2020

M.Sc COMPUTER SCIENCE

Course Structure and Syllabus

(For the candidates admitted from the academic year 2020-2021 onwards)

CHOICE BASED CREDIT SYSTEM

(CBCS)

THANTHAI HANS ROEVER COLLEGE (AUTONOMOUS)

(Nationally Re-Accredited by NAAC with B^{++})

(Affiliated to Bharathidasan University, Tiruchirappalli)

ELAMBALUR, PERAMBALUR – 621 220

VISION:

- To be a Centre of excellence in education and research in the frontier areas of Computer Science

MISSION:

- To facilitate quality transformative education in Computer Science
- To promote quality research and innovation in technology for meeting global challenges

  To transform students to competent professionals to cater to the needs of the society

Programme Outcomes (POs)

Upon completion of the programme, the postgraduate will be able to

1. Gain advanced knowledge resulting in entrepreneursip; innovation and newer opportunities for being employable in public and privat sectors, researc and development organizations
2. Apply enhanced nw techniques and aopt new technologies needed in the respecive disciplines
3. Appreciate the diversity of beaviour in professional practice and act in accordance with the core values of chosen profession
4. Demonstrate the knowledge, values and skills to be critical consumer of research practice and possess investigative skills to evaluate the practice
5. Engage in lifelong learning process, have the ability to communicate the findings of Physical Sciences with the current knowledge

Programme Specific Outcomes (PSOs)

Upon completion of the programme, the postgraduate will be able to

1. Basic fundamental knowledge in Mathematical problem solving and to identify, analyze, design, optimize and implement system solutions using appropriate algorithms of varying complexity.
2. Ability to demonstrate understanding of the working principles of the hardware and software aspects and development methodologies of the software systems
3. Communicate computer science concepts, designs, and solutions effectively and professionally
4. Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems
5. Basic knowledge for solving real-life and R&D problems with an orientation to lifelong learning

Thanthai Hans Roever College (Autonomous),Elambalur, Perambalur - 621 220

M.Sc., COMPUTER SCIENCE - *Course Structure Under* ***CBCS***

(For the candidates admitted from the academic year 2020-2021 onwards)

Semester	Course Code	Title of the Course	Ins. Hours/ Weeks	Credit	Exam Hours	CIA (Max)	ESE (Max)	Total (Max)
1	20PCS1CC1	Design & Analysis of Algorithms	6	4	3	25	75	100
1	20PCS1CC2	Advanced Web Technologies	6	4	3	25	75	100
1	20PCS1CC3	Advanced Database Management System	6	4	3	25	75	100
1	20PCS1CC4	Compiler Design	6	4	3	25	75	100
1	20PCS1CP1	Advanced Web Technologies Lab	6	4	3	40	60	100
		Total	**30**	**20**	**-**	**-**	**-**	**500**
2	20PCS2CC5	Distributed Operating System	6	5	3	25	75	100
2	20PCS2CC6	Advanced Java Programming	6	5	3	25	75	100
2	20PCS2EC1:1 20PCS2EC1:2 20PCS2EC1:3	Advanced Computer Network Cloud Computing Web Services	6	5	3	25	75	100
2	20PCS2EC2:1 20PCS2EC2:2 20PCS2EC2:3	Object Oriented System Development Mobile Computing Wireless Networks	6	5	3	25	75	100
2	20PCS2CP2	Advanced Java Lab	6	4	3	40	60	100
		Total	**30**	**24**	**-**	**-**	**-**	**500**
3	20PCS3CC7	Cryptography and Network Security	6	5	3	25	75	100
3	20PCS3CC8	Digital Image Processing	6	5	3	25	75	100
3	20PCS3EC3:1 20PCS3EC3:2 20PCS3EC3:3	Theory of computation Optimization Techniques Embedded Systems	6	5	3	25	75	100
3	20PCS3EC4:1 20PCS3EC4:2 20PCS3EC4:3	WAP & XML Statistical Computing Software Project Management	6	5	3	25	75	100
3	20PCS3CP3	Image processing Lab	6	4	3	40	60	100
		Total	**30**	**24**	**-**	**-**	**-**	**500**
4	20PCS4CC9	Internet of Things	**6**	**5**	**3**	25	75	100
4	20PCS4CC10	Machine Learning	**6**	**5**	**3**	25	75	100

4	20PCS4EC5:1 20PCS4EC5:2 20PCS4EC5:3	Data Mining Soft Computing Data Science and Big Data Analytics	6	4	3	25	75	100
4	20PCS4CP4	Machine Learning Lab	6	4	3	40	60	100
4	20PCS4PW	Project	6	4	-	-	-	100
Total			**30**	**22**	**-**	**-**	**-**	**500**
Grand Total			**120**	**90**	**-**	**-**	**-**	**2000**

List of Elective Courses

Elective	Course Code	Title of the Course
Elective -1	20PCS2EC1:1 20PCS2EC1:2 20PCS2EC1:3	1. Advanced Computer Network 2. Cloud Computing 3. Web Services
Elective –2	20PCS2EC2:1 20PCS2EC2:2 20PCS2EC2:3	1. Object Oriented System Development 2. Mobile Computing 3. Wireless Networks
Elective - 3	20PCS3EC3:1 20PCS3EC3:2 20PCS3EC3:3	1. Theory of computation 2. Optimization Techniques 3. Embedded Systems
Elective - 4	20PCS32EC4:1 20PCS3EC4:2 20PCS3EC4:3	1. WAP & XML 2. Statistical Computing 3. Software Project Management
Elective –5	20PCS4EC5:1 20PCS4EC5:2 20PCS4EC5:3	1. Data Mining 2. Soft Computing 3. Data Science and Big Data Analytics

Note:

Project : 100 Marks

Dissertation : 80 Marks

Viva Voce : 20 Marks

Core Papers	-	10
Core Practical	-	4
Elective Papers	-	5
Project	-	1

1. Theory Internal 25 marks External 75 marks
2. Practical " 40 marks " 60 marks
3. Separate passing minimum is prescribed for Internal and External

a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)

b) The passing minimum for University Examinations shall be 40% out of 75 marks (i.e. 30 marks)

c) The passing minimum not less than 50% in the aggregate.

SEMESTER – I

Course Code: 20PCS1CC1 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 4 External Marks: 75

CORE COURSE 1 – DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes:

On successful completion of the course, students will able to

CO1: It gives stepwise procedure to solve problems
CO2: The problems can be broken down into small pieces for program development.
CO3: Efficient approach of solving problems by a model of computations
CO4: It gives the knowledge of programming skill
CO5: Impact the knowledge of to design and find solution for real time Problems in lifelong learning

Unit - I
Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues–Trees– Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

Unit-II
Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding the Maximum and Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

Unit - III
The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

Unit - IV
Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees– Biconnected Components and DFS.

Unit - V
Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searched - 0/1 Knapsack Problem.

Text Book(s):

1. Ellis Horowitz, Satraj Sahni and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

Reference Book(s):

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Carlos A.Coello Coello, Gary B.Lamont, David A.Van Veldhuizen, "Evolutionary Algorithms for Solving Multi-Objective Problems", Springer 2nd Edition, 2007.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
I	**20PC1CC1**		**Design and Analysis of Algorithms**			**6**			**4**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

Mapping	1-29%	30-59%	60-69%	70-89%	90-100%
Matches	1-14	15-29	30-34	35-44	45-50
Relationship	Very Poor	Poor	Moderate	High	Very High

SEMESTER – I

Course Code: 20PCS1CC2 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 4 External Marks: 75

CORE COURSE 2 - ADVANCED WEB TECHNOLOGIES

Course Outcomes:

On successful completion of the course, students will able to

CO1: Design a web page with Web form fundamentals and web control classes
CO2: Recognize the importance of various web development tools and methods of web services
CO3: Efficient approach of solving problems by web development controls
CO4: Provides the knowledge of programming skill and enables the skills of entrepreneurship development
CO5: Impact the knowledge of to design web sites for real time requirements in lifelong learning

Unit - I

OVERVIEW OF ASP.NET - The .NET framework – Learning the .NET languages Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting up ASP.NET and IIS

Unit – II

Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications– Code behind- The Global. asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto PostBack and Web Control events- Accessing web controls. Using Visual Studio .NET: Starting a Visual Studio.NET Project- Web form Designer-Writing code-Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management-Tracing, Logging, and Error Handling

Unit – III

Working with Data -Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML

Unit - IV

Web Services - Web services Architecture: Internet programming then and now- WSDL–SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services: Web service basics- The Stock Quote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with Terra Service.

