

**SAKTHI COLLEGE OF ARTS AND SCIENCE FOR WOMEN, ODDANCHATRAM**

**(Recognized Under Section 2(f) and 12(B) of UGC Act 1956)**

**(Affiliated to Mother Teresa Women's University, Kodaikanal)**

**PG AND RESEARCH DEPARTMENT OF COMPUTR SCIENCE**

**CURRICULUM FRAMEWORK AND SYLLABUS FOR**

**OUTCOME BASED EDUCATION IN**

**SYLLABUS FOR**

**M.Sc., COMPUTER SCIENCE**

**FRAMED BY**

**MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL**

**UNDER**

**CHOICE BASED CREDIT SYSTEM**

**2018 - 2021**

**PREAMBLE:**

B.Sc., (Computer Science) is a broad and flexible degree programme introduced in the academic year 2009 – 2010, as a self supporting programme, with the curriculum specifically designed by Mother Teresa Women’s University, Kodaikanal to reflect the depth and breadth of computer science. The department has made its foray into Postgraduate education in 2015 and Pre-doctoral Programme (M.Phil.,) in 2014, with the ultimate aim of bringing the young rural women students to the scenario of higher education. Specialized courses, to suit the industry needs have been introduced in the curriculum, based on the inputs collected from experts in academia and industry. To enhance the quality of the programmes further, the department adheres to Outcome Based Education (OBE) since 2018-2019.

**VISION:**

- ✚ Employing women in the field of Information Technology.
- ✚ Moulding rural women into Future Leaders.

**MISSION:**

- ✚ Training students in latest trends in IT Field.
- ✚ Motivating students to organize IT related competitions.
- ✚ Conducting special lectures for the students to advance the state of the art in computer science and IT Field.
- ✚ Training students to do projects in recent technologies.

**OBJECTIVES:**

- ✚ Producing employable workforce, that will have a breadth and depth of knowledge in the discipline of computer science.
- ✚ Developing academically competent and professionally motivated personnel, equipped with objective, critical thinking, right moral and ethical values that compassionately foster the scientific temper with a sense of social responsibility.
- ✚ Developing skilled manpower in the various areas like: Data base management, Software Development, Computer-Languages, Software engineering, Web based applications etc.

**FIXING THE LEARNING OBJECTIVES:**

Since the Academic year 2018 – 2019, the learning objectives and outcomes of the Programmes of B.Sc., (CS), M.Sc., (CS) and M.Phil., (CS) have been set, following the Bloom’s Taxonomy

Cognitive Domain. Accordingly, it is broken into six levels of learning objectives of each course.

They are -

K1 / Knowledge = Remember

K2 / Comprehension = Understand

K3 / Application = Apply

K4 / Analysis = Analyze

K5 / Evaluation = Evaluate

K6 / Synthesis = Create

### **MAPPING COS WITH POS:**

For each Programme, the Educational Objectives and the Specific Objectives are specified. The Programme Outcomes are designed according to the curriculum, teaching, learning and evaluation process. For each course, the definite Outcomes are set, giving challenge to the cognitive domain. The Course Outcomes are mapped with the Programme Outcomes. The performance of the stakeholders is assessed and the attainment rate is fixed, by using the measurements 'high', 'medium' and 'low'. The restructuring of the curriculum is done based on the rate of attainment.

### **INSTITUTIONAL OBJECTIVES:**

The institution has certain definite Institutional Objectives to be attained.

- Skill Development & Capacity Building
- Women Empowerment
- Self-reliance
- Gender Equity & Integrity

### **PROGRAMME SPECIFIC OBJECTIVES:**

The Programmes B.Sc., M.Sc., and M. Phil., (CS) are offered with certain Specific Educational Objectives.

**PSO1:** Understanding of the basics of computer science.

**PSO2:** Applying fundamental principles and methods of Computer Science to a wide range of applications and mathematical and scientific reasoning to a variety of computational problems.

**PSO3:** Developing foundational skills to install and maintain computer networks, troubleshoot hardware and software problems.

**Mapping PEOs with IOs:**

Programme Educational Objectives	Institutional Objectives			
B.Sc., M.Sc., and M. Phil., (CS)	1	2	3	4
<b>PEO1:</b> Understanding of the basics of computer science.	*			
<b>PEO2:</b> Applying fundamental principles and methods of Computer Science to a wide range of applications and mathematical and scientific reasoning to a variety of computational problems.		*		
<b>PEO3:</b> Developing foundational skills to install and maintain computer networks, troubleshoot hardware and software problems.			*	*

**Measuring: H – High; M – Medium; L – Low**

## **M.Sc., COMPUTER SCIENCE**

### **PROGRAMME OUTCOMES:**

On successful completion of the programme, the student will be able to

**PO1:** Apply knowledge of computing and mathematics to solve problems.

**PO2:** Survive in today's interconnected world with the knowledge earned through critical thinking and fundamental core concepts.

**PO3:** Become women entrepreneurs such as web designer, database developer , programmer and multimedia designer.

**PO4:** Design and implement software applications for social, economic, health , safety and ethical issues.

**PO5:** Activate their sufficient knowledge in hardware and software to meet the current industry requirements.

**PO6:** Work in the areas of programming, database, multimedia, web designing, networking by acquiring knowledge in various domain based electives.

**PO7:** Design and develop computer applications to solve certain challenges met by the world.

**COMMON STRUCTURE / M.Sc., (CS) / 2018 - 2021**

**I SEMESTER**

S.No	Sub. Code	Title of the Course	HRS	CREDITS	CIA	CE	Total
1	PCST11	Part – III / Core – I / Advanced Java Programming	6	5	25	75	100
2	PCST12	Part – III / Core – II / Data Structures and Algorithms	6	5	25	75	100
3	PCST13	Part – III / Core – III / Mathematical Foundation of Computer Science	6	5	25	75	100
4	PCSP11	Part – III / Core Practical – I / Advanced Java Lab	6	5	25	75	100
5	PCSE11	Part – III / Elective-I / Computer Graphics (or) Soft Computing	6	5	25	75	100
<b>Total</b>			<b>30</b>	<b>25</b>			<b>500</b>

**II SEMESTER**

S.No	Sub. Code	Title of the Course	HRS	CREDITS	CIA	CE	Total
1	PCST21	Part – III / Core – IV / Advanced Operating System	6	5	25	75	100
2	PCST22	Part – III / Core – V / Relational Database Management System	6	5	25	75	100
3	PCST23	Part – III / Core – VI / Computer Networks	6	5	25	75	100
4	PCSP22	Part – III / Core Practical – II / RDBMS Lab	6	5	25	75	100
5	PCSE12	Part – III / Elective-II / Data Warehousing and Data Mining (or) Cryptography and Network Security	6	5	25	75	100
<b>Total</b>			<b>30</b>	<b>25</b>			<b>500</b>

