
CO2	3	2	2	3	3	2
CO3	3	2	3	3	3	3
CO4	3	2	3	3	3	3
CO5	3	2	2	3	3	3
Weightage of course contributed to each PSO	15	10	12	15	15	13

Title of the Course	PYTHON PROGRAMMING - PRACTICAL					
Paper Number	**CORE**					
Category Core	**Year**	I	**Credits**	4	**Course Code**	
	Semester	I				
Instructional Hours per week	**Lecture**		**Tutorial**	**Lab Practice**	**Total**	
	-			4	3	
Pre-requisite	Basic understanding of C, C++ and Java programming languages					
Objectives of the Course	This course gives practical experience in Python basics, Object Oriented programming like Classes, Inheritance, and Polymorphism, GUI Applications and Database connection.					
Course Outline	1. Python Basic programs 2. Control Structures 3. Lists 4. Functions and Recursions 5. Modules 6. String Processing 7. Dictionaries and Sets 8. Classes and Objects 9. Polymorphism 10. Inheritance 11. GUI Application 12. Working with Database					
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)					
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					
Recommended Text	Wesley J. Chun, (2007), "Core Python Programming", Pearson Education, Second Edition –					
Reference Books	1. Mark Lutz, (2013), "Learning Python Powerful Object Oriented Programming", O‟reillyMedia, 5 th Edition. 2. Timothy A. Budd, (2011), "Exploring Python", Tata MCGraw Hill Education PrivateLimited, First Edition. 3. Allen Downey, Jeffrey Elkner, Chris Meyers, (2012), "How to think like a computerscientist: learning with Python"					
Website and e-Learning Source	1. http://interactivepython.org/courselib/static/pythonds 2. http://www.ibiblio.org/g2swap/byteofpython/read/ 3. http://www.diveintopython3.net/ http://docs.python.org/3/tutorial/index.html					

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Understand the significance of control statements, loops and functions in creating simple programs.
CLO2	Apply the core data structures available in python to store, process and sort the data
CLO3	Analyze the real time problem using suitable python concepts
CLO4	Assess the complex problems using appropriate concepts in python
CLO5	Develop the real time applications using python programming language.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	3	2	2
CLO2	3	3	3	3	3	2
CLO3	3	2	3	3	3	3
CLO4	3	3	3	3	3	3
CLO5	3	3	3	3	3	3
Weightage of course contribute to each PSO	15	13	15	15	13	15

Title of the Course	ADVANCED JAVA & NETWORKING – PRACTICAL						
Paper Number							
Category	Core	Year	I	Credits	3	Course Code	
		Semester	I				
Instructional Hours per week		Lecture		Tutorial	Lab Practice	Total	
		-			4	5	
Pre-requisite		Students should able to know the concept of Java Fundamentals, Applet, Swings, JDBC, JavaBeans.					
Objectives of the Course		- Using Graphics, Animations and Multithreading for designing Simulation and Game based applications. - Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling. - Design and develop Web applications - Designing Enterprise based applications by encapsulating an application's business logic. - Designing applications using pre-built frameworks.					
Course Outline		1. Write a program to create a JTable. 2. Convert an image in RGB to a grayscale image. 3. Count number of access times of the servlet page. 4. Write a program to display a string in frame window with pink color as background. 5. Create chat application using either TCP or UDP protocol. 6. Implement TCP Server for transferring files using Socket and Server Socket. 7. Implement Student information system using JDBC and RMI. 8. Create Servlet file and study web descriptor file. 9. Write a program to design simple calculator with the use of Grid Layout. 10. Create login form and perform state management using Cookies, HTTP Session and URL Rewriting. 11. Write an Applet which will lay two sound notes in a sequence continuously use the play () methods available in the applet class and the methods in the audio clip interface. 12. Write a program to demonstrate the use of InetAddress class and its factor methods. 13. Create Servlet file which contains following functions: 1. Connect 2. Create Database 3. Create Table 4. Insert Records into respective tables 5. Update records of particular table in database 6. Delete Records from table. 7.Delete table and also database 14. Develop Simple Servlet Question Answer Application using Database 15, Develop simple shopping cart application using EJB [Stateful Session Bean].					

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
Reference Books	1. Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media 2. Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media 3. Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media 4. Programming Jakarta Struts, 2nd Edition by Chuck Cavaness, Publisher: O'Reilly Media
Website and e-Learning Source	https://nptel.ac.in/courses/106/105/106105191/ https://onlinecourses.nptel.ac.in/noc19_cs84/preview

CLO1: Learn the Internet Programming, using Java Applets
CLO 2: Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
CLO 3: Apply event handling on AWT and Swing components.
CLO 4:learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
CLO 5: Create dynamic web pages, using Servlets and JSP.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	3	3	2	3	3	3
CO3	3	3	2	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	2	3	3	3
Weightage of course contributed to each PO/PSO	15	15	10	15	15	15

Paper Number	ELECTIVE I (EC1) Data Structures					
Category	Elective	**Year**	I	**Credits**	3	**Course Code**	
		Semester	I				
Instructional Hours per week		**Lecture**	**Tutorial**		**Lab Practice**	**Total**	
		4			-	4	
Pre-requisite		Basic understanding of programming and foundational concepts in computer science					
Objectives of the Course		To become familiar with the various data structures and their applications and to increase the understanding of basic concepts of the design and use of algorithms					
Course Outline		**UNIT-I : Introduction and Overview:** Definitions – Concept of Data Structures – Overview of Data Structures – Implementation of Data Structures – Arrays: Definition – One Dimensional Array – Multidimensional Arrays: Two Dimensional Array – Sparse Matrices – Three dimensional and n-dimensional Arrays – Stacks : Introduction – Definition – Representation of Stack – Operations on Stack – Applications of Stacks: Evaluation of Arithmetic Expressions – Implementation of Recursion - Tower of Hanoi Problem					
		UNIT-II : Queues: Introduction – Definition – Representation of Queues – **Various Queue Structures :** Circular Queue – Deque – Priority Queue – **Applications of Queues :** Simulation – CPU Scheduling in a Multiprogramming Environment – Round Robin Algorithm – **Linked Lists:** Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – **Applications of Linked List:** Polynomial Representation					
		UNIT-III : Trees: Basic Terminologies – Representation of Binary Tree: Linear Representation – Linked Representation – **Operations:** Traversals – **Types of Binary Trees**: Expression Tree – Binary Search Tree – Splay tree					
		UNIT-IV :Sorting: Bubble Sort, Insertion Sort, Selection Sort, Shell Sort – Quick Sort - Merge Sort - Radix Sort - Heap Sort – **Searching:** Linear Search - Binary Search					