Unit – V

Advanced ASP.NET - Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability– Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.

Text Book(s):

1 Mathew Mac Donald, "ASP.NET Complete Reference", TMH 2005

Reference Book(s):

1. Crouch Matt J, "ASP.NET and VB.NET Web Programming", Addison Wesley 2002.
2. J.Liberty, D.Hurwitz, "Programming ASP.NET", Third Edition, O'REILLY, 2006.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20PC1CC2		Advanced Web Technologies			6			4	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓		✓	✓	✓	✓		✓	✓
CO2		✓	✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CO4	✓		✓			✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 39, Relationship: High										

SEMESTER – I

Course Code: 20PCS1CC3
Instruction Hours: 6
Credits: 4

Exam Hours: 3
Internal Marks: 25
External Marks: 75

CORE COURSE 3 – ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Outcomes:

On successful completion of the course, students will able to

CO1: Demonstrate an understanding of the elementary & advanced features of DBMS & RDBMS
CO2: Attain a good practical understanding of the SQL
CO3: Develop clear concepts about Relational Model
CO4: Examine techniques pertaining to Database design practices
CO5: Execute various advance SQL queries related to Transaction Processing & Locking using concept of concurrency control

Unit - I

Relational and parallel Database Design: Basics, Entity Types, Relationship Types, ER Model, ER-to-Relational Mapping algorithm. Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF, 4NF and 5NF. Architecture, I/O Parallelism, Interquery Parallelism, Intra query Parallelism, Intra operation Parallelism, Interoperation Parallelism.

Unit - II

Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.

Unit - III

Spatial Database: Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing.

Unit - IV

XML Databases: XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, and Illustrative Experiments.

Unit - V

Temporal Databases: Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints,

Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.

Text Book(s):

1. Abraham Silberschatz, Henry F Korth , S Sudarshan, "Database System Comcepts", 6th edition , McGraw-Hill International Edition , 2011
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education Reprint 2016.

Reference Book(s):

1. Ramez Elmasri, Shamkant B Navathe, "Fundamental of Database Systems", Pearson, 7th edition 2016.
2. Thomas Connolly, Carolyn Begg., "Database Systems a practical approach to Design, Implementation and Management ", Pearson Education, 2014.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20PC1CC3		Advanced Database Management Systems			6			4	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓		✓	✓	✓	✓		✓	✓	✓
CO2	✓			✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓	✓	✓	✓	✓		
CO4	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

SEMESTER – I

Course Code: 20PCS1CC4 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 4 External Marks: 75

CORE COURSE 4 - COMPILER DESIGN

Course Outcomes:

On successful completion of the course, students will able to

CO1: Understand the major phases of compilation and to understand the knowledge of Lex tool & YAAC tool
CO2: Develop the parsers and experiment the knowledge of different parsers design without automated tools
CO3: Construct the intermediate code representations and generation
CO4: Apply for various optimization techniques for dataflow analysis
CO5: Use the knowledge of patterns, tokens & regular expressions for solving a problem in the field of data mining

Unit – I

Lexical analysis - Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

Unit – II

Syntax Analysis - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

Unit – III

Semantic Analysis - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S- attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

Unit – IV

Intermediate Code Generation - Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

Unit – V

Code Generation and Code Optimization - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs– Optimization of Basic Blocks- A simple code generator – Peephole Optimization.

Text Book(s):

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey Ullman, "Compilers-Principles, Techniques and Tools", Second Edition, Pearson Education Asia, 2009

Reference Book(s):

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers-Principles, Techniques and Tools, Addison- Wesley, 2003.
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, 1988.
3. Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, 2004.
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, 2001.
5. S.Godfrey Winster, S.Aruna Devi, R.Sujatha, "Compiler Design", yesdee Publishers, Third Reprint 2019.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
I	**20PC1CC4**		**Compiler Design**			**6**		**4**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓	✓		✓		✓
CO2	✓	✓	✓	✓	✓	✓	✓			✓
CO3	✓	✓	✓	✓		✓		✓		✓
CO4		✓	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER - I

Course Code: 20PCS1CP1 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 40
Credits: 4 External Marks: 60

CORE PRACTICAL 1 – ADVANCED WEB TECHNOLOGIES LAB

Course Outcomes:

On successful completion of this course, Students will be able to:

CO1: Develop to build a complete web application using .NET Framework
CO2: Create interactive web pages using web controls
CO3: Able to connect with databases using ADO.NET and ASP.NET
CO4: Develop a simple web application using servicer side PHP programming and database connectivity using MYSQL
CO5: Able to create a complete web application with all the required modules

1. Create a welcome Cookie (Hit for a page) and display different image and text content each time when the user hit the page
2. List a table of content and navigate within the pages.
3. Demonstrate Request and Response object using HTML Form.
4. Database Connection to display all the values in the table in a webpage using ADO.NET.
5. Query textbox and Displaying records & Display records by using database
6. Write LINQ queries to access the database.
7. Write a program to get the information from the user and display it in a message box.
8. Write a program to receive user feedback using Form and stored it in a database.
9. Create a web service using ASP.NET
10. Write a component based programming using advanced ASP.NET

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
I	20PCS1CP1		Advanced Web Technologies Lab			6			4	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓		✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓		✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

SEMESTER – II

Course Code: 20PCS2CC5
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

CORE COURSE 6 – DISTRIBUTED OPERATING SYSTEM

Course Outcomes:

On successful completion of the course, students will able to

CO1: Clear understanding on several resource management techniques like distributed shared memory and other resources
CO2: Knowledge to understand hardware, software and communication in distributed OS
CO3: Understand the different Distributed Systems and the challenges involved in Design of the Distributed Systems
CO4: Able to design and implement algorithms of distributed shared memory and commit protocols
CO5: Able to design and implement fault tolerant distributed systems

Unit - I

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources , Reusable Resources.

Unit - II

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations – Lamport's Logical Clock, Vector Clock, Global State, Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

Unit - III

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

Unit - IV

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Non blocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

Unit - V

Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

Text Book(s):

1. Mukesh Singhal N.G.Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill 2000.
2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

Reference Book(s):

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts", 6th Edition Addison Wesley publications 2003.
2. Andrew S.Tanenbaum, "Modern Operating Systems", 2nd Edition Addison Wesley 2001

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20PC2CC5**		**Distributed Operating System**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓		✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – II

Course Code: 20PCS2CC6 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

CORE COURSE 6– ADVANCED JAVA PROGRAMMING

Course Outcomes:

On successful completion of the course, students will able to

CO1: Knowledge of the structure and model of the Java programming language

CO2: Use the Java programming language for various programming technologies

CO3: Develop software in the Java programming language

CO4: Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

CO5: Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem

Unit - I

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern- Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern

Unit - II

Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs- Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes- Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers

Unit - III

JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.

Unit - IV

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.