**III SEMESTER**

S.No	Sub. Code	Title of the Course	HRS	CREDITS	CIA	CE	Total
1	PCST31	Part – III / Core – VII / Compiler Design	6	5	25	75	100
2	PCST32	Part – III / Core – VIII / Software Engineering	6	5	25	75	100
3	PCST33	Part – III / Core – IX / Web Programming	6	5	25	75	100
4	PCSP33	Part – III / Core Practical – III / Web Programming Lab	6	5	25	75	100
5	PCSE33	Part – III / Elective-III / Software Project Management(or) Big Data Analytics	6	5	25	75	100
<b>Total</b>			<b>30</b>	<b>25</b>			<b>500</b>

**IV SEMESTER**

<b>S.No</b>	<b>Sub. Code</b>	<b>Title of the Course</b>	<b>HRS</b>	<b>CREDITS</b>	<b>CIA</b>	<b>CE</b>	<b>Total</b>
1	PCST41	Part – III / Core – X / Digital Image Processing	6	5	25	75	100
2	PCST42	Part – III / Core – XI / Mobile Computing	6	5	25	75	100
3	PCSP44	Project	-	5	25	75	100
<b>Total</b>			<b>12</b>	<b>15</b>			<b>300</b>
<b>Grand Total</b>				<b>90</b>			<b>1800</b>

## SEMESTER-I

**CODE-PCST11**

**ADVANCED JAVA PROGRAMMING**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge how to import user defined package, to create thread program and string methods.	Knowledge (Level – 1)
<b>CO2:</b> Understanding the Basic Programming Concepts of Java.	Comprehension (Level – 2)
<b>CO3:</b> Evaluating the integrated development environment to create, debug and multi-tier enterprise level applications.	Evaluation (Level – 5)
<b>CO4:</b> Analysing the Input/output and Networking package classes and methods	Analysis (Level – 4)
<b>CO5:</b> Gaining ability to design console based, GUI and web based applications	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I OVERVIEW OF JAVA, INHERITANCE AND METHODS

Introduction- Object-Oriented Programming- Lexical Issues- Data types- Variables and Arrays – Operators – Control Statements –Objects-Classes - Inheritance – Methods –Method Overriding – Using Final with Inheritance - The Creation of Java- Java Byte code - The Java Buzzwords – Garbage Collection

### UNIT – II USER DEFINED PACKAGES, THREAD PROGRAMMING AND STRING

Packages – Importing Packages – Interfaces – Exception Handling – Multithreaded Programming-The String Constructors –String Handling – Character Extraction – Comparison – Modifying a String - String Buffer.

### UNIT – III JAVA PACKAGES: I/O, NET PACKAGE

I/O Package: The Java I/O Classes and Interfaces – File – Byte Streams – The Character Streams – Serialization- Net Package: The Networking Classes and Interfaces – InetAddress – Datagrams –TCP/IP Server Sockets.

### UNIT – IV JAVA PACKAGES: AWT, APPLET

AWT Package: AWT Classes – Window Fundamentals – Working with Graphics– Working with Color – Working with Fonts – Applet Package: Applet Basics – Applet Architecture – Reading and Writing in Console – Print Writer class

## **UNIT – V      SOFTWARE DEVELOPMENT USING JAVA**

Remote Method Invocation – JDBC – Servlets – Life Cycle of a Servlet – The Servlet API – Servlet and Http Package.

### **TEXT BOOK(S):**

1. Herbert Schildt "The Complete Reference JAVA", 7th Edition-,Tata McGraw Hill, 2007.

### **Reference(s):**

1. Herbert Schildt, "The Complete Reference",8th Edition-,Tata McGraw Hill, 2011.
2. Kogent, "Java 6 Programming Black Book" Edition 2011, Kogent Learning Solutions.
3. Steven Holzner, "Java2(JDK 5 Edition) Programming" 2007 edition

## SEMESTER-I

CODE-PCST12

DATASTRUCTURES AND ALGORITHMS

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of programming and system networking	Knowledge (Level – 1)
<b>CO2:</b> Comprehending the Software development and networking system	Comprehension (Level – 2)
<b>CO3:</b> Evaluating the software development, data manipulation and technology re-engineering	Evaluation (Level – 5)
<b>CO4:</b> Analysing the maintenance of software network to handle the technological challenges.	Analysis (Level – 4)
<b>CO5:</b> Becoming capable of handling digital commerce, software development and can achieve organizational goals objectives.	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT I INTRODUCTION TO ANALYSIS OF ALGORITHMS

Introduction to algorithms - Algorithm Analysis framework - Performance of algorithms: Space and Time Complexity - Asymptotic Notations: Big-Oh, Big-Omega and Big-Theta - Best, Worst and Average case analysis of algorithms. Mathematical analysis of Non recursive Algorithms - Sequential Search. Mathematical analysis of Recursive Algorithms - Recurrence relation - Binary search.

### UNIT II LINEAR DATA STRUCTURES

Abstract Data Types (ADT) - List ADT - Array-based implementation - Linked list implementation - doubly-linked lists - Applications of Lists - Polynomial Operations. Stack ADT - Array based and linked List based implementation - Postfix expression evaluation. Queue ADT - Circular queue and linked List based implementation - Applications of Queues.

### UNIT III BINARY TREES AND PRIORITY QUEUES

Trees - Binary trees - Binary tree representation and traversals - Threaded binary trees - Expression Trees - Binary Search Tree - Applications of trees. Balanced trees: AVL trees. Priority queue - Binary heap - Heap operations - Applications of heap.

#### **UNIT IV            SETS AND HASHING**

Disjoint Set ADT - Dynamic equivalence problem - Set operations - Representation - Implementation of union - Find operations - Smart union algorithms - Path compression - Applications of set. Hashing - Closed hashing: Separate chaining - Open addressing: Linear and quadratic probing - rehashing - Extendible hashing.

#### **UNIT V            GRAPHS**

Graph - Definitions - Representations - Topological sort - Breadth first traversal - Depth first traversal - Connected components - Shortest path algorithms: Single source shortest path - Minimum spanning tree - Prim's and Kruskal's algorithms.

#### **TEXT BOOK(S):**

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Pearson Education, Fourth Edition, 2013.
2. AnanyLevitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2013.

#### **Reference Book(s):**

1. Ellis Horowitz and SartajSahni, "Fundamentals of Data Structures", Galgotia Book Sorce, Gurgaon, 2007.
2. Jean-Paul Tremblay and Paul G. Sorenson, "An Introduction to Data Structures with Applications", Tata McGraw-Hill, New Delhi, Second Edition, 1991.

3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, New Delhi, 2006
4. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein, "Introduction to Algorithms", Prentice Hall of India, New Delhi, Second Edition, 2007

## SEMESTER-I

### CODE-PCST13 MATHEMATICAL FOUNDATIONS ON COMPUTER SCIENCE

#### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of the basic set theory	Knowledge (Level – 1)
<b>CO2:</b> Comprehending the basic concept of Permutations and combinations.	Comprehension (Level – 2)
<b>CO3:</b> Evaluating the Mathematical Foundation of computer science	Evaluation (Level – 5)
<b>CO4:</b> Analysing the basic search algorithms to find the shortest path.	Analysis (Level – 4)
<b>CO5:</b> Becoming familiar with different mathematical structures.	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I MATHEMATICAL LOGIC & PREDICATES

Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms. **Predicates:** Predicative logic, Free & Bound variables, Rules of inference, Consistency, proof of contradiction, Automatic Theorem Proving.