	UNIT-V: Graphs: Introduction – Graph representation and its operations – Path Matrix – Graph Traversal - Application ofDFS – Shortest Path Algorithm - **Minimum Spanning Tree :** Prim‟s Algorithm – Kruskal‟s Algorthim - Greedy – Knapsack – Back Tracking – 8 Queens
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Debasis Samantha (2013), Classic Data Structures, Second Edition, PHI Learning Private Limited. 2. P. Sudharsan, J. John Manoj Kumar, C & Data Structures, Third Edition, RBA Publications. Unit 4: Chapter 14, Unit 5: Chapter 13 3. Ellis Horowitz, SartajSahni, Sanguthevar Rajeshakaran, (2007), Fundamentals of Computer Algorithms, Second Edition, Universities Press (P) Limited
Reference Books	1. Sara Baase, (1991), Computer Algorithms – Introduction to Design and Analysis, Addison- Wesley Publishing Company 2. Robert Kruse, C.L.Tondo, Bruce Leung, Data Structures and Program Design in C,2nd Edition, PHI Publications.
Website and e-Learning Source	1. http://www.cs.sunysb.edu/~skiena/214/lectures/ 2. http://datastructures.itgo.com/graphs/dfsbfs.htm 3. http://oopweb.com/Algorithms/Documents/PLDS210/VolumeFrames.html 4. http://discuss.codechef.com/questions/48877/data-structures-and-algorithms 5. http://code.tutsplus.com/tutorials/algorithms-and-data-structures--cms-20437

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Outline the basic data structures
CLO2	Identify the different operations and memory representations
CLO3	Interpret different techniques with their complexities
CLO4	Compare the applications of various data structures
CLO5	Choose an algorithm to solve simple problems suited for appropriate Situations

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	1	2	2	1	2
CLO2	3	2	2	2	2	3
CLO3	3	2	3	3	3	2
CLO4	3	3	2	3	3	3
CLO5	3	3	3	3	3	2
Weightage of course contribute to each PSO	15	11	12	13	12	14

Title of the Course	COMPILER DESIGN					
Paper Number	ELECTIVE I (EC1)					
Category	Elective	Year	I	Credits	3	Course Code	
		Semester	I				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total
	4				-	4
Pre-requisite	Basic knowledge in one of the programming language and data structures					
Objectives of the Course	To acquire the knowledge about the compiler design and to understand the different phases of Compiler					
Course Outline	**UNIT-I :** Compilers & Translators, Need of Translators, Structure of a Compiler, Phases, Lexical Analysis, Syntax Analysis, Intermediate Code Generation, Code Optimization, Code Generation, Book Keeping, A Symbol Table in brief, Semantic Analysis, L-value, r-values, Error Handling					
	UNIT-II : Rules of Lexical Analyser, Need for Lexical Analysis, Input Buffering, Preliminary Scanning, A simple Approach to the Design of Lexical Analysers, Transition Diagrams, Regular Expression, String & Languages, Finite Automata, Non-deterministic Automata, Deterministic Automata, From regular Expression to Finite Automata, Context free Grammars, Derivations & Parse Trees, Parsers, Shift Reduce Parsing, Operator-Precedence Parsing					
	UNIT-III : Symbol Table Management, Contents of a Symbol Table, Names & Symbol table records, reusing of symbol table spaces, array names, Indirection in Symbol Table entries, Data Structures for Symbol Tables, List, Self Organizing Lists, Search Trees, Hash Tables, Errors, Reporting Errors, Sources of Errors Syntactic Errors, Semantic Errors, Dynamic Errors, Lexical Phase Errors, Minimum Distance Matching, Syntactic Phase Error, Time of Detection, Ponic mode, Case study on Lex and Yacc					

	UNIT-IV : Principal Sources of Optimization, Inner Loops, Language Implementation Details Inaccessible to the User. Further Optimization, Algorithm Optimization, Loop Optimization , Code Motion, Induction Variables, Reduction in Strength, Basic Blocks, Flow Graphs, DAG Representation of Basic Blocks, Value Numbers & Algebraic Laws, Global Data Flow Analysis, Memory Management Strategies , Fetch Strategy, Placement Strategies, Replacement Strategies, Address Binding, Compile Time, Load Time, Execution Time, Static Loading, Dynamic Loading, Dynamic Linking
	UNIT-V: Problems in Code Generation, a Simple Code Generator, Next-Use Information, Register Descriptors, Address Descriptors, Code Generation Algorithm, Register Allocation & Assignment, Global Register Allocation, Usage Counts, Register Assignment for Outer Loops, Register Allocation by Graph Coloring, Code Generation from DAG's, Peep-Hole Optimization, Redundant Loads & Stores, Un-Reachable Code, Multiple Jumps, Algebraic Simplifications, Use of Machine Idioms
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	Compilers: Principles, Techniques & Tools, Second Edition by A. V. Aho, Monicas. Lam, Ravi Sethi, J. D. Ullman
Reference Books	1. Dhamdhere D.M., "Compiler Construction: Theory and Practice", McMillan India Ltd., 1983 2. Holub Allen, "Compiler Design in C", Prentice Hall of India, 1990
Website and e-Learning Source	1. https://www.geeksforgeeks.org/compiler-design-tutorials/ 2. https://www.tutorialspoint.com/compiler_design/ 3. https://www.javatpoint.com/compiler-tutorial 4. https://onlinecourses.nptel.ac.in/noc19_cs01/preview 5. http://ecomputernotes.com/compiler-design

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Identify the major phases of compilation and the functionality of LEX and YACC
CLO2	Describe the functionality of compilation process and symbol table management
CLO3	Apply the various parsing, optimization techniques and error recovery routines to have a better code for code generation
CLO4	Analyze the techniques and tools needed to design and implement compilers.
CLO5	Test a compiler and experiment the knowledge of different phases in compilation