Unit - V

Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class- Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class- Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

Text Book(s):

1. Bert Bates, Karthy Sierra , Eric Freeman, Elisabeth Robson, "Head First Design Patterns", O'REILLY Media Publishers.(1st & 5 th Unit).
2. Herbert Schildt, "Java: A Beginner Guide", Oracle Pres-Seventh Edition. (2nd and 3rd Unit).
3. Murach's, "Java Servlets and JSP", 2nd Edition, Mike Murach & Associates Publishers; 3rd Edition. (4th Unit).

Reference Book(s):

1. Paul Deitel and Harvey Deitel, "Java: How to Program", Prentice Hall Publishers; 9th Edition.
2. Jan Graba, "An Introduction to Network Programming with Java- Java 7 Compatible", 3rd Edition, Springer.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
II	**20PC2CC6**		**Advanced Java Programming**			**6**		**5**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓			✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC1:1 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

ELECTIVE COURSE 1 (1) - ADVANCED COMPUTER NETWORKS

Course Outcomes:

On successful completion of this course students will be able to

CO1: Basic understanding of computer networks and concepts of the OSI reference model, TCP-IP reference model

CO2: Impact the knowledge for use protocols, network interfaces and design/performance issues in local area networks and wide area networks

CO3: Understand the wireless networking concepts, and be familiar with contemporary Issues in networking technologies

CO4: To be familiar with network tools and network programming

CO5: Develop current research problems and research methods in advance computer networks

Unit - I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs –RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

Unit - II

Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

Unit - III

Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

Unit - IV

Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol

Unit - V

Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

Text Book(s):

1. S.Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

Reference Book(s):

1. B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.
2. F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.
3. D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.
4. Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi
5. Teresa C.Piliouras, "Network Design Management and Technical Perspectives, Second Edition", Auerbach Publishers, 2015

Website, E-learning resources

1)http://peasonhighered.com/tanenbaum

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
II	**20PCS2EC1:1**		**Advanced Computer Networks**			**6**		**5**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓			✓	✓		✓	✓	✓
CO2	✓		✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓		✓	✓	✓		
CO4	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC1:2 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 25
Credits: 5 | External Marks: 75

ELECTIVE COURSE 1 (2) – CLOUD COMPUTING

Course Outcomes:

On successful completion of this course students will be able to

- **CO1:** Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
- **CO2:** Ability to explain the core issues of cloud computing such as security, privacy and interoperability
- **CO3:** Choose the appropriate technologies, algorithms, and approaches for the related issues and identify problems, and explain, analyze, and evaluate various cloud computing solutions
- **CO4:** Provide the appropriate cloud computing solutions and recommendations according to the applications used
- **CO5:** Attempt to generate new ideas and innovations in cloud computing and collaboratively research and write a research paper, and present the research online.

Unit – I

COMPUTING BASICS

Cloud computing definition- Characteristics- Benefit-Challenges- Distributed Systems- Virtualization-Service-oriented computing- Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.

Unit - II

VIRTUALIZATION, CLOUD SERVICES AND PLATFORMS

Virtualization: Virtualization- Characteristics- taxonomy-types- Pros and Cons- Examples Architecture: Reference model- types of clouds- Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

Unit – III

CLOUD APPLICATION DESIGN AND DEVELOPMENT

Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.

Unit – IV
PYTHON FOR CLOUD

Introduction- Installing Python- Data types & Data Structures- Control Flow- Functions- Modules- Packages- File Handling- Date/Time Operations – Classes- Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API.

Unit – V
BIG DATA ANALYTICS, MULTIMEDIA CLOUD & CLOUD SECURITY

Big Data Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols – Case Study: Video Trans coding App-Cloud Security: CSA Cloud Security Architecture – Authentication- Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare & Education.

Text Book(s):

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, 2013.
2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach" Universities press (India) Pvt. limited 2016.

Reference Book(s):

1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2016.
2. Michael Miller "Cloud Computing Web based application that change the way you work and collaborate online". Pearson edition, 2008.
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business
4. Models, Mobile, Security and More, Jones & Bartlett Learning, 2012.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**	
II	**20PCS2EC1:2**		**Cloud Computing**			**6**		**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓		✓	✓	✓	✓
CO2	✓		✓	✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓	✓	✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓		✓	✓	✓	
Number of matches (✓) = 37, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC1:3 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 25
Credits: 5 | External Marks: 75

ELECTIVE COURSE 1 (3) – WEB SERVICES

Course Outcomes:

On successful completion of this course students will be able to

CO1: Understand the design principles and application of SOAP and REST based web services.

CO2: Design collaborating web services according to a specification.

CO3: Implement an application that uses multiple web services in a realistic business scenario

CO4: Use industry standard open source tools such as Apache Axis2, Tomcat, Derby and Eclipse to build, test, deploy and execute web services and web applications that consume them

CO5: Indentify and select the appropriate framework components in creation of web service solution

Unit – I

Overview of Distributed Computing, Introduction to web services – Industry standards, Technologies and concepts underlying web services – their support to web services. Applications that consume web services.

Unit – II

XML – its choice for web services – network protocols to back end databases- technologies – SOAP, WSDL – exchange of information between applications in distributed environment – locating remote web services – its access and usage. UDDI specification – an introduction

Unit - III

A brief outline of web services – conversation – static and interactive aspects of system interface and its implementation, work flow – orchestration and refinement, transactions, security issues – the common attacks – security attacks facilitated within web services quality of services – Architecting of systems to meet users requirement with respect to latency, performance, reliability, QOS metrics, Mobile and wireless services – energy consumption, network bandwidth utilization, portals and services management.

Unit – IV

Building real world enterprise applications using web services – sample source codes to develop web services – steps necessary to build and deploy web services and client applications to meet customer s requirement – Easier development, customization, maintenance, transactional requirements, seamless porting to multiple devices and platforms.

Unit - V

Deployment of Web services and applications onto Tomcat application server and axis SOAP server (both are free wares) – Web services platform as a set of enabling technologies for XML based distributed computing.

Text Book(s):

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services : An Architects Guide , Prentice Hall, Nov 2003.
2. Heather Williamson, "XML: The Complete Reference ",Tata McGraw-Hill Education India.

Reference Book(s):

1. Martin Kalin, "Java Web Services: Up and Running", O'Reilly Publishers.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours		Credits		
II	20PCS2EC1:3		Web Services			6		5		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓				✓	
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Number of matches (✓) = 39, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC2:1 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

ELECTIVE COURSE 2 (1) – OBJECT ORIENTED SYSTEMS DEVELOPMENT

Course Outcomes:

On successful completion of this course students will be able to

CO1: Show how the object-oriented approach differs from the traditional approach to systems analysis and design

CO2: Analyze, design, document the requirements through use case driven approach

CO3: Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of modeling views

CO4: Recognize the difference between various object relationships: inheritance, association and aggregation

CO5: Show the role and function of test cases, testing strategies and test plans in developing object-oriented software

Unit - I

Fundamentals of OOSD - Overview of Object Oriented Systems Development: Two orthogonal view of the software - OOSD methodology - Why an object Object orientation. Object basics: Object Oriented Philosophy- Objects – Attributes – Object respond to messages – Encapsulation and information hiding – class hierarchy – Polymorphism – Object relationship and associations. OOSD life cycle: Software development process – OOSD Use case Driven Approach – Reusability.

Unit – II

Methodology, Modeling and UML - Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique – The Booch methodology – The Jacobson et al. methodology – Patterns – Frameworks - The Unified approach. Unified Modeling Language : Static and dynamic models – Why modeling - UML diagrams – UML class diagram – Use case diagram - UML dynamic modeling – packages and model organization.