### UNIT – II SET THEORY

Properties of binary Relations, equivalence, compatibility and partial ordering relations, Hasse diagram. Functions: Inverse Function Composition of functions, recursive Functions, Lattice and its Properties, Pigeon hole principles and its application.

### UNIT – III ALGEBRAIC STRUCTURES & COMBINATORICS

Algebraic structures: Algebraic systems Examples and general properties, Semi groups and monoids, groups sub groups' homomorphism, Isomorphism. Elementary **Combinatorics:** Basis of counting, Combinations & Permutations, with repetitions, Constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, the principles of Inclusion – Exclusion.

### UNIT – VI RECURRENCE RELATIONS

Generating Functions, Function of Sequences Calculating Coefficient of generating function, Recurrence relations, solving recurrence relation by substitution and Generating Functions. Characteristics roots solution of in homogeneous Recurrence Relation.

#### **UNIT – V GRAPH THEORY AND APPLICATIONS**

Representation of Graph, DFS, BFS, Spanning Trees, and planar Graphs. Applications of Graph: Graph Theory and Applications, Basic Concepts Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

#### **TEXT BOOK(S):**

1. Mathematical Foundation of computer science(Discrete Structures)- Dr.D.S.C, PRISM, 3/e, 2010.
2. Mathematical Foundation of computer science-Dr.J.Rajendra Prasad, T.Rama Rao, A.MadanaMohana Rao, 1/e, 2011.
3. Discrete mathematics structure with application to computer science, Tremblay. JP &Manohar P., Mc-Graw-Hill, 2/e, 2004.

#### **Reference Book(s):**

1. Discrete Mathematics, Norman Biggs, Oxford. 10/e, 2010.
2. Discrete Mathematics for Computer Scientists and Mathematicians. Joe L. Mott, Abraham Kandel, and Theodore P. Baker, Prentice Hall, 2/e, 2002.
3. Elements of Discrete Mathematics, C. L. Liu, McGraw-Hill, 3/e, 2008.
4. Discrete and Combinatorial Mathematics – An Applied Introduction – Ralph. P. Grimaldi, Pearson Education , 5/e ,2003.
5. Discrete mathematics and its applications, Kenneth H. Rosen, McGraw-Hill, 7/e, 2012.

## SEMESTER-I

**CODE-PCSP11**

**ADVANCED JAVA LAB**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

<b>COs</b>	<b>Bloom's Taxonomy Level</b>
<b>CO1:</b> Gaining knowledge about basic Java language syntax and semantics	Knowledge (Level – 1)
<b>CO2:</b> Understanding the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.	Comprehension (Level – 2)
<b>CO3:</b> Analysing the principles of inheritance, packages and interfaces	Analysis(Level – 4)
<b>CO4:</b> Becoming capable of writing Java programs and using concepts such as variables, conditional and iterative execution methods etc.	Synthesis (Level – 6)
<b>CO5:</b> Developing software in the Java programming language	Synthesis (Level – 6)

## COURSE CONTENT

### LIST OF EXPERIMENTS

## SEMESTER-I / ELECTIVE-I / OPTION - I

CODE-PCSE11

COMPUTER GRAPHICS

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1: Gaining knowledge about hardware system architecture for computer graphics	Knowledge (Level – 1)
CO2: Understanding the fundamentals of the current 3D graphics API	Comprehension (Level – 2)
CO3: Discussing future trends in computer graphics	Analysis (Level – 4)
CO4: Mastering future computer graphics concepts and APIs.	Synthesis (Level – 6)
CO5: Being familiar with key algorithms for modelling and rendering	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT I

Overview of Graphics System – output primitives: points and lines – line drawing algorithm – circle generating algorithm – ellipse generating algorithm – filled area primitives – character generation.

### UNIT II

Two Dimensional transformation: basic transformation – Matrix representation – composite transformation and other transformation – window-to-viewport transformation, viewing – clipping – interactive input methods.

### UNIT III

Three dimensional transformation: 3 D concepts – 3 D representation: polygon surfaces, curved line and surfaces, quadric surfaces – spline representation – cubic spline interpolation – Bezier curves – B Spline Curves and surfaces and Beta spline – fractal-geometric methods.

### UNIT IV

Three dimensional geometric and modeling transformation – 3 D viewing – Visible surface detection methods – illumination models and surface-rendering methods.

### UNIT V

Color Models and color applications: properties of light – standard primaries and the chromaticity diagram – all color models – conversion between HSV and RGB Models - Color

selection – Design and animation sequences – general computer animation functions – computer animation languages – Key frame system – Motion specification.

**REFERENCE BOOK**

1. Donald Hearn and M.Pauline Baker – Computer Graphics, Pearson Education, Second Edition.

**SEMESTER-I / ELECTIVE-I / OPTION - I**

**CODE-PCSE11**

**SOFT COMPUTING**

**Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>COs</b>	<b>Bloom's Taxonomy Level</b>
<b>CO1:</b> Gaining knowledge of soft computing theories fundamentals	Knowledge (Level – 1)
<b>CO2:</b> Applying artificial neural networks, fuzzy sets and fuzzy logic and Genetic algorithms in problem solving	Application (Level – 3)
<b>CO3:</b> Analysing the use of heuristics based on human experience	Analysis(Level – 4)
<b>CO4:</b> Familiarizing with genetic algorithms and random search procedure useful while seeking global optimum in self-learning situations.	Synthesis (Level – 6)
<b>CO5:</b> Having clear practical knowledge of the fundamentals of non-traditional technologies and approaches to solve hard real-world problems.	Synthesis (Level – 6)

**COURSE CONTENT**

**UNIT – I NEURAL NETWORKS - I**

(Introduction and Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks. Various Learning Techniques; Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory.

**UNIT – II NEURAL NETWORKS - II**

(Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co-Efficient ;Back Propagation Algorithm, Factors Affecting Back Propagation Training, Applications.

**UNIT – III FUZZY LOGIC - I**

(Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion.

**UNIT – IV FUZZY LOGIC – II**

(Fuzzy Membership, Rules) Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules,

Fuzzy Implications and Fuzzy Algorithms, Fuzzifications and Defuzzifications, Fuzzy Controller, Industrial Applications.

#### **UNIT – V        GENETIC ALGORITHM**

Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications.

#### **TEXT BOOK(S):**

1. S. Rajasekaran and G.A. VijayalakshmiPai, —Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, Prentice Hall of India, 2003.
2. N.P.Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, 2005.
3. J.S.R. Jang, C.T. Sun and E. Mizutani, —Neuro-Fuzzy and Soft Computing, Pearson Education, 2004.