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	2	2	2	3	2
CLO2	3	2	2	2	3	3
CLO3	3	2	3	3	2	3
CLO4	3	3	3	3	2	3
CLO5	3	3	3	3	3	3
Weightage of course contribute to each PSO	15	12	13	13	13	14

Title of the Course	MACHINE LEARNING						
Paper Number	CORE						
Category	Core	Year	I	Credits	4	Course Code	
		Semester	I				
Instructional Hours per week		Lecture	Tutorial		Lab Practice	Total	
		4	1		-	5	
Pre-requisite	The Prerequisites for Machine learning is to understand, and practice machine learning approaches and familiarity with data handling techniques.						
Objectives of the Course	By the end of the course the students will be able to ☐☐Gain knowledge about basic concepts of Machine Learning ☐☐Solve the problems using various machine learning techniques ☐☐Apply Dimensionality reduction techniques.						
Course Outline	UNIT-I :Introduction: Machine Learning - Machine Learning Foundations –Overview – Applications - Types of Machine Learning - Basic Concepts in Machine Learning - Examples– Applications. Linear Models for Regression-Linear Basis Function Models-The Bias-Variance Decomposition- Bayesian Linear Regression-Bayesian Model Comparison.						
	UNIT-II :Supervised Learning Linear Models for Classification - Discriminant Functions - Probabilistic Generative Models - Probabilistic Discriminative Models - Bayesian Logistic Regression - Decision Trees - Classification Trees - Regression Trees – Pruning - Neural Networks - Feed-Forward Network Functions - Error Back-Propagation - Regularization - Mixture Density and Bayesian Neural Networks - Kernel Methods - Dual Representations - Radial Basis Function Networks - Ensemble methods - Bagging - Boosting.						
	UNIT-III :Unsupervised Learning Clustering- K-means - EM - Mixtures of Gaussians - The EM Algorithm in General -Model Selection for Latent Variable Models - High-Dimensional Spaces - The Curse of Dimensionality - Dimensionality Reduction - Factor Analysis - Principal Component Analysis - Probabilistic PCA- Independent Components Analysis.						

	UNIT-IV :Probabilistic Graphical Models Directed Graphical Models - Bayesian Networks - Exploiting Independence Properties - From Distributions to Graphs - Examples - Markov Random Fields - Inference in Graphical Models - Learning – Naive Bayes Classifiers - Markov Models – Hidden Markov Models – Inference – Learning- Generalization – Undirected graphical models - Markov Random Fields- Conditional Independence Properties - Parameterization of MRFs - Examples - Learning - Conditional Random Fields (CRFs) - Structural SVMs
	UNIT-V :Advanced Learning Sampling – Basic sampling methods – Monte Carlo - Reinforcement Learning - K-Armed Bandit Elements - Model-Based Learning - Value Iteration- Policy Iteration - Temporal Difference Learning- Exploration Strategies- Deterministic and Non- deterministic Rewards and Actions Eligibility Traces- Generalization- Partially Observable States- The Setting- Example - Semisupervised Learning - Computational Learning Theory - Mistake Bound Analysis - Sample Complexity Analysis - VC Dimension - Occam Learning - Accuracy and Confidence Boosting.
Extended Professional Component	**Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) (is a part of internal component only, Not to be included in the External Examination question paper)**
Skills acquired from this course	**Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill**
Recommended Text	**Christopher Bishop, "Pattern Recognition and Machine Learning" Springer, 2006**
Reference Books	**Kevin P. Murphy, "Machine Learning: A Probabilistic Perspective", MIT Press, 2012** **EthemAlpaydin, "Introduction to Machine Learning", Prentice Hall of India, 2005** **Tom M. Mitchell, Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.** **Hastie, Tibshirani, Friedman, "The Elements of Statistical Learning" (2nd ed)., Springer, 2008** **Stephen Marsland, "Machine Learning –An Algorithmic Perspective", CRC Press, 2009**
Website and e-Learning Source	**https://nptel.ac.in/courses/106/106/106106139/** **https://www.coursera.org/learn/machine-learning** **https://onlinecourses.nptel.ac.in/noc21_cs24/preview**

CLO 1: To introduce students to the basic concepts and techniques of Machine Learning.
CLO 2: To become familiar with regression methods, classification methods, clustering methods.
CLO 3: To become familiar with Dimensionality reduction Techniques.
CLO 4: Identify machine learning techniques suitable for a given problem
CLO 5: Design application using machine learning techniques

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3
CO2	2	3	3	3	3	2
CO3	2	3	3	3	3	2
CO4	3	3	3	3	3	2
CO5	3	3	2	3	3	3
Weightage of course contributed to each PSO	13	15	13	15	15	12

Title of the Course	HUMAN COMPUTER INTERACTION					
Paper Number	ELECTIVE I					
Category	Elective	Year	I	Credits	3	Course Code	
		Semester	I				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total
	4				-	4
Pre-requisite	Understanding the impact of human factors and Computer Science fundamentals					
Objectives of the Course	To think constructively and analytically in designing and evaluating interactive technologies					
Course Outline						

UNIT-I :

Foundations: The Human: Introduction-Input-Output Channels- Memory. The Computer: Introduction- Text Entry Devices- Display Devices- Memory. The Interaction: Introduction – Models of Interaction-Frameworks and HCI Ergonomics-Interaction Styles-Elements of the WIMP Interface-Interactivity - The Context of the Interactions

UNIT-II :

Design Process: Design Basics- Introduction - Process- User Focus-Scenarios- Navigation Design- Screen Design and Layout-Interaction and Prototyping. Design Rules-Introduction- Principles to Support Usability-Guidelines-Golden Rules and Heuristics-HCI Patterns

UNIT-III :

Implementation Support: Introduction - Elements of Windowing Systems - Programming the Application- Using Toolkits-User Interface Management Systems. Evaluation Techniques: What is an Evaluation- Goal of Evaluation-Evaluation Through Expert Analysis-Choosing an Evaluation Method