Unit – III

Object Oriented Analysis - Object Oriented Analysis process: Business Object Analysis - Use case driven object oriented analysis – Business process modeling – Use-Case model – Developing effective documentation - Classification : Classifications theory – Approaches for identifying classes – Noun phrase approach – Common class patterns approach – Use-Case Driven approach – Classes, Responsibilities, and Collaborators - Naming classes. Identifying object relationships, attributes, and methods: Association– Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility

Unit – IV

Object Oriented Design - Object Oriented Design Process and Design Axioms - OOD

process- OOD axioms – Corollaries – Design patterns. Designing classes: Designing classes – Class visibility – Refining attributes – Designing methods and protocols– Packages and managing classes. Access layer: Object Store and persistence – DBMS--Logical and physical Database Organization and access control – Distributed Databases and Client Server Computing — Multidatabase Systems – Designing Access layer classes. View Layer: Designing view layer classes – Macro level process – Micro level process – The purpose of view layer interface – Prototyping the user interface.

Unit – V

Software Quality - Software Quality Assurance: Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous testing. System Usability and Measuring User satisfaction: Usability Testing – User satisfaction test-A tool for analyzing user satisfaction. System Usability and Measuring User satisfaction: Introduction – Usability Testing.

Text Book(s):

1. Ali Bahrami, "Object Oriented Systems Development using UML", McGraw-Hill, 2008

Reference Book(s):

1. Booch Grady, Rumbaugh James, Jacobson Ivar, "The Unified modeling Language – User Guide, Pearson Education, 2006
2. Brahma Dathan, Sarnath Ramnath, "Object Oriented Analysis, Design and Implementation", Universities Press, 2010.
3. Mahesh P.Matha, "Object-Oriented Analysis and Design Using UML", PHI Learning Private Limited, 2012.
4. Rachita Misra, Chhabi Rani Panigrahi, Bijayalaxmi Panda, "Principles of Software Engineering and System Design", Yesdee Publishing 2019.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20PCS2EC2:1**		**Object Oriented System Development**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓		✓		✓	✓	✓	✓		✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓		✓		
CO4	✓	✓			✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 37, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC2:2 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

ELECTIVE COURSE 2 (2) - MOBILE COMPUTING

Course Outcomes:

On successful completion of this course students will be able to

CO1: Ability to explain the principles and theories of mobile computing technologies.

CO2: Describe infrastructures and technologies of mobile computing technologies

CO3: Impact he knowledge to develop applications in different domains that mobile computing offers to the public, employees, and businesses

CO4: Understand the Mobile Ad hoc networks and its routing

CO5: Describe the possible future of mobile computing technologies, securities and applications

Unit - I

Basics of mobile - Mobile device profiles - Middleware and gateways - Wireless Internet - Smart clients - Three-tier Architecture- Design considerations for mobile computing-– Mobility and Location based services.

Unit - II

Mobile computing through Internet - Mobile-enabled Applications - Developing Mobile GUIs – VUIs and Mobile Applications – Characteristics and benefits -Multichannel and Multi modal user interfaces – Synchronization and replication of Mobile Data - SMS architecture – GPRS – Mobile Computing through Telephony.

Unit - III

Mobile Application Development - Android- wi-fi –GPS – Camera – Movement – orientation - event based programming – iOS/ windows CE - Blackberry – windows phone – M-Commerce- structure – pros & cons – Mobile payment system - J2ME

Unit - IV

ADHOC Wireless Network - Ad Hoc Wireless Network –MAC protocol-Routing protocols - Transport Layer Protocol - QoS – Energy Management – application design – work flow - composing applications – Dynamic linking – Intents and Services – Communication via the web.

Unit - V

Security and Hacking - Password security – Network security – web security – Database security **-** Wireless Sensor Network - Architecture and Design – Medium Access Control – Routing – Transport Layer – Energy model

Text Book(s):

1. Jochen Schiller, Mobile Communications, Second Edition,2012.
2. William Stallings,"Wireless Communications & Networks", Pearson Education, 2009.

Reference Book(s):

1. C.Siva Ram Murthy, B.S. Manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education. 2004
2. Ashok K Talukder, Roopa R Yavagal, "Mobile Computing", Tata McGraw Hill, 2005.
3. Jochen Burkhardt Dr.Horst Henn, Klaus Rintdoff Thomas Schack, "Pervasive Computing", Pearson, 2009.
4. Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20PCS2EC2:2**		**Mobile Computing**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓		✓	✓	
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓			✓		✓	✓	✓	
Number of matches (✓) = 36, Relationship: High										

SEMESTER – II

Course Code: 20PCS2EC2:3
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ELECTIVE COURSE 3 (3) – WIRELESS NETWORKS

Course Outcomes:

On successful completion of the course, the Students will be able to

CO1: To Conversant with the latest 3G/4G and WiMAX networks and its architecture.
CO2: Analyze security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks
CO3: Understand the transmission of voice and data through various networks.
CO4: To design and implement wireless network environment for any Application using latest wireless protocols and standards
CO5: To implement different type of applications for smart phones and mobile devices with latest network strategies

Unit - I

WIRELESS LAN - Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum -IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX

Unit - II

MOBILE NETWORK LAYER - Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling and Encapsulation, IPV6- Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

Unit - III

MOBILE TRANSPORT LAYER - TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.

Unit - IV

WIRELESS WIDE AREA NETWORK - Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

Unit - V

4G NETWORKS - Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation And Coding With Time Slot Scheduler, Cognitive Radio.

Text Book(s):

1. Jochen Schiller,"Mobile Communications", Second Edition, Pearson Education 2012 (Unit I, II, III)
2. Vijay Garg, "Wireless Communications And Networking", First Edition, Elsevier 2014 (Unit IV, V)

Reference Book(s):

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE For Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy Kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin, Michael Moher, David Koilpillai, Modern Wireless Communications", First Edition, Pearson Education 2013.
4. David G. Messerschmitt, "Understanding Networked Applications", Elsevier, 2010.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20PCS2EC2:3**		**Wireless Networks**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓	✓		✓	✓	✓
CO2	✓		✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (□) = 39, Relationship: High										

SEMESTER - II

Course Code: 20PCS2CP2 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 40
Credits: 4 External Marks: 60

CORE PRACTICAL 2 – ADVANCED JAVA LAB

Course Outcomes:

On successful completion of the course, students will able to

CO1: Provides knowledge of Internet Programming, using Java Applets
CO2: Ability to use a full set of GUI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using AWT and Swings
CO3: Develop the applications using Java Data Base Connectivity (JDBC)
CO4: Impact the knowledge for creation of dynamic web pages, using Servlets and JSP.
CO5: Understand the frameworks; this gives the opportunity to reuse the codes for quick development

1. Write java program to create and display singly linked list
2. Write a java program to developing Applet Program with Passing Values through Parameters
3. Write a java program to create a button and click on the button , the application terminates using swing
4. Write a java program to generate mouse move events using swing
5. Write a java program to update customer information using JDBC with MYSQL connection
6. Write a java program to generate simple plain text using servlet
7. Write a java program to display the cookie id using servlet
8. Write a java program to create JSP page for basic arithmetic functions
9. Write a JSP Program to validate username and password
10. Write a java program for using TCP socket client/server communication

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
II	**20PCS2CP2**		**Advanced Java Lab**			**6**			**4**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (□) = 40, Relationship: High										

SEMESTER - III

Course Code: 20PCS3CC7 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

CORE COURSE 7 - CRYPTOGRAPHY AND NETWORK SECURITY

Course Outcomes:

On successful completion of the course, students will able to

CO1: Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CO2: Apply the different cryptographic operations of symmetric and public key cryptographic algorithms
CO3: Apply the various Authentication schemes to simulate different applications.
CO4: Understand various Security practices and System security standards
CO5: Be able to digitally sign emails and files

Unit - I

Introduction - Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography-Foundations of modern cryptography: perfect security
– Information theory – product cryptosystem – cryptanalysis.