#### **Reference Book(s):**

1. SimanHaykin, —Neural Networks, Prentice Hall of India, 1999
2. Timothy J. Ross, —Fuzzy Logic with Engineering Applications, Third Edition, Wiley India, 2010
3. S.Y.Kung, —Digital Neural Network, Prentice Hall International, 1993.
4. Aliev.R.A and Aliev,R.R, — Soft Computing and its Application, World Scientific Publishing Company, 2001.
5. Wulfram Gerstner and WennerKristler, —Spiking Neural Networks, Cambridge University Press.
6. Bart Kosko, —Neural Networks and Fuzzy Systems: Dynamical Systems Application to Machine Intelligence, Prentice Hall, 1992.

## SEMESTER-II

**CODE-PCST21**

**ADVANCED OPERATING SYSTEM**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of the concepts of operating system	Knowledge (Level – 1)
<b>CO2:</b> Comprehending the various issues in operating system	Comprehension (Level – 2)
<b>CO3:</b> Analysing the emerging trends in operating system	Analysis (Level – 4)
<b>CO4:</b> Gaining mastery over the Modern Operating Systems	Synthesis (Level – 6)
<b>CO5:</b> Becoming familiar with the important mechanisms in operating systems	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – IOPERATING SYSTEMS OVERVIEW

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection and security – Distributed systems – Computing Environments – Open-source operating systems – OS services – User operating-system interface – System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication – Examples – Multithreading models – Thread Libraries – Threading issues – OS examples.

### UNIT – II PROCESS MANAGEMENT

Basic concepts – Scheduling criteria – Scheduling algorithms – Thread scheduling – Multiple-processor scheduling – Operating system examples – Algorithm Evaluation – The critical-section problem – Peterson's solution – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – Synchronization examples – Deadlocks – System model – Deadlock characterization – Methods for handling deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock detection – Recovery from deadlock.

### UNIT-III STORAGE MANAGEMENT

Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Example: The Intel Pentium - Virtual Memory: Background – Demand paging – Copy on write – Page replacement – Allocation of frames – Thrashing.

## **UNIT –IV I/O SYSTEMS**

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management – Protection.

## **UNIT –V CASE STUDY**

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 7 – History – Design Principles – System Components – Terminal Services and Fast User – File system – Networking.

### **TEXT BOOK(S):**

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, —Operating System Concepts Essentials, John Wiley & Sons Inc., 2010.

### **Reference Book(s):**

1. Andrew S. Tanenbaum, —Modern Operating Systems, Second Edition, Addison Wesley, 2001.
2. D M Dhamdhere, —Operating Systems: A Concept-based Approach, Second Edition, Tata McGraw-Hill Education, 2007.
3. Charles Crowley, —Operating Systems: A Design-Oriented Approach, Tata McGraw Hill Education, 1996.
4. William Stallings, —Operating Systems: Internals and Design Principles, Seventh Edition, Prentice Hall, 2011.

## SEMESTER-II

### CODE-PCST22 RELATIONAL DATABASE MANAGEMENT SYSTEM

#### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1:. Gaining knowledge of Database Systems and Data Models	Knowledge (Level – 1)
CO2: Comprehending the needs of Database processing	Comprehension (Level – 2)
CO3: Modifying and maintaining the Database Structure	Analysis(Level – 4)
CO4:. Practising the techniques for controlling the consequences of concurrent access	Synthesis (Level – 6)
CO5: Becoming capable of handling the Database.	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT I: INTRODUCTION

Database Systems vs. File Systems- View of Data-Data Models-Database Languages-Transaction Management-Database System Structure-History of Database Systems-Database System Applications-Entity Relational Model.

### UNIT II: RELATIONAL DATABASES

SQL-Basic Structure-Set Operations-Complex Queries-Joined Queries-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions-Query by Example-Normalization.

### UNIT III: RELATIONAL DATABASE DESIGN

Relational Database Design-Indexing & Hashing-Static Hashing-Dynamic Hashing-Multiple Key Access-Integrity And Security.

### UNIT IV: QUERY EVALUATION AND OPTIMIZATION

Query Processing-Selection Operation-Sorting-Join Operation-Evaluation of Expressions-Query Optimization.

### UNIT V: TRANSACTION MANAGEMENT

Transaction Management-Concurrency Control-Protocols-Deadlock Handling-Recovery Systems-Recovery with Concurrent Transactions-Shadow Paging-Buffer Management-Case Studies-Oracle-Microsoft SQL Server.

**TEXT BOOK**

1. Abraham Silberschatz, Henry F.Korth and S.Sudharssan, "Database System Concepts", 4<sup>th</sup> Edition, Tata McGraw Hill, 2002

**REFERENCE BOOKS**

2. Raghu Ramakrishnan & Johannesgerhrke, "Database Management Systems", McGraw Hill International edition, 2000
3. Introduction to RDBMS-C.J.Date

## SEMESTER-II

**CODE-PCST23**

**COMPUTER NETWORKS**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of the networking concepts and basic communication model	Knowledge (Level – 1)
<b>CO2:</b> Understanding the working principles of various application protocols	Comprehension (Level – 2)
<b>CO3:</b> Analyzing the basic terminology and Topology of the computer networking area	Analysis (Level – 4)
<b>CO4:</b> Evaluating the working principles of various application protocols	Evaluation (Level – 5)
<b>CO5:</b> Mastering the working with routing algorithms	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I INTRODUCTION, PHYSICAL LAYER

Overview: Data Communication - Network Types - Internet History - TCP/IP Protocol Suite - The OSI Model - Digital Signals - Data rate limits - Performance - Line Coding - Block Coding - Transmission Media: Guided Media - Unguided Media – Switching.

### UNIT – II DATA LINK LAYER

Link Layer Addressing - ARP - Error Detection and Correction - Data Link Control Services - Data Link Layer Protocols - HDLC - PPP - Media Access Control - Ethernet - Wireless LANs: IEEE 802.11, Bluetooth -Connecting Devices.

### UNIT – III NETWORK LAYER

Network layer Services - Packet switching - Performance - IPV4 addresses - Forwarding of

packets - Internet Protocol - ICMPV4 - Mobile IP - Routing algorithms - Routing Protocols - IPV6 addressing - IPV6 protocol -Transition from IPV4 to IPV6

#### **UNIT – IV      TRANSPORT LAYER**

Transport Layer Services - Protocols - UDP - TCP: Transition Diagram, Flow Control, Error Control, Congestion Control - SCTP - QoS: Flow Control to improve QoS - Integrated Services - Differentiated Services - Client Server Programming.

#### **UNIT – V      APPLICATION LAYER AND SECURITY**

World Wide Web and HTTP - FTP - Electronic Mail - Telnet - Secure Shell - Domain Name System - Cryptographic Algorithms - Authentication Protocols - Message Integrity Protocols - Public Key Distribution(X.509) - Network Layer Security - Transport Layer Security - Application Layer Security - Firewalls.