	UNIT-IV :Universal Design: Introduction - Universal Design Principles-Designing for Diversity. User Support: Introduction-Requirements of User Support-Approaches to User Support-Adaptive Help Systems-Designing User Support Systems
	UNIT-V: Models: Cognitive Models: Introduction-Goals and Task-Linguistic Models- Challenge of Display Based System-Physical and Device Models - Cognitive Architectures
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	Alan dix, Janet finlay, Gregory D. Abowd and Russell Beale,(2004),Human Computer Interaction, 3rd edition, Pearson Education
Reference Books	1. John C. Caroll, (2002), Human Computer Interaction in the new millennium, Pearson Education 2. Jenny Preece, Yvonne Rogers, Helen Sharp (2019), Interaction Design: Beyond Human–Computer Interaction,fifth edition, John Wiley & Sons Inc.
Website and e-Learning Source	1. http://courses.iicm.tugraz.at/hci/ 2. http://www.hcibook.com/hcibook/downloads/pdf/exercises.pdf 3. http://www.idemployee.id.tue.nl/g.w.m.rauterberg/lectures.html 4. http://user.medunigraz.at/andreas.holzinger/holzinger/papersen/HCI/Workshop/forISSEP%2 02005.pdf 5. http://universaldesign.ie/What-is-Universal-Design/The-7-Principles/ (Unit IV: Universal Design Principles)

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Describe typical human–computer interaction (HCI) models, styles, and various historic HCI paradigms
CLO2	Identify the usability and the beneficiary factors of User support systems
CLO3	Analyze the core theories, models and methodologies in the field of HCI
CLO4	Evaluate interactive systems based on the human factor theories
CLO5	Elaborate an interactive system based on the design principles, standards and guidelines

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	2	1	2	2	2
CLO2	3	2	1	2	2	2
CLO3	3	2	2	3	3	3
CLO4	3	3	2	3	3	3
CLO5	3	2	2	3	3	3
Weightage of course contribute to each PSO	15	11	8	13	13	13

Semester II

Title of the Course	DATABASE SYSTEMS					
Paper Number	CORE					
Category	Core	Year	I	Credits	4	Course Code
		Semester	II			
Instructional Hours per week	Lecture		Tutorial	Lab Practice	Total	
	4		1	-	5	
Pre-requisite	Fundamental computer knowledge that includes the hardware and memory storage.					
Objectives of the Course	To understand the basic DBMS models, architecture, query and to normalize the database. To Learn Transaction Processing, Recovery and Distributed Database.					
Course Outline	**UNIT-I : Introduction**: Database System Applications-Purpose of Database Systems-View of Data- Database Users and Administrators. **Relational Database**: Structure of Relational Databases- Databases Schema- Keys-Schema Diagrams-**Formal Relational Query Languages**: Relational Algebra-Tuple Relational Calculus					
	UNIT-II : Database Design: Overview of Design Process-The Entity Relationship Model-Constraints- Removing Redundant Attributes in Entity Sets-Entity-Relationship Diagrams-Reduction to Relational Schemas-Extended E-R features -Alternative Notations for Modeling Data**. Relational Database Design:** Features of Good Relational Design-Functional Dependency-**Normalization**: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF- Functional Dependency Theory					
	UNIT-III : Transaction Management: Transaction Concept-Simple Transaction Model-Storage Structure- Transaction Atomicity and Durability-Transaction Isolation-Serializability. **Concurrency Control:** Lock Based Protocols-Locks-Granting of Locks-Two Phase Locking Protocol-Time Stamp Based Protocol - **Recovery System:** Failure Classification-**Recovery and Atomicity**: LogRecords-Database Modification-Concurrency Control and Recovery-Recovery Algorithm					
	UNIT-IV : Distributed Database: Homogeneous and Heterogeneous Databases-Distributed Data storage- Distributed Transactions-Commit Protocols-Concurrency Control in Distributed Databases- Distributed Query Processing. Case study: MongoDB					

	UNIT-V: SQL - Table Fundamentals - Viewing Data - Inserting - Deleting - Updating - Modifying - Constraints - Functions - Grouping - Subqueries - Joins - Views.**PL/SQL**: Introduction - PL/SQL Block - Data Types And Variables - Control Structure -Cursors - PL/SQL Security - Locks. PL/SQL Database Objects: Exception Handling- Packages - Procedures and Functions - Database Triggers
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour) **(is a part of internal component only, Not to be included in the External Examination question paper)**
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Abraham Silberchatz, Henry F.Korth, S.Sudarshan, Database Systems Concepts, SixthEdition, Tata Mcgraw Hill. 2. Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, Fourth edition, BPBPublications. Unit IV & V
Reference Books	1. AtulKahate, Introduction to Database Management systems, Pearson Edn. 2. Carlo Zaniolo, Stefano Ceri, Christos Faloustsos, R.T.Snodgrass, V.S.Subrahmanian, (1997),Advanced Database Systems, Morgan Kaufman. 3. George Koch, Kelvin Loney, (2002), Oracle 9i : The Complete Reference, Oracle Press, TataMcGrawHill Publication. 4. RamezElmasri, Shamkant B. Navathe (2014), "Database Systems", Sixth edition, PearsonEducation, New Delhi
Website and e-Learning Source	1. http://awtrey.com/tutorials/dbeweb/database.php 2. http://www.slideshare.net/SalamaAlbusaidi/emerging-database-technology-multimedia- database. 3. http://www.tutorialspoint.com/dbms/index.htm 4. http://www.tutorialspoint.com/plsql/index.htm 5. https://opentextbc.ca/dbdesign/chapter/chapter-11-functional-dependencies/(FunctionalDependencies)

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Explain the relational databases and uses of PL/SQL
CLO2	Apply Schema, ER- Model, normalization, transaction, concurrency, and recovery on tables using SQL and PL/SQL.
CLO3	Analyze and manage relational & distributed, database, transaction, concurrency control and query languages
CLO4	Assess databases based on models and Normal Forms.
CLO5	Design and construct tables and manipulate it effectively using PL/SQLdatabase objects

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	3	3	3
CLO2	3	3	3	3	3	2
CLO3	3	2	3	3	3	2
CLO4	3	3	3	3	3	2
CLO5	3	3	3	3	3	3
Weightage of course contribute to each PSO	15	13	15	15	15	12