Unit - II

Symmetric Encryption and Message Confidentiality - Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4 , Chipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

Unit - III

Authentication Applications - Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.

Unit - IV

IP Security - IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Web Security: Web Security Considerations, Secure Socket Layer (SSL) and Transport Layer Security(TLS), Secure Electronic Transaction(SET).Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

Unit - V

Intruders: Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

Text Book(s):

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007, Reprint 2015.
2. Stallings William, "Cryptography and Network Security- Principles and Practice 2017.
3. William Stallings, "Network Security Essentials Applications and Standards" Third Edition, Pearson Education, 2008

Reference Book(s):

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
2. Charles Pfleeger, "Security In Computing", 4th Edition, Prentice Hall Of India, 2006.
3. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
4. Charlie Kaufman And Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication In Public World", PHI 2002.
5. Bruce Schneier And Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson "Cryptography – Theory And Practice", First Edition, CRC Press, 1995.
7. Http://Nptel.Ac.In/.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
III	20PCS3CC7		Cryptography and Network Security			6			5	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓			✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓		✓	✓
Number of matches (✓) = 40, Relationship: High										

SEMESTER - III

Course Code: 20PCS3CC8 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 25
Credits: 5 | External Marks: 75

CORE COURSE 8 - DIGITAL IMAGE PROCESSING

Course Outcomes:

On successful completion of the course, students will able to

CO1: Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transforms.
CO2: Evaluate the techniques for image enhancement and image restoration. Categorize various compression techniques.
CO3: Interpret Image compression standards, and Interpret image segmentation and representation techniques.
CO4: Gain idea to process various image used in various fields such as weather forecasting, Diagnosis of various deasease using image such as tumor, cancer etc.
CO5: Understand the rapid advances in Machine vision..

Unit – I

Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.

Color Models: Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.

Unit – II

Spatial Domain: Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

Frequency Domain: Image transforms: FFT, DCT, Karhunen-Loeve transform, Hotlling's T^2 transform, Wavelet transforms and their properties. Image filtering in frequency domain

Unit – III

Edge Detection: Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

Unit – IV

Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform based coding; Lossy Compression: FFT; DCT; KLT; DPCM;

MRFM based compression; Wavelet transform based; Image Compression standards.

Unit – V

Image Segmentation: Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds- The use of motion in segmentation, Image Segmentation based on Color- **Morphological Image Processing:** Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

Text Book(s):

1. Rafael Gonzalez, Richard E. Woods, "Digital Image Processing", Fourth Edition, PHI/Pearson Education, 2013.
2. A. K. Jain, Fundamentals of Image Processing, Second Ed., PHI, New Delhi, 2015.

Reference Book(s):

1. B. Chan la, D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2003.
2. Nick Elford, "Digital Image Processing a practical introducing using Java", Pearson Education, 2004.
3. Todd R.Reed, "Digital Image Sequence Processing, Compression, and Analysis", CRC Press, 2015.
4. L.Prasad, S.S.Iyengar, "Wavelet Analysis with Applications to Image Processing", CRC Press, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
III	20PCS3CC8		Digital Image Processing			6			5	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2			✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓				✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – III

Course Code: 20PCS3EC3:1 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

ELECTIVE COURSE 3 (1) - THEORY OF COMPUTATION

Course Outcomes:

On successful completion of the course, students will able to

CO1: Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
CO2: Demonstrate their understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
CO3: Understanding the basic results of the Theory of Computation, state and explain the relevance of the Church-Turing thesis.
CO4: Recognize and comprehend formal reasoning about languages
CO5: Able to subdivide problem space based on input subdivision using constraints

Unit - I

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite. Automata (FA) –Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

Unit - II

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

Unit - III

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata.

Unit - IV

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM. A language that is not Recursively Enumerable (RE)

Unit - V

An undecidable problem RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP

Text Book(s):

1. Peter Linz, "An Introduction to Formal Languages and Automata", Third Edition ,Narosa, 2005
2. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

Reference Book(s):

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science,Languages and Machines", Third Edition, Pearson Education, 2007.
3. Raymond Greenlaw an H.James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
5. J. Martin, "Introduction to Languages and the Theory of computation," Third Edition, Tata Mc Graw Hill, 2007.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3EC3:1**		**Theory of Computation**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓	✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓		✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 39, Relationship: High										

SEMESTER – III

Course Code: 20PCS2EC3:2
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ELECTIVE COURSE 3 (2) - OPTIMIZATION TECHNIQUES

Course Outcomes:

On successful completion of the course, students will able to

CO1: Solve optimization problems using classical optimization techniques
CO2: Solve simple non-linear multivariable optimization problems
CO3: Describe clearly a problem, identify its parts and analyze the individual functions. Feasibility study for solving an optimization proble
CO4: Evaluate and measure the performance of an algorithm, Discovery, study and solve optimization problems.
CO5: Understand optimization techniques using algorithms, and Investigate, study, develop, organize and promote innovative solutions for various applications.

Unit – I
Linear Programming Problem (LPP): Formulations and graphical solution of (2 variables) canonical and standard terms of linear programming problem. Simplex method, two phase simplex method

Unit – II
Duality in LPP- dual problem to primal- primal to dual problem- duality simplex method-Revised simplex method-revised simplex algorithm-revised simplex method versus simplex method

Unit – III
Transportation Model: North West corner Method, Least cost method, and vogel's approximation method. Determining Net evaluation- Degeneracy in TP- Assignment Model: Hungarian assignment model – Travelling sales man problem

Unit – IV
Replacement Problem: Replacement policy for equipment that deteriorate gradually, Replacement of item that fail suddenly- Individual and group replacement, Problems in mortality and staffing.

Unit – V
Project Scheduling PERT/CPM Networks– Fulkerson's Rule – Measure Of Activity – PERT Computation – CPM Computation – Resource Scheduling.

Text Book(s):

1. KantiSwarup, P.K. Gupta &Manmohan – Operation Research 1996.
2. S.Kalavathy: Operations Research – Second Edition – Vikas Publishing House Pvt.Ltd.,
3. S.Godfrey Winster, S. Aruna Devi, R.Sujatha, "Compiler Design", Yesdee Publishing.

Reference Book(s):

1. D.Shanthi, N.Uma Maheswari, S.Jeyanthi, "Theory of Computation", Yesdee Publishing.
2. John W.Chinneck, "Feasibility and Infeasibility in Optimization-Algorithms and Computatonal Methods", Springer, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
III	**20PCS3EC3:2**		**Optimization Techniques**			**6**		**5**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓		✓	✓			✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – III

Course Code: 20PCS3EC3:3 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 25
Credits: 5 | External Marks: 75

ELECTIVE COURSE 3 (3) - EMBEDDED SYSTEMS

Course Outcomes:

On Successful completion of the course, students will able to

CO1: Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO2: Be familiar with working on a team to create and apply embedded systems,
CO3: Become aware of interrupts, hyper threading and software optimization.
CO4: Design real time embedded systems using the concepts of RTOS.
CO5: interpret application specifications and make practical recommendations on resource selection for embedded systems

Unit - I

Introduction to Embedded system - Embedded system vs General computing systems - History - Classification - Major Application Areas - Purpose of Embedded systems - Smart running shoes: The innovative bonding of lifestyle with embedded technology. Characteristics and Quality Attributes of Embedded systems

Unit - II

Elements of an Embedded system - core of the embedded system: General purpose and domain specific processors, ASICs, PLDs, COTS - Memory - Sensors and Actuators - Communication Interface: Onboard and External Communication Interfaces - Embedded Firmware - Reset circuit, Brown-out protection circuit, Oscillator unit, Real-time clock, and Watchdog timer - PCB and Passive Components

Unit - III

Embedded Systems - Washing machine: Application-specific - Automotive: Domain specific. Hardware Software Co-Design - Computational Models - Embedded Firmware Design Approaches - Embedded Firmware Development Languages - Integration and testing of Embedded Hardware and firmware

Unit - IV

RTOS based Embedded System Design: Operating System Basics - Types of operating Systems - Tasks, process and Threads - Multiprocessing and Multitasking - Task Scheduling- Task Communication - Task Synchronisation - Device Drivers - choosing an RTOS.