##### **Text Book(s):**

1. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, Fifth Edition, 2013
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Morgan Kauffmann Publishers Inc., Third Edition, 2003.

##### **Reference Book(s):**

1. James F. Kuross, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Addison Wesley, ThirdEdition,2004.
2. Pete Loshin, “IPv6: Theory, Protocol and Practice”, ELSEVIER, Morgan Kauffmann Publishers Inc., Second edition, 2004
3. William Stallings, “Data and Computer Communication”, Pearson Education, Sixth Edition, 2000.
4. Andrew S. Tannenbaum, “Computer Networks”, Pearson Education, Fourth Edition, 2003
5. D.E. Comer, “Internetworking with TCP/IP Vol- III”, (BSD Sockets Version), Pearson Education, Second Edition, 2003.
6. W. Richard Stevens, “UNIX Network Programming Vol-I”, Pearson Education, II Edition.

## SEMESTER-II

CODE-PCSP22

RDBMS LAB

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1: Knowing the connectivity of databases with controls (DAO,ADO & RDO)	Knowledge (Level – 1)
CO2: Becoming familiar with SQL fundamental Concepts.	Comprehension (Level – 2)
CO3: Applying Normalization techniques to normalize a database	Application (Level – 3)
CO4: Evaluating the underlying concepts of database technologies	Evaluation (Level – 5)
CO5: Designing and implementing a database scheme for a given problem-domain	Synthesis (Level – 6)

## COURSE CONTENT

### 1. Creating Database

- Creating a Database
- Creating a Table
- Specifying Relational Data Types
- Specifying Constraints
- Creating Indexes

### 2. Table and Record Handling

- INSERT statement
- Using SELECT and INSERT together
- DELETE- UPDATE- TRUNCATE statements
- DROP- ALTER statements

### 3. Retrieving Data from a Database

- The SELECT statement
- Using the WHERE clause
- Using Logical Operators in the WHERE clause
- Using IN- BETWEEN- LIKE - ORDER BY- GROUP BY and HAVING

Clause

Using Aggregate Functions

Combining Tables Using JOINS

Subqueries

#### **4. Database Management**

Creating Views

Creating Column Aliases

Creating Database Users

Using GRANT and REVOKE

## SEMESTER-II / ELECTIVE - II

PCSE22

### CRYPTOGRAPHY AND NETWORK SECURITY

#### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1: Knowing about the Finite Fields and Number Theory	Knowledge (Level – 1)
CO2: Comprehending the concept of Public key cryptography	Comprehension (Level – 2)
CO3: Applying the working procedure of Digital signature and authentication protocols	Application (Level – 3)
CO4: Evaluating the Internet Firewall System	Evaluation (Level – 5)
CO5: Mastering and updating knowledge in Internet Security: Cryptographic Principles	Synthesis (Level – 6)

#### COURSE CONTENT

##### UNIT – I INTRODUCTION & NUMBER THEORY

Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

##### UNIT – II BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

##### UNIT – III HASH FUNCTIONS AND DIGITAL SIGNATURES

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – El Gamal – Schnorr.

##### UNIT – IV SECURITY PRACTICE & SYSTEM SECURITY

Authentication applications – Kerberos – X.509 Authentication services - Internet

Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

#### **UNIT V E-MAIL, IP & WEB SECURITY**

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPsec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).

#### **Text Book(s):**

1. William Stallings, Cryptography and Network Security, 6 th Edition, Pearson Education, March 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, “Network Security”, Prentice Hall of India, 2002.

#### **Reference Book(s):**

1. Behrouz A. Ferouzan, “Cryptography & Network Security”, Tata Mc Graw Hill, 2007.
2. Man Young Rhee, “Internet Security: Cryptographic Principles”, “Algorithms and Protocols”, Wiley Publications, 2003.
3. Charles Pfleeger, “Security in Computing”, 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, “Internet Security Protocols”, Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, “Network Security, Second Edition, Private Communication in Public World”, PHI 2002.
6. Bruce Schneier and Neils Ferguson, “Practical Cryptography”, First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson “Cryptography – Theory and practice”, First Edition, CRC Press, 1995.

## SEMESTER-II / ELECTIVE -II

CODE-PCSE22

### DATA WAREHOUSING AND DATA MINING

#### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1: Being aware of the functionalities, patterns, of operating system	Knowledge (Level – 1)
CO2: Understanding the concept of classification for the retrieval purposes	Comprehension (Level – 2)
CO3: Working out the applications of data mining	Application (Level – 3)
CO4: Discovering interesting patterns from large amounts of data to analyze and extract patterns to solve problems	Synthesis (Level – 6)
CO5: Designing and deploying appropriate classification techniques	Synthesis (Level – 6)

### COURSE CONTENT

#### UNIT – I INTRODUCTION TO DATA WAREHOUSING

Evolution of Decision Support Systems- Data Warehousing Components –Building a Data Warehouse, Data Warehouse and DBMS, Data Marts, Metadata, Multidimensional Data Model, OLAP vs. OLTP, OLAP Operations, Data Cubes, Schemas for Multidimensional Database: Stars, Snowflakes and Fact Constellations.

#### UNIT – II DATA WAREHOUSE PROCESS AND ARCHITECTURE

Types of OLAP Servers, 3 –Tier Data Warehouse Architecture, Distributed and Virtual Data Warehouses. Data Warehouse Implementation, Tuning and Testing of Data Warehouse. Data Staging (ETL) Design and Development, Data Warehouse Visualization, Data Warehouse Deployment, Maintenance, Growth, Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - Tools – SAS.

#### UNIT – III INTRODUCTION TO DATA MINING

Data Mining - KDD versus Data Mining, Stages of the Data Mining Process- Task Primitives, Data Mining Techniques - Data Mining Knowledge Representation – Data Mining Query Languages, Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data Cleaning, Data Transformation, Feature Selection, Dimensionality Reduction, Discretization and

Generating Concept Hierarchies - Mining Frequent Patterns Association- Correlation.

#### **UNIT – IV CLASSIFICATION AND CLUSTERING**

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Clustering techniques – Partitioning Methods - k-means- Hierarchical Methods - Distance-based Agglomerative and Divisible Clustering, Density-Based Methods – Expectation Maximization - Grid Based Methods – Model-Based Clustering Methods – Constraint – Based Cluster Analysis – Outlier Analysis.

#### **UNIT – V TRENDS IN DATAMINING AND BIG DATA MINING**

Introduction to Big Data-Case Studies on Big Data Mining Tools: Apache Hadoop, Apache Mahout and R - Mining Complex Data Objects, Spatial Databases, Temporal Databases, Multimedia Databases, Time Series and Sequence Data; Text Mining – Web Mining- Application and Trends in Data Mining.

#### **TEXT BOOK(S):**

- 1 Jiawei Han and MichelineKamber, —Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, Third Edition, 2011.
- 2 Paul Zikopoulos, Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, —Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming, McGraw-Hill Osborne Media, First Edition, 2011.