Title of the Course	Wireless Networks and Mobile Computing					
Paper Number	CORE					
Category	Core	Year		I	Credits	4	Course Code	
		Semester		II				
Instructional Hours per week	Lecture			Tutorial	Lab Practice	Total
	4			1	--	5
Pre-requisite	This course requires the understanding of Wireless Mobile computing and applications environment.					
Objectives of the Course	Students will try to learn: ➢ Define the fundamentals of wireless networks. Summarize about Learning and analyzing the different wireless technologies. ➢ Interpret the process of building and mobile networks applications. ➢ Understand and evaluate emerging wireless technologies and computing environments ➢ Critically asses the design considerations for wireless networks and J2ME ➢ Conceive the security threats and related security standards on Wireless computing					
Course Outline	**UNIT-I :** **Mobile Computing Architecture:** Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. Wireless Networks : Global Systems for Mobile Communication (GSM and Short Service Messages (SMS): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Introduction to SMS, SMS Architecture, SM MT, SM MO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS, Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Introduction to WiMAX					
	UNIT-II : Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices. Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6					

	UNIT-III : **Mobile OS and Computing Environment :** Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators
	UNIT-IV : **Building, Mobile Internet Applications :** Thin client: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML
	UNIT-V: **J2ME:** Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life-cycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Ashok Talukder, RoopaYavagal, Hasan Ahmed: Mobile Computing, Technology, Applications and Service Creation, 2nd Edition, Tata McGraw Hill, 2010.
Reference Books	1. Martyn Mallik: Mobile and Wireless Design Essentials, Wiley India, 2003 2. Raj kamal: Mobile Computing, Oxford University Press, 2007. 3. ItiSahaMisra: Wireless Communications and Networks, 3G and Beyond, Tata McGraw Hill, 2009.
Website and e-Learning Source	https://nptel.ac.in/courses/108/106/106106167/ https://nptel.ac.in/courses/117/104/117104099/ https://nptel.ac.in/courses/106/106/106106147/

Students will able to:

CLO1: Explain the basic concepts of wireless network and wireless generations

CLO 2: Demonstrate the different wireless technologies such as CDMA, GSM, GPRS etc

CLO 3: Appraise the importance of mobile computing networks and mobile client IP- Protocols

CLO 4: Explain the design considerations for deploying the wireless network infrastructure

CLO 5: Differentiate and support the security measures, standards. Services and layer wise security considerations

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	3
CO2	2	3	2	2	3	3
CO3	2	3	2	2	3	3
CO4	3	3	2	2	3	3
CO5	3	3	2	2	3	3
Weightage of course contributed to each PSO	12	15	10	10	15	15

Title of the Course	RDBMS LAB						
Paper Number	CORE						
Category	Core	Year	I	Credits	3	Course Code	
		Semester	II				
Instructional Hours per week	Lecture		Tutorial		Lab Practice	Total	
	-				4	4	
Pre-requisite	Basic understanding of SQL queries						
Objectives of the Course	The primary Course Objective of this paper is to learn and implement SQL& PL/SQL.						
Course Outline	1. DDL Commands 2. DML Commands 3. DCL Commands 4. Usage of Sub Queries in DML and Create-SQL 5. Solving queries using built-in functions 6. Simple programs in PL/SQL block 7. Exception Handling in PL/SQL 8. Programs using Implicit Cursors 9. Programs using Explicit Cursors 10. Procedures & User-defined functions 11. Creation of Triggers						
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved **(To be discussed during the Tutorial hour) (is a part of internal component only, Not to be included in the External Examination question paper)**						
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill						
Recommended Text	Ivan Bayross, SQL, PL/SQL The Programming Language of ORACLE, Fourth edition, BPBPublications						
Reference Books	RamezElmasri, Shamkant B. Navathe (2014), "Database Systems", Sixth edition, PearsonEducation, New Delhi						
Website and e-Learning Source	1. http://awtrey.com/tutorials/dbeweb/database.php 2. http://www.slideshare.net/SalamaAlbusaidi/emerging-database-technology-multimedia- database. 3. http://www.tutorialspoint.com/dbms/index.htm 4. http://www.tutorialspoint.com/plsql/index.htm						

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Choose appropriate SQL queries and PL/SQL blocks for the database.
CLO2	Implement SQL and PL/SQL blocks for the given problem effectively.
CLO3	Analyse the problem and Exceptions using queries and PL/SQL blocks.
CLO4	Validate the database for normalization using SQL and Pl/SQL blocks.
CLO5	Design Database tables, create Procedures, user-defined functions and Triggers.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	2	3	3	3
CLO2	3	3	3	3	3	3
CLO3	3	3	2	3	3	3
CLO4	3	3	2	3	3	2
CLO5	3	3	3	3	3	3
Weightage of course contribute to each PSO	15	15	12	15	15	14

Title of the Course	OPEN SOURCE TECHNOLOGIES – PRACTICAL					
Paper Number	Core					
Category	Core	Year	I	Credits	3	Course Code
		Semester	II			
Instructional Hours per week	Lecture		Tutorial	Lab Practice	Total	
	-			4	4	
Pre-requisite	Basic understanding of computer programming, Internet and HTML/XHTML					
Objectives of the Course	To learn the efficiency of Open Source Technology and to train to have a good practical knowledge of how to write successful PHP and Ruby code and utilizing adatabase using PHP.					
Course Outline	**Write PHP Scripts** **1. Get name of the user from a form and show greetingtext.** **2. To check whether given number is Armstrong or not.** **3. To find largest values of two numbers using nesting offunction.** **4. To check whether given number is String palindromeor not.** **5. login page with SQL connection.** **6. Sort a list of numbers.** **7. Design Curriculum Vitae.** **8. Login system using session.** **Write Ruby Script** **a. To accept user's first name & last name and print them in reverse order with a space between them** **b. To accept a filename from the user and print itsextension** **c. To print the elements of an array in reverse order** **d. To retrieve total marks of a student where subjectname and marks are stored in a hash** **e. to create a new string from a given string where thefirst and last characters have been exchanged.** **f. to test whether a year is leap year or not**					

Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Steven Holzner, (2016), "PHP: The Complete Reference", McGraw Hill Education Private Limited, Indian Edition. (Unit I, II) 2. RachnaKapur, Mario Briggs, Tapas Saha, Ulisses Costa, Pedro Carvalho, Raul F. Chong, Peter Kohlmann (2010), "Getting Started with Open Source Development", DB2 on Campus Book Series. (Unit III) 3. http://indexof.es/Ruby/Beginning%20Ruby%20On%20Rails.pdf (Unit IV) 4. http://www.cs.uni.edu/~wallingf/teaching/agile-may2010/ruby/programming-ruby.pdf(Unit V)
Reference Books	1. W. Jason Gilmore (2010), "Beginning PHP &MySql", Apress. 2. Joel Murach, Ray Harris (2010), "PHP and MySQL",Shroff Publishers & Distributors 3. Larry Ullman (2008), "PHP 6 and MySQL 5", Pearson Education. 4. John Coggeshall (2006), "PHP 5", Pearson Education. 5. Michale C. Glass (2004), "Beginning PHP, Apache, MySQL Web Development", WileyDreamTech Press.
Website and e-Learning Source	1. http://www.w3schools.com/php/ 2. http://howtostartprogramming.com/PHP/ 3. http://www.massey.ac.nz/~nhreyes/MASSEY/159339/Lectures/Lecture%2011%20-%20PHP%20-%20Part%205%20-%20CookiesSessions.pdf 4. http://www.tutorialspoint.com/mysql/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Demonstrate the setup and configuration of development environment to write PHP and Ruby Scripts
CLO2	Select the appropriate language fundamentals and techniques to write and compile PHP and Ruby programs
CLO3	Examine the bugs and analyze how to prevent and remove the bugs
CLO4	Test and debug the application with sample inputs to check the correctness andconsistency of the scripts
CLO5	Create simple programs that make use of various PHP and Ruby features and functions and solve web application and database tasks using PHP

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	1	2	3
CLO2	3	3	3	2	2	2
CLO3	3	2	3	3	2	2
CLO4	3	2	3	2	3	3
CLO5	3	3	3	3	2	3
Weightage of course contribute to each PSO	15	13	15	11	11	13

Title of the Course	BIOMETRIC TECHNIQUES					
Paper Number	ELECTIVE					
Category	Elective	Year	I	Credits	3	Course Code	
		Semester	II				
Instructional Hours per week	Lecture		Tutorial	Lab Practice	Total	
	4			-	4	
Pre-requisite	Basic knowledge of computer vision and cyber security concepts					
Objectives of the Course	To understand various physiological and behavioural biometrics and its applications					
Course Outline	**UNIT-I :** Introduction: Biometric Fundamentals - Biometrics Vs Traditional Techniques - Benefits of Biometrics in Identification Systems - Key Biometric Terms and Processes: Verification, Identification and Biometric Matching - Accuracy in Biometric Systems: False Match Rate, False Non-Match Rate, Failure to Enroll Rate, Derived Metrics					
	UNIT-II : Physiological Biometrics: Finger Scan: Components-How it works-Competing Technologies- Deployments-Strengths and Weaknesses. Facial Scan: Components- How it Works-Competing Technologies-Deployments-Strengths and Weaknesses					
	UNIT-III: Other Physiological Biometrics: Iris Scan: Components-How it Works-Competing Technologies-Deployments-Strengths & Weaknesses. Voice Scan: How it Works-Competing Technologies-Deployments-Strengths & Weaknesses-Other Physiological Biometrics: Hand Scan & Retina Scan					
	UNIT-IV : Behavioural Biometrics: Signature Scan and Keystroke Scan: How it Works-Competing Technologies-Deployments-Strengths and Weaknesses. Esoteric Biometrics: Vein Pattern- Facial Thermography-DNA- Sweat Pores- Hand Grip- Finger Nail Bed-Body Odor- Ear-Gait- Skin Luminescence- Brain Wave Pattern-Foot Print and Foot Dynamics					
	UNIT-V: Biometric Applications: Categorizing Biometric Applications - Application Areas: Criminal and Citizen Identification, Surveillance, PC/Network Access, E-Commerce/Telephony and Retail/ATM - Costs to Deploy -Issues in Deployment- Biometric Standards					
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)					
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill					

Recommended Text	1. Samir Nanavati, Michael Thieme, Raj Nanavati,(2003),Biometrics - Identity Verification in a Networked World, Wiley-dreamtech India Pvt Ltd, New Delhi
	2. John D. Woodward, Nicholas M. Orlans, Peter T. Higgins, Biometrics: the ultimate reference, Dreamtech Press
Reference Books	Anil K Jain, Patrick Flynn, Arun A Ross, (2008), Handbook of Biometrics, Springer
Website and e-Learning Source	1. http://www.sans.org/reading-room/whitepapers/authentication/biometric-scanning/
	2. http://www.biometrics.gov/documents/biointro.pdf
	3. http://www.cse.unr.edu/~bebis/CS790Q/Lect/IntroBiometrics.pdf
	4. http://www.planetbiometrics.com/creo_files/upload/article-files/btamvol1 update.pdf
	5. http://www.biometrics.gov/documents/biointro.pdf (Unit V)

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Outline the existing theories, methods and interpretations in the field of Biometrics
CLO2	Identify the deployment areas, competing technologies, strength and weakness of various Physiological and Behavioral Biometrics
CLO3	Analyze various Application areas, Biometric security issues & Biometric Standards
CLO4	Assess the methods relevant for design, development and operation of biometric access control systems
CLO5	Determine identification /verification systems to validate the user identity and technological uplifts in biometrics compared to traditional securing mechanisms

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	2	1	1	1	1	1
CLO2	2	2	1	1	2	2
CLO3	3	2	1	2	2	3
CLO4	3	2	2	3	3	2
CLO5	3	3	2	3	3	3
Weightage of course contribute to each PSO	13	10	7	10	11	11