Unit - V

Components in embedded system development environment, Files generated during compilation, simulators, emulators and debugging - Objectives of Embedded product Development Life Cycle - Different

Phases of EDLC - EDLC Approaches - Trends in Embedded Industry - Case Study: Digital Clock.

Text Book(s):

1. K. V. Shibu, "Introduction to embedded systems", TMH education Pvt. Ltd. 2009.

Reference Book(s):

1. Raj Kamal, "Embedded Systems: Architecture, Programming and Design", TMH. Second Edition 2009
2. Frank Vahid, Tony Givargis, "Embedded System Design", John Wiley. Third Edition 2006
3. Cliff Young, Faraboschi Paolo, and Joseph A. Fisher, "Embedded Computing: A VLIW Approach to Architecture, Compilers and Tools", Morgan Kaufmann Publishers, An imprint of Elsevier, 2005.
4. David E. Simon, "An Embedded Software Primer" Pearson Education, 1999

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3EC3:3**		**Embedded Systems**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓		✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓		✓	✓	✓	
Number of matches (✓) = 37, Relationship: High										

SEMESTER – III

Course Code: 20PCS3EC4:1 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 25
Credits: 5 | External Marks: 75

ELECTIVE COURSE 4 (1) – WAP and XML

Course Outcomes:

On Successful completion of the course, students will able to

CO1: Apply XML concepts to develop Web application.
CO2: Develop SOA application using XML and Web Services.
CO3: Extract information from the web sites using XML programming
CO4: Explain the basic concepts of wireless network and wireless generations.
CO5: Indentify and select the appropriate framework components in creation of web service solution

Unit - I

Overview of WAP: WAP and the wireless world – WAP application architecture – WAP internal structure – WAP versus the Web – WAP1.2 – WTA and push features. Setting up WAP: Available software products – WAP resources – The Development Toolkits.

Unit - II

WAP gateways: Definition – Functionality of a WAP gateway – The Web model versus the WAP model – Positioning of a WAP gateway in the network – Selecting a WAP gateway Basic WML: Extensible markup language – WML structure – A basic WML card – Text formatting – navigation – Advanced display features.

Unit - III

Interacting with the user: Making a selection – Events – Variables – Input and parameter passing WML Script: Need for WML script – Lexical Structure – Variables and literals – Operators – Automatic data type conversion – Control Constructs Functions – Using the standard libraries – programs – Dealing with Errors.

Unit - IV

XML: Introduction XML: An Eagle's Eye view of XML – XML Definition- List of an XML Document – Related Technologies – An introduction to XML Applications – XML Applications – XML for XML – First XML Documents Structuring Data: Examining the Data XMLizing the dataThe advantages of the XML format – Preparing a style sheet for Document Display.

Unit - V

Attributes, Empty Tags and XSL: Attributes – Attributes Versus Elements – Empty Tags XSL – Well formed XML documents – Foreign Languages and Non Roman Text – Non Roman Scripts on the Web Scripts, Character sets, Fonts and Glyphs – Legacy character sets– The Unicode Character set – Procedure to Write XML Unicode.

Text Book(s):

1. Charles Arehart and Others. "Professional WAP with WML, WML script, ASP, JSP, XML, XSLT, WTA Push and Voice XML" Shroff Publishers and Distributers Pvt. Ltd 2000.(For Unit I, II, III)
2. Eliotte Rusty Harlod "XML TM Bible", Books India (P) Ltd, 2000(For Unit IV & V)

Reference Book(s):

1. Heather Williamson, "XML: The Complete Reference ", Tata McGraw-Hill Education India.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3EC4:1**		**WAP and XML**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓		✓	✓	✓	✓		✓	✓	
CO2	✓	✓	✓	✓	✓		✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓			✓	✓	✓	
Number of matches (✓) = 36, Relationship: High										

SEMESTER – III

Course Code: 20PCS3EC4:2
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ELECTIVE COURSE 4 (2) – STATISTICAL COMPUTING

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Design and implement Monte Carlo methods to evaluate integrals and perform simulations.
CO2: Design and conduct appropriate resampling methods to estimate sampling variance for statistical estimates.
CO3: Data analytics from a database formed from the real world problem
CO4: Predict the exact reason for the real time issues
CO5: Be life-long learners who are able to independently expand their mathematical or statistical expertise when needed, or for interest's sake.

Unit - I

Correlation - Definition of Correlation- Scatter Diagram- Kari Pearson's Coefficient of Linear Correlation- Coefficient of Correlation and Probable Error of r- Coefficient of Determination - Merits and Limitations of Coefficient of Correlation- Spearman's Rank Correlation(7.1-7.9.4).

Unit - II

Regression Analysis - Regression and Correlation (Intro)- Difference between Correlation and Regression Analysis- Linear Regression Equations -Least Square Method- Regression Lines- Properties of Regression Coefficients- Standard Error of Estimate.(8.1-8.8)

Unit - III

Probability Distribution and mathematical Expectation- Random Variable- Defined - Probability Distribution a Random Variable- Expectation of Random Variable- Properties of Expected Value and Variance (12.2-12.4).

Unit - IV

Sampling and Sampling Distributions - Data Collection- Sampling and Non-Sampling Errors – Principles of Sampling-- Merits and Limitations of Sampling- Methods of Sampling- Parameter and Statistic- Sampling Distribution of a Statistic- Examples of Sampling Distributions- Standard Normal, Student's *t,* Chi-Square (x^2) and Snedecor's F-Distributions(14.1-14.16).

Unit - V

Statistical Inference- Estimation and Testing of Hypothesis - Statistical Inference- Estimation- Point and interval- Confidence interval using normal, *t* and x^2Distributions- Testing of Hypothesis- Significance of a mean - Using *t* Distribution(15.1-15.10.2).

Text Book(s):

1. K.L.Sehgal, "Quantitative Techniques and Statistics", First Edition, Himalaya Publishing House, 2011.

Reference Book(s):

1. N. P. Bali, P. N. Gupta, C. P. Gandhi, "A Textbook of Quantitative Techniques", First Edition, Laxmi Publications, 2008.
2. U. K. Srivastava, G. V. Shenoy, S. C. Sharma, "Quantitative Techniques for Managerial Decisions", Second Edition, New Age International Publishers, 2005.
3. David Makinson, "Sets, Logic and Maths for Computing", Springer, 2011.
4. Christopher Chatfield, "Statistics for Technology- A Course in Applied Statistics, Third Edition", CRC Press, 2015.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3EC4:2**		**Statistical Computing**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓		✓		✓	✓			✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓		✓	✓	✓	✓	✓		✓
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

SEMESTER – III

Course Code: 20PCS3EC4:3 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

ELECTIVE COURSE 4 (3)–SOFTWARE PROJECT MANAGEMENT

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Analyze the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.
CO2: Align the project to the organization's strategic plans and business justification throughout its lifecycle.
CO3: Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.
CO4: Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.
CO5: Apply project management concepts through working in a group as team leader or active team member on an IT project.

Unit - I

Project Management Framework: Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. **The Standard for Project Management of a Project**: Project management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.