#### **Reference Book(s):**

- 1 Mehmed Kantardzic, —Datamining Concepts, Models, Methods, and Algorithms, Wiley Interscience, 2003.
- 2 Alex Berson and Stephen J. Smith, —Data Warehousing, Data Mining and OLAP, Tata McGraw Hill Edition, Tenth Reprint 2007.
- 3 G. K. Gupta, —Introduction to Data Mining with Case Studies, Easter Economy Edition, Prentice Hall of India, 2006.
- 4 Gareth James, Daniela Witten, Trevor Hastie, RobertTibshirani, —An Introduction to Statistical Learning: with Applications in R, Springer, 2014.

## SEMESTER-III

**CODE-PCST31**

**COMPILER DESIGN**

### **Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>COs</b>	<b>Bloom's Taxonomy Level</b>
<b>CO1:</b> Acquiring knowledge of the various parsing and different levels of translation.	Knowledge (Level – 1)
<b>CO2:</b> Understanding the working of compile	Comprehension (Level – 2)
<b>CO3:</b> Analysing the specific object code from source language.	Analysis (Level – 4)
<b>CO4:</b> Evaluating the Code Scheduling Constraints	Evaluation (Level – 5)
<b>CO5:</b> Knowing to optimize the code and schedule for optimal performance.	Synthesis (Level – 6)

## **COURSE CONTENT**

### **UNIT – I FRONT END OF COMPILERS**

The Structure of Compiler – Lexical Analysis: Role of Lexical Analyzer, Specification and Recognition of Tokens, Syntax Analysis: Top Down Parsing, Bottom up Parsing, LR Parsers: SLR, CLR, and LALR.

### **UNIT – II INTERMEDIATE CODE GENERATION**

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Syntax Directed Translation Schemes, Intermediate Languages: Syntax Tree, Three Address Code, Postfix Code, Declarations, Translation of Expressions, Type Checking, Back Patching.

### **UNIT – III RUNTIME AND OBJECT CODE GENERATION**

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of Code Generator - Register Allocation and Assignment – Instruction Selection by Tree Rewriting – Optimal Code Generation for Expressions –

Dynamic Programming Code Generation.

#### **UNIT – IV CODE OPTIMIZATION**

Basic Blocks and Flow Graphs – Optimization of Basic Blocks – Principal Sources of Optimizations – Data Flow Analysis – Constant Propagation – Partial Redundancy Elimination – Peephole Optimizations.

#### **UNIT – V SCHEDULING AND OPTIMIZING FOR PARALLELISM**

Code Scheduling Constraints – Basic Block Scheduling – Global Code Scheduling - Basic Concepts in Parallelization – Parallelizing Matrix Multiplication – Iteration Spaces – Affine Array Indexes.

#### **TEXT BOOK(S):**

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, —Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2009.

#### **Reference Book(s):**

1. Randy Allen, Ken Kennedy, —Optimizing Compilers for Modern Architectures: A Dependence-based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, —Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, —Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. V. Raghavan, —Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
5. Allen I. Holub, —Compiler Design in C, Prentice-Hall Software Series, 1993.

### SEMESTER-III

**CODE-PCST32**

### SOFTWARE ENGINEERING

#### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of the processes of software development	Knowledge (Level – 1)
<b>CO2:</b> Comprehending and developing software design and modules for real time system	Comprehension (Level – 2)
<b>CO3:</b> Analyzing verification & validation techniques	Analysis (Level – 4)
<b>CO4:</b> Developing software design and modules for real time system	Synthesis (Level – 6)
<b>CO5:</b> Identifying, formulating and solving engineering problems	Synthesis (Level – 6)

### COURSE CONTENT

#### UNIT – I SOFTWARE PROCESS MODELS

The Evolving Role of Software – Software – The changing Nature of Software – Legacy software — A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment –Personal and Team Process Models – Product and Process – Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – The Unified Process.

#### UNIT – II REQUIREMENT ENGINEERING

Software Engineering Practice – Communication Practice – Planning Practice - Modeling Practice– Construction Practice –Deployment. Requirements Engineering - Requirements Engineering Tasks – Initiating the Requirements Engineering Process - Eliciting Requirements – Developing Use Cases – Building the Analysis Models –Elements of the Analysis Model – Analysis Pattern – Negotiating Requirements – Validating Requirements.

### **UNIT – III ANALYSIS MODELLING**

Requirements Analysis – Analysis Modeling Approaches – Data Modeling Concepts – Object Oriented Analysis – Scenario Based Modeling – Flow Oriented Modeling – Class Based Modeling – Creating a Behaviour Model.

### **UNIT – IV DESIGN AND TESTING**

Design Engineering – Design Process -Design Quality - Design Model - User Interface Design – Testing Strategies - Testing Tactics - Strategies Issues for Conventional and Object Oriented Software - Validation Testing – System Testing – Art of Debugging – Project Management

### **UNIT –V QUALITY AND MAINTENANCE**

Software Evolution - Verification and Validation -Critical Systems Validation – Metrics for Process, Project and Product-Quality Management - Process Improvement – Risk Management - Configuration Management – Software Cost Estimation

#### **TEXT BOOK(S):**

1. Roger S. Pressman, —Software Engineering: A Practitioner’s Approach, McGraw Hill International edition, Seventh edition, 2009.
2. Ian Sommerville, —Software Engineering, Ninth Edition, Pearson Education, 2008.

#### **Reference Book(s):**

1. Stephan Schach, —Software Engineering, Tata McGraw Hill, 2007
2. Pfleeger and Lawrence —Software Engineering: Theory and Practice, Pearson Education, Second edition, 2001

## SEMESTER-III

**CODE-PCST33**

**WEB PROGRAMMING**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Understanding the role of mark-up languages in the workings of the web and web applications.	Comprehension (Level – 2)
<b>CO2:</b> Applying the knowledge of the internet and related internet concepts that are vital in understanding web application development	Application (Level – 3)
<b>CO3:</b> Analyzing the insights of internet programming to implement complete application over the web	Analysis (Level – 4)
<b>CO4:</b> Becoming capable of choosing the best technologies for solving web client/server problems.	Synthesis (Level – 6)
<b>CO5:</b> Automating the real time problems by developing & analyzing a web project and identifying its elements and attributes in comparison to traditional projects.	Synthesis (Level – 6)

### COURSE CONTENT

#### UNIT – I BASICS INTERNET PROTOCOLS, HTML5

Basic Internet Protocols - The World Wide Web - HTTP messages - Web servers and clients - Introduction to HTML5 - Editing HTML5 - W3C HTML validation service - Headings - Linking - Images - Special characters and horizontal rules - Lists - Tables - Forms - Internal linking - Meta elements - New HTML5 Form input types - Input and datalist elements and auto complete attribute - Page structure elements - Introduction to Canvas - Canvas Coordinate System - Rectangles - Drawing Arcs and Circles - Shadows