Title of the Course	Advanced Digital Image Processing						
Paper Number							
Category	Elective IV	**Year**	I	**Credits**	3	**Course Code**	
		Semester	II				
Instructional Hours per week		**Lecture**		**Tutorial**	**Lab Practice**	**Total**	
		4			--	4	
Pre-requisite		Able to know extract from Differential Equations and the understanding of Linear Algebra.					
Objectives of the Course		The main objectives of this course are to: ➢ To understand representation of digital images in the spatial and frequency domains. ➢ To understand Image Compression, Segmentation and image compression standards. ➢ To provide an in-depth understanding of various concepts related to image Representation and Description. ➢ To get familiar with image enhancement concepts and image degradation/restoration process.					
Course Outline		**UNIT-I :** **DIGITAL IMAGE FUNDAMENTALS** – Introduction -Resolution and Quantization- Image format-The Origins of digital image processing – fundamental steps in Digital Image Processing -elements of visual perception systems-Light and the electromagnetic Spectrum-Image Sensing and Acquisition- Image sampling and Quantization- Some basic Relationship between Pixels- Introduction to the Basic Mathematical Tools Used in Digital Image Processing					
		UNIT-II : **INTENSITY TRANSFORMATION AND SPATIAL FILTERING:** Mathematics of Image formation- The Basic of Intensity Transformations and Spatial Filtering- Background-Some basic Intensity Transformation Function – Histogram Processing-Histogram Equations –Histogram Matching-Local Histogram Processing- Smoothing(Low Pass) Spatial Filter – Sharpening (High Pass) Spatial Filter – Highpass, Bandreject, and Bandpass Filters from Low pass Filters – Combining Spatial Enhancement Methods					
		UNIT-III : **IMAGE RESTORATIONAND RECONTRUCTION:** Image Modeling- Spatial and Frequency Properties of Noise – Periodic Noise-A Model of the Image Degradation/Restoration Process. Noise Models. Restoration in the Presence of Noise Only-Spatial Filtering- The Weiner-Histogram filter-.Matrix formulation of image restoration- Constrained Least Squares Filtering- Geometric Mean Filter.					

	UNIT-IV : **COLOR IMAGE PROCESSING:** Color Fundamentals – Color Models - Pseudo color Image Processing - Basics of Full –Color Image Processing-Color Transformations –Color Image Smoothing and Sharpening –Image Segmentation based on color - Using Color in Image Segmentation-Noise in Color Images - Color Image Compression
	UNIT-V: **COLOR IMAGE COMPRESSION & WATER MARKING:** Fundamentals-Huffman Coding – Golomb Coding – Arithmetic Coding – LZW Coding – Run length Coding – Symbol Based Coding-Bit Plane Coding – Black Transform Coding- Predictive Coding-Wavelet Coding – Digital Image Water marking.
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	R.C. Gonzalez and R. E. Woods, Digital image processing, Addison-Wesley Publishing House, 4th edition, 2018.
Reference Books	Chris Solomon and Toby Breckon, Fundamentals of Digital image processing, A Practical Approach with Examples in MATLAB, First edition, 2011 John wiley& Sons
Website and e-Learning Source	https://www.imageprocessingplace.com/ https://www.fundipbook.com/

CLO1: Acquire knowledge of principles of digital image processing
CLO 2: Solve problems pertaining to the field of image acquisition, preprocessing, Fourier domain processing.
CLO 3: Perform basic image restoration, image segmentation and image compression.
CLO 4: Provide the foundations for life-long learning and continual professional development in the areas of image applications.
CLO 5: Interpret various image compression standards

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO 6
CO1	**3**	**3**	**2**	**2**	**3**	**3**
CO2	**3**	**2**	**3**	**2**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**2**	**1**
CO4	**3**	**3**	**3**	**3**	**3**	**3**
CO5	**3**	**2**	**3**	**3**	**3**	**3**
Weightage of course contributed To each PSO	**15**	**12**	**14**	**12**	**14**	**13**

Title of the Course		Distributed and Cloud Computing					
Paper Number							
Category	Elective	**Year**		I	**Credits**	3	**Course Code**
		Semester		II			
Instructional Hours per week		**Lecture**			**Tutorial**	**Lab Practice**	**Total**
		4				--	4
Pre-requisite		The Prerequisites of Cloud computing is it builds upon prior knowledge that students have on computing and software systems and programming knowledge.					
Objectives of the Course		The main objectives of this course are to: ➢ Classify and describe the architecture and taxonomy of Parallel and Distributed Systems Context.(K1) ➢ Cloud Virtualization, Abstractions and Enabling Technologies Characterize the distinctions between Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS).(K2) ➢ Examine the design of task and data parallel distributed algorithms on Programming Patterns for "Big Data" Applications on Cloud.(K3,K4) ➢ Application Execution Models on Clouds.(K5) ➢ Illustrate the use of load balancing techniques for stateful and stateless applications.(K6)					
Course Outline		**UNIT-I :** **Distributed Communication** Introduction to Distributed Systems – Characterization of Distributed Systems – Distributed Architectural Models –Remote Invocation – Request-Reply Protocols – Remote Procedure Call –Remote Method Invocation – Group Communication – Coordination in Group Communication– Ordered Multicast – Time Ordering – Physical Clock Synchronization – Logical Time and Logical Clocks.					
		UNIT-II : **Distributed Resource Management** Global States– Distributed Mutual Exclusion – Election Algorithms – Distributed Deadlock – Distributed File System Architecture – HDFS – Map Reduce.					

	UNIT-III : **Introduction to Cloud** Cloud Computing Overview – Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self-service , Broad network access , Location independent resource pooling , Rapid elasticity , Measured service. Architectural influences – High- performance Computing, Utility and Enterprise Grid Computing, Autonomic Computing, Service Consolidation, Horizontal scaling, Web services, High scalability Architecture. Cloud Benefits – Cloud Deployment Model: Public Clouds – Private Clouds – Community Clouds - Hybrid Clouds - Advantages of Cloud Computing.
	UNIT-IV : **Virtualization Techniques** Introduction to Virtual Machines, Emulation :Interpretation and Binary Translation, Process Virtual machines and System Virtual machines Virtualization : Virtualization and cloud computing - Need of virtualization – limitations – Types of Hardware Virtualization: Full Virtualization – Para Virtualization – Case Studies : Xen,VMware – Desktop Virtualization – Network Virtualization.
	UNIT-V: **Cloud Resources Management And Issues** Cloud architecture: Cloud delivery model, Cloud Storage Architectures, Software as a Service (SaaS): SaaS service providers – Google App Engine, Salesforce.com and googleplatfrom – 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.
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	George Coulouris, Jean Dollimore, Tim Kindberg, Distributed Systems Concepts and Design, Fifth Edition, Pearson Education Asia, 2012.