Unit - II

Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype - **Agile Methods** – Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban methods-uncertainty, Risk, and lifecycle selection-Scrum Elements overview-5 levels of planning-Scrum Process overview-Agile Team-roles and responsibilities- Epic-feature- User Stories-PBI-The Sprint.

Unit - III

The Project Management Knowledge Areas: Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements -

Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

Unit - IV

Project cost management: Estimate costs - Determine budget - Control costs. Project Quality Management: Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management: Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.

Unit - V

Project Risk Management: Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

Text Book(s):

1. "A guide to the Project management Body of Knowledge (PMBOK Guide)" Fourth Edition, Project Management Institute, Pennsylvania, 2008
2. BOB Huges, Mike Cotterell, Rajib Mall "Software Project Management", McGraw Hill, Fifth Edition,2011.
3. Emerson, "Agile Handbook," Philosophy

Reference Book(s):

1. Futrell, "Quality Software Project Management", Pearson Education India.
2. Royce, "Software Project Management", Pearson Education India.
3. C.Ravindranath Pandian, "Applied Software Risk Management-A Guide for Software Project Managers", Auerbach Publications, 2015.
4. Benjamin A. Lieberman, "The Art of Software Modeling", Auerbach Publications, 2010.
5. Adapt projects in response to issues that arise internally and externally.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3EC4:3**		**Software Project Management**			**6**			**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓		✓
CO2		✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓		✓	✓		✓	✓	✓	✓
Number of matches (✓) = 38, Relationship: High										

SEMESTER – III

Course Code: 20PCS3CP3 | Exam Hours: 3
Instruction Hours: 6 | Internal Marks: 40
Credits: 4 | External Marks: 60

CORE PRACTICAL 3 – IMAGE PROCESSING-LAB

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Understand the need for image transforms different types of image transforms and their properties.
CO2: Develop any image processing application and understand the rapid advances in Machine vision.
CO3: Learn different techniques employed for the enhancement of images and feature extraction techniques
CO4: Learn different causes for image degradation and overview of image restoration techniques.
CO5: Understand the need for image compression and to learn the spatial and frequency domain techniques of image compression.

1. Create a program to display grayscale image using read and write operation.
2. Create a vision program to find histogram value and display histograph of a grayscale and color image.
3. Create a vision program for Nonlinear Filtering technique using edge detection
4. Create a vision program to determine the edge detection of an image using different operators.
5. Create a program to discretize an image using Fourier transformation.
6. Create a program to eliminate the high frequency components of an image.
7. Create a color image and perform read and write operation.
8. Obtain the R, B, G color values and resolved color values from a color box by choosing any color.
9. Create a program performs discrete wavelet transform on image.
10. Create a program for segmentation of an image using watershed transforms.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
III	**20PCS3CP3**		**Image Processing Lab**			**6**			**4**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓		✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4CC9 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 5 External Marks: 75

CORE COURSE 9 – INTERNET OF THINGS

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Gain the basic knowledge about IoT and able to use IoT related products in real life.
CO2: It helps to rely less on physical resources and started to do their work smarter.
CO3: Understand the concepts of Internet of Things Analyze basic protocols in wireless sensor network
CO4: Design IoT applications in different domain and analyze their performance
CO5: Implement basic IoT applications on embedded platform

Unit - I

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

Unit - II

IoT ARCHITECTURE: 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 PROTOCOLS: 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

WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit - V

APPLICATIONS: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging

Text Book(s):

1. Arshdeep Bahga, Vijay Madisetti, "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. 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.

Reference Book(s):

1. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010.
2. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**	
IV	**20PCS4CC9**		**Internet of Things**			**6**		**5**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓			✓	✓	✓	✓	✓	✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓		✓	✓
CO5	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4CC10
Instruction Hours: 6
Credits: 5

Exam Hours: 3
Internal Marks: 25
External Marks: 75

CORE COURSE 10- MACHINE LEARNING

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.
CO2: Identify machine learning techniques suitable for a given problem
CO3: Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
CO4: Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
CO5: Design and implement various machine learning algorithms in a range of real-world applications

Unit- I

INTRODUCTION

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search

Uni t- II

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptions – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms– Hypothesis Space Search– Genetic Programming – Models of Evaluation and Learning.

Unit - III

BAYESIAN AND COMPUTATIONAL LEARNING : Bayes Theorem –Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Unit - IV

INSTANT BASED LEARNING: K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

Unit - V

ADVANCED LEARNING :

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Text Book(s):

1. Tom M.Mitchell,—Machine Learning, McGraw-Hill Education (India) Private Limited, 2013

Reference Book(s):

1. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, "Genetic Algorithms and Genetic Programming", CRC Press Taylor and Francis Group.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours			Credits	
IV	20PCS4CC10		Machine Learning			6			5	
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓			✓	✓		✓	✓	✓
CO2	✓	✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓		✓	✓			✓	✓		
CO4	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	✓
Number of matches (✓) = 40, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4EC5:1
Instruction Hours: 6
Credits: 4

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ELECTIVE COURSE 5(1) – DATA MINING

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Understand Data Warehouse fundamentals, Data Mining Principles
CO2: Identify appropriate data mining algorithms to solve real world problems
CO3: Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
CO4: Describe complex data types with respect to spatial and web mining.
CO5: Benefit the user experiences towards research and innovation. Integration.

Unit - I

Data Mining And Data Preprocessing: Data Mining – Motivation – Definition – Data Mining on Kind of Data –Functionalities – Classification – Data Mining Task Primitives – Major Issues in Data Mining – Data Preprocessing – Definition – Data Clearing – Integration and Transformation – Data Reduction.

Unit - II

Data Warehousing: Multidimensional Data Model –Data Warehouse Architecture – Data Warehouse Implementation –From data Warehousing to Data Mining – On Line Analytical Processing - On Line Analytical Mining.

Unit - III

Frequent Patterns, Associations And Classification: The Apriori Algorithm – Definition of Classification and Prediction – Classification by Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Lazy Learners – K-Nearest Neighbor – Other Classification Methods.

Unit - IV

Cluster Analysis: Definition – Types of data in Cluster Analysis – Categorization of major Clustering Techniques – Partitioning Methods - Hierarchical Clustering – BIRCH - ROCK – Grid Based Methods – Model Based Clustering Methods – Outlier Analysis.

Unit - V

Spatial, Multimedia, Text And Web Data: Spatial Data Mining – Multimedia Data Mining – Text Mining – Mining the World Wide Web – Data Mining Applications – Trends in Data Mining.

Text Book(s):

1. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems) 3rd Edition, July 6, 2011.
2. Ian H. Witten, Eibe Frank, Mark A. Hall, "Data Mining: Practical Machine Learning Tools and Techniques", Elsevier; Third edition, 2014.

Reference Book(s):

1. Margret H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education, 2003.
2. M. Awad, Latifur Khan, Bhavani Thuraisingham, Lei Wang,"Design and Implementation of Data Mining Tools", CRC Press- Taylor & Francis Group, 2015.
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "Introduction to Data Mining-Instructor's Solution Manual", Pearson Education, First Edition, 2016.
4. Mohammed J.Zaki, Wagner Meira JR, "Data Mining and Analysis: Fundamental Concepts and Algorithms", Cambridge India, 2016.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**		**Credits**		
IV	**20PCS4EC5:1**		**Data Mining**			**6**		**4**		
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓			✓	✓	✓			✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		✓
CO4	✓	✓	✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4EC5:2
Instruction Hours: 6
Credits: 4

Exam Hours: 3
Internal Marks: 25
External Marks: 75

ELECTIVE COURSE 5 (2) – SOFT COMPUTING

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
CO2: Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
CO3: Impact the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations.
CO4: Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications.
CO5: Reveal different applications of these models to solve engineering and other problems.