#### UNIT – II JAVASCRIPT, JQUERY

Introduction to JavaScript - Syntax - Variables and data types - JavaScript Control Statements - Operators - Literals - Functions - Objects - Arrays - Built in objects - Event handling - Fundamentals of JQuery - JQuery selectors - JQuery methods to access HTML attributes - Traversing - Manipulators - Events - Effects

### **UNIT – III CSS3, DOM**

Types of CSS - Conflicting style sheets - Positioning Elements - Element Dimension - Box model and Text Flow - Media types - Media Queries - Drop-Down Menus - Text shadows - Rounded corners - Color - Box Shadows - Introduction to the Document Object Model - DOM History and Levels - Intrinsic Event Handling - Modifying Element Style - The Document Tree - Properties of window - DOM Collections - Using Timer and Dynamic Styles to Create Animated Effects - JavaScript Event Handling - Reviewing the load, mousemove, mouseover, mouseout events - Form processing with focus, blur, submit, reset - Event Bubbling - More Events

### **UNIT – IV XML AND PHP**

XML documents and vocabularies - XML versions and declarations - XML namespace - Representing data types : DTD, XML schema - XSLT - XPath - XQuery - Introduction to PHP - Converting Between Data Types - Arithmetic Operators - Initializing and Manipulating Arrays - String Comparisons - String Processing with Regular Expressions - Form Processing and Business Logic - Reading from a Database - Using Cookie - Dynamic Content.

### **UNIT – V AJAX AND WEB SERVICES**

Ajax - Enabled rich internet applications with XML and JSON - Web Services Introduction - WCF Services Basics - SOAP - REST - JSON - Publishing and Consuming SOAP-Based Web Services, REST-Based XML Web Services, REST-Based JSON Web Services

#### **TEXT BOOK(S):**

1. P.J.Deitel, H.M.Deitel, "Internet and World Wide Web - How to program", Pearson Education Publishers, Fifth Edition, 2009.
2. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 2007.

#### **Reference Book(s):**

1. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007.
2. Kogent Learning Solutions Inc., "Html5 Black Book: Covers CSS3, JavaScript, XKL,

XHTML, AJAX, PHP and jQuery”, Dreamtech Press, 2011.

3. Joe Fawcett, Danny Ayers, Liam R. E. Quin, “Beginning XML”, John Wiley & Sons Publisher, Fifth Edition, 2012
4. Bates, “Developing Web Applications”, Wiley, 2006.

## SEMESTER-III

CODE-PCSP33

WEB PROGRAMMING LAB

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Understanding the role of mark-up languages in the workings of the web and web applications.	Comprehension (Level – 2)
<b>CO2:</b> Applying the knowledge of the internet and related internet concepts that are vital in understanding web application development	Application (Level – 3)
<b>CO3:</b> Analyzing the insights of internet programming to implement complete application over the web	Analysis (Level – 4)
<b>CO4:</b> Becoming capable of choosing the best technologies for solving web client/server problems.	Synthesis (Level – 6)
<b>CO5:</b> Automating the real time problems by developing & analyzing a web project and identifying its elements and attributes in comparison to traditional projects.	Synthesis (Level – 6)

### COURSE CONTENT

#### LIST OF EXPERIMENTS

1. Using InetAddress class, Socket Programming in Java
2. RMI
3. Client side scripting using
  - XHTML
  - Javascript – DOM
  - CSS
4. XML DTD, Parsers, XSLT, XPATH, SAX
5. Programming with AJAX, JQuery, JSON
6. Server Side programming (implement these modules using any of the server side scripting languages like PHP, Servlets, JSP etc.,
  - Gathering form data , Querying the database ,Response generation ,Session management , MySQL/JDBC/Oracle
7. Case Study – Sample Application development
8. Ruby-on-Rails setup and programming

9. Django, Jena – Integrating Databases and applications
10. JAX – RPC
11. WSDL
12. SOAP

## SEMESTER –III / ELECTIVE –III

**CODE: PCSE33 SOFTWARE PROJECT MANAGEMENT**

### **Course Outcomes:**

After completion of the course, certain outcomes are expected from the learners.

<b>COs</b>	<b>Bloom's Taxonomy Level</b>
<b>CO1:</b> Gaining in depth knowledge about software development standards	Knowledge (Level – 1)
<b>CO2:</b> Understanding how to manage people and organization of teams	Comprehension (Level – 2)
<b>CO3:</b> Estimating the cost associated with a project	Analysis (Level – 4)
<b>CO4:</b> Planning and monitoring projects for the risk management	Synthesis (Level – 6)
<b>CO5:</b> Exploring the process of monitoring and controlling	Synthesis (Level – 6)

## **COURSE CONTENT**

### **UNIT – I INTRODUCTION**

Project Definition – Contract Management – Activities covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning - Project evaluation - Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation

### **UNIT – II ACTIVITY PLANNING**

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control

### **UNIT – III MONITORING AND CONTROL**

Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance

#### **UNIT – IV MANAGING PEOPLE AND ORGANIZING TEAMS**

Understanding Behavior – Organizational Behavior – Selecting The Right Person For The Job – Instruction in the Best Methods – Motivation – The Oldham Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies

#### **UNIT – V DEVELOPMENT AND MANAGEMENT STANDARDS**

Microsoft solution Framework - PMBOK Guide - NASA practices - PRINCE 2 - Capability Maturity Model - Integration - open source tools for managing projects: Project information flow - basic infrastructure - collaborative document writing

#### **Text Book(s):**

1. Bob Hughes, Mike Cotterell, “Software Project Management”, Fifth Edition, Tata McGraw Hill, 2011
2. Adolfo Villafiorita, “Introduction to Software Project Management”, CRC Press 2014

#### **Reference Book(s):**

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002

## SEMESTER –III / ELECTIVE –III

**CODE: PCSE33**

## BIG DATA ANALYTICS

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Gaining knowledge of the fundamental concepts of big data and analytics	Knowledge (Level – 1)
<b>CO2:</b> Comprehending the research that requires the integration of large amounts of data	Comprehension (Level – 2)
<b>CO3:</b> Exploring tools and practices for working with big data	Analysis (Level – 4)
<b>CO4:</b> Acquiring in depth knowledge in stream computing research that requires the integration	Synthesis (Level – 6)
<b>CO5:</b> Mastering Business Intelligence: Tools-skills- applications	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I INTRODUCTION TO BIG DATA

Introduction – understanding Big data-capturing bigdata-Volume-velocity-variety-veracity- Benefiting Big Data –Management of bigdata- organazing big data- Technology challenges

### UNIT – II BIGDATA SOURCES AND ARCHITECTURE

Big data sources-people to people communication-m2m- big data applications- Examining big data types- structured data – unstructured data- semi structured data-integrating data type into big data environment-Big data Architecture.

### UNIT – II HADOOP

Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization- Hadoop Architecture, Hadoop Storage. Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers-: HDFS- Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting and Aggregating, Map Reduce Scripts, Joins &Subqueries, HBase

### UNIT – IV ANALYTICS AND BIG DATA

Basic analytics-Advanced analytics-operationalized analytics-Monetizing analytics-modifying business intelligence products to handle big data- big data analytics solution-understanding text analytics-tools for big data.