Reference Texts	
	1. Distributed Systems - Principles and Paradigms, Andrew S. Tanenbaum,Maarten Van Steen, Second Edition, Pearson Prentice Hall, 2006. 2. MukeshSinghal, Advanced Concepts In Operating Systems, McGraw Hill Series in Computer Science, 1994. 3. Cloud Computing A Practical Approach - Anthony T.Velte, Toby J. Velte, Robert Elsenpeter Tata-McGraw- Hill , New Delhi – 2010.
Website and e-Learning Source	https://nptel.ac.in/courses/106/104/106104182/ https://onlinecourses.nptel.ac.in/noc21_cs15/preview

CLO1: Introduction to distributed systems and cloud computing.
CLO 2: Design, architectures and technology. Cloud applications, service quality and security.
CLO 3: Algorithms for synchronization, coordination, data sharing, resource allocation, consistency, fault tolerance.
CLO 4: Replication, consistency and concurrency control in transactional systems.
.**CLO 5:**Illustrate the use of load balancing techniques for stateful and stateless applications.
.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO 6
CO1	3	3	2	2	3	3
CO2	3	2	3	2	3	3
CO3	3	2	3	2	2	1
CO4	3	3	3	3	3	3
CO5	3	2	3	3	3	3
Weightage of course contributed To each PSO	15	12	14	12	14	13

Title of the Course	SOFTWARE PROJECT MANAGEMENT					
Paper Number	ELECTIVE					
Category	Elective	Year	I	Credits	3	Course Code
		Semester	II			
Instructional Hours per week	Lecture		Tutorial	Lab Practice		Total
	4			-		4
Pre-requisite	Basic knowledge about the fundamentals of software project development					
Objectives of the Course	The primary objective is to define and highlight importance of software project management and to become familiarize in formulating software management metrics & strategy in managing projects					
Course Outline	UNIT-I : Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.					
	UNIT-II : Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.					
	UNIT-III :Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.					
	UNIT-IV :Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling					

	UNIT-V: Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software
Extended Professional Component	Questions related to the above topics, from various competitive examinations UPSC / TRB / NET / UGC – CSIR / GATE / TNPSC / others to be solved (To be discussed during the Tutorial hour)
Skills acquired from this course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	Robert T. Futrell, Donald F. Shafer, Linda I. Safer, "Quality Software Project Management", Pearson Education Asia 2002
Reference Books	1. Pankaj Jalote, "Software Project Management in Practice", Addison Wesley 2002. 2. Hughes, "Software Project Management", Tata McGraw Hill 2004, 3rd Edition.
Website and e-Learning Source	1. https://highered.mheducation.com/sites/0077109899/information-center-view/ 2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm 3. https://www.smartsheet.com/content/software-project-management 4. https://www.philadelphia.edu.jo/academics/lalqoran/uploads/SPM_Chapter_1-%202016%204.ppt 5. https://cs.gmu.edu/~kdobolyi/cs421/projectmanagement.ppt

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Understanding of project management fundamentals such as project planning, risk management and quality assurance
CLO2	Choose the appropriate scheduling and testing techniques to build a quality product
CLO3	Apply different cost estimation techniques and quality measures for software development
CLO4	Differentiate various software development models and methodologies, planning activities and scheduling methods
CLO5	Asses the importance of software project documentation and identify the methods to create project documentation, including requirements documents, design documents, and project plans

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	2	2	3	3	2
CLO2	3	2	2	3	3	2
CLO3	3	2	3	2	3	3
CLO4	3	3	2	3	3	3
CLO5	3	3	3	2	3	3
Weightage of course contribute to each PSO	15	12	12	13	15	13

Title of the Course	SOCIAL NETWORK ANALYSIS						
Category	Skill	Year	I	Credits	2	Course Code	
		Semester	II				
Instructional Hours per week		Lecture		Tutorial		Lab Practice	Total
		4				--	4
Pre-requisite		Basic understanding of social networks					
Objectives of the Course		To introduce the concepts and fundamentals of social network components and analysis					
Course Outline		**UNIT-I: INTRODUCTION TO SEMANTIC WEB AND SOCIAL NETWORKS** Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis- Brief history of Social network analysis **Book 1- Chapter 1,2,3 Book 2: Chapter 1**					
		UNIT-II: MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION Knowledge Representation on the semantic web- Ontology and their role in the Semantic Web - Ontology languages for the Semantic Web- Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations **Book 1: Chapter 4,5,6**					

	UNIT-III: DATA COLLECTION Boundary specification – Data collection process- Information bias and issue of reliability – Archival data – Understanding SNA data – Managing SNA data **Book2 : Chapter 2**
	UNIT-IV : METHODS IN SOCIAL NETWORK ANALYSIS Descriptive methods – Graph – Density- Centrality – cliques – MDS-structural equivalence – Two mode networks – Inferential methods – QAP- ERGM **Book 2- Chapter 3, 4**
	UNIT-V: CASE STUDIES Case studies – Evaluation of web-based social network extraction – semantic – based social network analysis in the sciences – emergent semantics **Book 1: Chapter 7,8,9**
Extended Professional Component (is a part of internal component only, Not to be included in the External Examination question paper)	Case study on recent developments and presentation
Skills acquired from this course	Apply social network in real time applications
Recommended Text	1. Peter Mika, "Social Networks and the Semantic Web", Springer 2007. 2. Yang, Song, Franziska B. Keller, and Lu Zheng. Social network analysis: Methods and examples. Sage Publications, 2016.

Reference Books	1. Guandong Xu ,Yanchun Zhang and Lin Li, ―Web Mining and Social Networking – Techniques and applications‖, First Edition, Springer, 2011. 2. Dion Goh and Schubert Foo, ―Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively‖, IGI Global Snippet, 2008.
Website and e-Learning Source	https://bookdown.org/chen/snaEd/ch4.html https://www.sciencedirect.com/topics/social-sciences/social-network-analysis https://www.publichealth.columbia.edu/research/population-health-methods/social-network-analysis https://www.ibm.com/docs/en/spss-modeler/18.0.0?topic=analysis-about-social-network

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CO's	Course Outcomes
CLO1	Understand the fundamentals of social web and elements of social network analysis.
CLO2	Apply and visualize the knowledge representation in social network.
CLO3	Analyse the various methods in social network analysis.
CLO4	Evaluate the tools and methods for analysing the social network data.
CLO5	Investigate the recent potential applications and development of social network with real time case studies.

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CLO1	3	3	3	2	1	1
CLO2	3	3	3	2	1	1
CLO3	3	3	3	2	1	1
CLO4	3	3	3	2	1	1
CLO5	3	3	3	2	1	1
Weightage of course contribute to each PSO						