Unit - I

Introduction: Soft Computing Constituents – Soft Computing Vs Hard Computing – Characteristics - Applications - Artificial Neural Network (ANN): Fundamental Concept – Application Scope - Basic Terminologies – Neural Network Architecture – Learning Process – Basic Models of ANN: McCulloch-Pitts Model – Hebb Network – Linear Separability.

Unit - II

Supervised Learning Networks: Perceptron Networks – Adaline and Madaline Networks – Back Propagation Network – Radial Basis Function Network. Associative Memory Networks – BAM - Hopfield Network - Boltzmann Machine Unsupervised Learning Networks: Kohonen Self Organizing Network – Counter Propagation Network – ART Network.

Unit - III

Fuzzy Sets: Basic Concept – Crisp Set Vs Fuzzy Set - Operations on Fuzzy Set – Properties of Fuzzy Sets – Fuzzy Relations: Concept – Fuzzy Composition – Fuzzy Equivalence and Tolerance Relation - Membership Functions: Features – Fuzzification – Methods of Membership value assignments – Defuzzification – Methods.

Unit - IV

Fuzzy Arithmetic – Extension Principle – Fuzzy Measures – Fuzzy Rules and Fuzzy Reasoning: Fuzzy Propositions – Formation of Rules – Decomposition of Rules – Aggregation of Rules – Approximate Reasoning – Fuzzy Inference and Expert Systems – Fuzzy Decision Making – Fuzzy Logic Control Systems.

Unit - V

Genetic Algorithm: Fundamental Concept – Basic Terminologies – Traditional Vs Genetic Algorithm - Elements of GA - Encoding - Fitness Function – Genetic Operators: Selection – Cross Over - Inversion and Deletion - Mutation – Simple and General GA – The Schema Theorem - Classification of Genetic Algorithm – Genetic Programming – Applications of GA.

Text Book(s):

1. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", Wiley India, 2007.

Reference Book(s):

1. S. Rajasekaran, G.A.V. Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms", Prentice Hall India, 2004.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	Code		Title of the Course			Hours		Credits		
IV	20PCS4EC5:2		Soft Computing			6		4		
Course Outcomes (Cos)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓		✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4EC5:3 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 25
Credits: 4 External Marks: 75

ELECTIVE COURSE 5 (3) - DATA SCIENCE AND BIG DATA ANALYTICS

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics
CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
CO4: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc..
CO5: Apply Hadoop ecosystem components and participate data science and big data analytics projects

Unit - I

Introduction to Big Data Analytics : Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Ana lytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.

Unit - II

Basic Data Analytic Methods Using R : Introduction to R programming – R Graphical User Interfaces – Data Import and Export - Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis : Visualization Befor Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation –– Statistical Methods of Evaluation : Hypothesis Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA.

Unit - III

Advanced Analytical Theory and Methods: Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics – Reasons to choose and cautions–Additional Algorithms - Association Rules: A Priori Algorithm –Evaluation of Candidate Rules Applications of Association Rules– Validation and Testing –

Diagnostics. Regression: Linear Regrression and Logistic Regression:– Use cases – Model Description – Diagnostics - Additional Regression Models.

Unit - IV

Classification : Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na'ive Bayes – Bayes Theorem – Naïve Bayes Clasifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis : Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.

Unit - V

Advanced Analytics-Technology and Tools: MapReduce and Hadoop: Analytics for Unstructured Data .- *UseCases* - *MapReduce* - Apache Hadoop – The Hadoop Ecosystem – pig – Hive – Hbase – Manout – NoSQL - Tools in Database Analytics : SQL Essentials – Joins – Set operations – Grouping Extensions – In Database Text Analysis - Advanced SQL – Windows Functions – User Defined Functions and Aggregates – ordered aggregates- MADiib – Analytics Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization

Text Book(s):

1. D ata Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", EMC Education Services Published by John Wiley & Sons, Inc. 2015

Reference Book(s):

1. Noreen Burlingame , "The little book on Big Data", New Street publishers, 2012.
2. Anil Maheshwari, " Data Analytics", McGraw Hill Education, 2017.
3. Norman Matloff, "The Art of R Programming: A Tour of Statistical Software Design", Starch Press; 1 edition , 2011.
4. Sandip Rakshit, "R for Beginners", McGraw Hill Education, 2017
5. http://www.johndcook.com/R_language_for_programmers.html.
6. http://bigdatauniversity.com/.
7. http://home.ubalt.edu/ntsbarsh/stat- data/topics.htm#rintroduction.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
IV	**20PCS3EC5:3**		**Data Science and Big Data Analytics**			**6**			**4**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓		✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4			✓		✓	✓		✓	✓	✓
CO5	✓	✓	✓	✓	✓			✓	✓	
Number of matches (✓) = 38, Relationship: High										

SEMESTER – IV

Course Code: 20PCS4CP4 Exam Hours: 3
Instruction Hours: 6 Internal Marks: 40
Credits: 4 External Marks: 60

CORE PRACTICAL 10- MACHINE LEARNING LAB

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Gain knowledge about basic concepts of Machine Learning
CO2: Identify machine learning techniques suitable for a given problem
CO3: Solve the problems using various machine learning techniques
CO4: Apply Dimensionality reduction techniques.
CO5: Design application using machine learning techniques.

1. Write a program to implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file

2. Write a program for a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample

4. Write a program to build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets

6. Write a progran to assuming set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data

Set. use Java/Python ML library classes/API

8. Write a program to apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Write a program to implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**		**Title of the Course**			**Hours**			**Credits**	
IV	**20PCS4CP4**		**Machine Learning Lab**			**6**			**4**	
Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	
CO2	✓	✓	✓		✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓		✓	✓	✓
CO5		✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 39, Relationship: High										

SEMESTER - IV

DISSERTATION AND VIVA VOCE (INDUSTRY/RESEARCH)

Course Code: 20PCS4PW
Instruction Hours: 6
Credits: 4

Course Outcomes:

On successful completion of the course the students will be able to

CO1: Demonstrate a sound technical knowledge of their selected project topic.
CO2: Undertake problem identification, formulation and solution.
CO3: Design solutions to complex problems utilizing a systems approach and enable to: Conduct the science projects.
CO4: Communicate large in written an oral forms.
CO5: Demonstrate the knowledge, skills and attitudes of a student

S.No	**Work Description**	**Maximum Marks**
1	Dissertation	80
2	Viva voce	20
Total		100

Note: PASSING MINIMUM – 50 MARKS

I Review –December last week

- Confirmation letter from the company
- Project type & title
- Company profile
- Synopsis
- Contact number &mail_id of the external guide
- S/w selection

II Review – January3rdweek

- Data or System flow diagram
- Documentation of first three chapters
- Database design
- Input design – Forms
- Output design – Reports

III Review – February 3rdweek

- Complete coding

- Test plan with demo
- Rough documentation of the entire project
-

IV Review – March 1st week

- Corrected rough draft
- Explanation of the entire project
- Execution of Implementation Work

Note:

- Attending all the review is compulsory
- PPT and necessary Documentation should be brought for each Review
- Font size in documentation has to be 12, Times New Roman, Space 1.5
- Document should be neatly aligned and justified
- No change can be made in the review marks later
- Internal mark will be submitted at the same day of review to controller section.

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes:

Semester	**Code**	**Title of the Course**	**Hours**	**Credits**
IV	**20PCS4PW**	**Dissertation And Viva Voce (Industry/Research)**	**6**	**4**

Course Outcomes (Cos)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✓	✓	✓	✓	✓	✓		✓	✓	✓
CO2		✓	✓	✓	✓	✓	✓		✓	✓
CO3	✓	✓	✓	✓		✓	✓	✓		
CO4	✓		✓		✓	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓		✓	✓	✓	
Number of matches (✓) = 40, Relationship: High										