#### **UNIT – V DATA VISUALIZATION & R**

Introduction-excellence in visualization- types of chart-Business Intelligence: Tools-skills- applications – Health care- Education-retail – E- Governance – Working with R- Import a data set in R- plotting a histogram-Big data mining

#### **Text Book(s):**

1. Anil Maheshwari, Data Analytics Made Accessible: 2017 edition Kindle Edition
2. Judith Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman “ Big Data for Dummies “ wiley India Pvt.Ltd.New Delhi, 2014.

#### **Reference Book(s):**

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al., “Understanding Big data ”, McGraw Hill, 2012.
3. Tom White, “HADOOP: The definitive Guide”, O Reilly 2012. 6 IT2015 SRM(E&T)
4. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014.
5. JyLiebowitz, “Big Data and Business analytics”, CRC press, 2013.
6. VigneshPrajapati, “Big Data Analytics with R and Hadoop”, Packet Publishing 2013.

## SEMESTER-IV

CODE-PCST41

DIGITAL IMAGE PROCESSING

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
CO1: Knowing about the basic concepts of digital image processing	Knowledge (Level – 1)
CO2: Understanding the image enhancement technique	Comprehension (Level – 2)
CO3: Applying a broad range of image processing techniques	Application (Level – 3)
CO4: Becoming skilful in image restoration and segmentation	Synthesis (Level – 6)
CO5: Creating Image Classification, retrieval, Image fusion, Digital compositing & Video motion analysis	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I FUNDAMENTALS OF IMAGE PROCESSING

Introduction - Steps in image processing systems - Image acquisition - Sampling and Quantization - Pixel relationships - Color fundamentals and models - File Formats, Image operations: Arithmetic, Geometric and Morphological - Introduction to MATLAB - Image operations using MATLAB.

### UNIT – II IMAGE ENHANCEMENT

Spatial Domain - Gray level transformations - Histogram processing - Spatial filtering - Smoothing and sharpening - Frequency domain: Filtering in frequency domain - DFT, FFT, DCT - Smoothing and sharpening filters - Homomorphic filtering - Image enhancement using MATLAB.

### UNIT – III IMAGE RESTORATION AND SEGMENTATION

Noise models - Mean Filters - Order Statistics - Adaptive filters - Band reject Filters - Band pass Filters - Notch Filters - Optimum Notch Filtering - Inverse Filtering - Wiener filtering. Segmentation: Detection of discontinuities - Edge operators - Edge linking and boundary Detection - Thresholding - Region based segmentation - Morphological Watersheds - Motion segmentation.

### UNIT – IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS

Multi Resolution analysis: Image pyramids - Multi resolution expansion - Wavelet transforms - Image compression: Fundamentals - Models - Elements of information theory - Error free compression - Lossy compression - JPEG standard, JPEG 2000, SPIHT, MPEG Standards. Image compression and enhancement using Wavelet transforms.

## **UNIT – V IMAGE REPRESENTATION AND RECOGNITION**

Boundary representation - Chain Code - Polygonal approximation, signature, boundary segments - Boundary description - Shape number - Fourier Descriptor, moments- Regional Descriptors - Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching. Image Classification, retrieval. Image fusion - Digital compositing - Video motion analysis.

### **TEXT BOOK(S):**

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing”, Pearson Education, Third Edition, 2009.
2. Anil K.Jain, “Fundamentals of Digital Image Processing”, PHI, 2011.

### **Reference Book(s):**

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Thompson Learning, Second Edition, 2007.
2. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
3. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, PHI Learning Pvt. Ltd., First Edition, 2011.
4. Sanjit K. Mitra and Giovanni L. Sicuranza, “Non Linear Image Processing”, Elsevier, 2007.
5. S.Sridhar, “Digital Image Processing”, Oxford University Press, 2011.

## SEMESTER-IV

**CODE-PCST42**

**MOBILE COMPUTING**

### Course Outcomes:

After completion of the course, certain outcomes are expected from the learners.

COs	Bloom's Taxonomy Level
<b>CO1:</b> Knowing about the satellite system	Knowledge (Level – 1)
<b>CO2:</b> Understanding the mobile communications environment	Comprehension (Level – 2)
<b>CO3:</b> Analysing the mobile computing system	Analysis (Level – 4)
<b>CO4:</b> Mastering interaction with servers and database systems.	Synthesis (Level – 6)
<b>CO5:</b> Interfacing a mobile computing system to hardware and networks	Synthesis (Level – 6)

## COURSE CONTENT

### UNIT – I INTRODUCTION

Introduction: Applications - A Simplified Reference Model. Wireless Transmission: Frequencies for radio transmission – Signals – Antennas - Signal Propagation – Multiplexing – Modulation – Spread Spectrum - Cellular System.

### UNIT – II MEDIUM ACCESS CONTROL

Medium Access Control: Motivation for a Specialized MAC- Hidden and exposed terminals – Near and far terminals – SDMA – FDMA – TDMA - Fixed TDM – Classical Aloha – Slotted Aloha – Carrier Sense Multiple Access – Demand assigned Multiple Access – PRMA Packet Reservation Multiple Access – Reservation TDMA – Multiple Access with Collision Avoidance – Polling – Inhibit Sense Multiple Access. CDMA - Spread Aloha multiple access. Comparison of S/T/F/CDMA.

### UNIT – III TELECOMMUNICATION SYSTEMS

Telecommunication Systems: GSM - Mobile Services – System Architecture – Radio Interface – Protocols - Localization and Calling – Handover – Security. UMTS and IMT 2000: UMTS releases and standardization - UMTS System Architecture - UMTS Radio Interface –UTRAN - UMTS Handover.

#### **UNIT – IV SATELLITE SYSTEM**

Satellite System: History – Applications – Basics - Routing– Localization – Handover. Wireless LAN: IEEE 802.11- System Architecture – Protocol Architecture - Physical Layer – Medium Access Control Layer. Bluetooth: User scenarios – Architecture – Radio Layer – Baseband Layer – Link Manager Protocol.

#### **UNIT – V MOBILE NETWORK LAYER**

Mobile Network Layer: Mobile IP - Goals, Assumption, and Requirements – Entities and Terminology – IP Packet delivery – Agent discovery – Registration. Dynamic Host Configuration Protocol - Mobile Transport Layer: Traditional TCP - Congestion Control – Slow Start – Fast Retransmit.

#### **TEXT BOOK(S):**

1. Jochen Schiller, “Mobile Communications”,2nd Edition, eighth impression, Pearson Education, 2011.

#### **Reference Book(s):**

1. William Stallings,“Wireless Communication and Networks”, 2nd Edition, Pearson Education, 2005.
2. Theodore Rappaport, “Wireless Communications: Principles and Practice”, Prentice Hall Communications,1996.



