MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 102

M.Sc.(COMPUTER SCIENCE)

(EFFECTIVE FROM JUNE 2018-2019 ONWARDS)

MASTER OF SCIENCE

M.SC. Computer Science

UNDER CBCS (with effect from 2018-2019)

About the Programme M.Sc- Computer Science

M.Sc. in Computer Science is a two-year Post-graduate programme with the objective to develop human resources with core competence in various thrust areas of Computer Science. The programme includes software engineering, system development, mathematical foundations ,data analytics, software development, applied communications, network architecture and database design. The coursework of the programme focus on preparing students for major techno companies or on entrepreneurship.

Students are provided with opportunities to develop and hone core competency in the field of Computer science and encourage them to make a mark in the much sought after IT industry. Guest lectures, case studies and presentations are organized from time to time to give an insight into the latest development in the industry.

OBJECTIVES:

- To develop girl students with core competence in various thrust areas of Computer Science

- To prepare students for innovation on data analytics, software development or on entrepreneurship

- To prepare the students on Software development and networking systems

PROGRAMME OUTCOMES (POs)
On successful completion of this programme the students will be able to:

1. Get core competence in various subjects of Computer Science.

2. Recognize the organizational need and to engage themselves in continuing professional development.

3. Apply knowledge of computing and mathematics appropriate to the discipline.

4. Design, implement, and evaluate a computational system to meet the desired needs within realistic constraints.

5. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.

6. Function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.

7. Recognize the need for and ability to engage in continuing professional development.

8. Use appropriate techniques, skills, and tools necessary for computing practice.

9. Identify, formulate, develop solutions to computational challenges. Understand professional, ethical, legal, security, and social issues and responsibilities for the computing profession.

10. Apply design and development principles in the construction of software systems of varying complexity.

PROGRAMME SPECIFIC OUTCOMES

PS01 : Able to handle any kind of software development

PS02 :Able to maintain the software network to handle the technological challenges.

PS04: Able to develop strong analytical skills, critical thinking and experimental skills.

PS05 : Able to solving on Computational problems, system networking knowledge, use of technology with innovative ideas

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 102

DEPARTMENT OF COMPUTER SCIENCE

M.SC. COMPUTER SCIENCE

ALLOCATION OF PAPERS AND CREDITS FOR PG PROGRAMME

2018 – 2019 ONWARDS

S.NO.	SUBJECT CODE	SUBJECT NAME	HOURS	CREDITS	INT	EXT	TOT
First Semester							
01.	PCST11	Advanced Java Programming	6	5	25	75	100
02.	PCST12	Data Structures and Algorithms	6	5	25	75	100
03.	PCST13	Mathematical Foundations of Computer Science	6	5	25	75	100
04.	PCSP11	Advanced Java Lab	6	5	25	75	100
05.	PCSE11	Elective – I	6	5	25	75	100
Total			**30**	**25**			**500**
Second Semester							
01.	PCST21	Advanced Operating System	6	5	25	75	100
02.	PCST22	Relational Database Management System	6	5	25	75	100
03.	PCST23	Computer Networks	6	5	25	75	100
04.	PCSP22	RDBM Lab	6	5	25	75	100
05.	PCSE22	Elective – II	6	5	25	75	100
Total			**30**	**25**			**500**
Third Semester							
01.	PCST31	Compiler Design	6	5	25	75	100
02.	PCST32	Software Engineering	6	5	25	75	100
03.	PCST33	Web Programming	6	5	25	75	100
04.	PCSP33	Web Programming Lab	6	5	25	75	100
05.	PCSE33	Elective – III	6	5	25	75	100
Total			**30**	**25**			**500**

Fourth Semester							
01.	PCST41	Digital Image Processing	6	5	25	75	100
02.	PCST42	Mobile Computing	6	5	25	75	100
03.	PCSP44	Project	-	5	25	75	100
Total			**12**	**15**			**300**
Grand Total				**90**			**1800**

ELECTIVES		
SEMESTER I	**SEMESTER II**	**SEMESTER III**
1. Computer Graphics 2. Soft Computing	1. Data Warehousing and Data Mining 2. Cryptography and Network Security	1. Software Project Management 2. Big Data Analytics

SCHEME OF EXAMINATION

Internal (Theory)	-	**25**
Test	-	**15**
Attendance	-	**5**
Assignment / Technical Quiz	-	**5**
Total	-	**25**
External (Theory)	-	**75**

QUESTION PATTERN

1.	PART A	**10*1 Marks=10** (Objective Type/Multiple Choice) 2 Question from each Unit	**10**
2.	PART B	**5*4 Marks =20** (From each Unit Either or Choice)	**20**
3.	PART C	**3*15 Marks =45** (Open Choice) (Any three Question out of 5,onequestion from each unit)	**45**
		Total	**75**

The Internal assessment for Practical   : 25

The External assessment for Practical   : 75

PCST11	ADVANCED JAVA PROGRAMMING		
	Semester I	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K6-Create		
Objectives	1. To remind the object oriented paradigm in Java programming 2. To understand the importance of Interfaces and exception handling concept 3. Compare and contrast the Net and Applet Java packages 4. To develop Java application using Servlet		

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

Course Outcomes:
After successful completion of this course, the students shall be able to
CO1: Design and Create Java Applications using OOPs concept **K6**
CO2: Utilise the features of exception handling, threads & util package in Java. **K3**
CO3: Simplify the communication between client & server using database connectivity. **K2**
CO4: Build Java applications that include GUIs and event driven programming **K3**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	M	S	M	M	S
CO2	M	S	S	S	M	S	S	S	M	S
CO3	S	S	M	M	M	S	M	S	S	M
CO4	M	S	M	S	S	M	S	M	M	S

S – Strongly Correlating   M- Moderately Correlating

PCST12	DATA STRUCTURES AND ALGORITHMS		
	Semester I	Credits: 5	Hours: 6
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To recognize the space and time complexities for specific program/ algorithm 2. To understand the linear and non-linear data structure and its operations 3. To know the importance of hashing techniques in space complexity 4. To learn the binary tree and graph representation concept		

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.

UNITII   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   SETS AND HASHING
IV

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 Jeffry 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

Outcomes

After successful completion of this course, the students shall be able to

CO1: Analyse the space and time complexities for an algorithm   **K2**
CO2: Identify and use appropriate data structure to solve problems   **K3**
CO3: Use Hashing Techniques to solve real time Problems   **K3**
CO4: Implement and Handle various searching and sorting algorithms   **K3, K4**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	S	M	M	M	S	M	M
CO2	M	S	M	S	M	S	S	M	M	S
CO3	M	S	S	S	S	M	S	M	S	S
CO4	M	S	S	S	S	M	S	M	S	S

S – Strongly Correlating   M- Moderately Correlating

PCST13	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE		
	Semester I	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K6-Create		
Objectives	1. To understand the concept of Logic and WFF 2. To identify and solve the Set theory and its relation 3. To solve the mathematical problems using algebraic structures 4. To familiarize with graph representation and its applications		

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.

Course Outcomes:
 After successful completion of this course, the students can be able to
CO1: Construct simple mathematical proofs and possess the ability to verify them.   **K6**
CO2: Utilise Algebraic Structures and Recurrence Function   **K3**
CO3: Know various graphs and its algorithms in computer programs.   **K2**
CO4: Describe computer programs in a formal mathematical manner   **K2**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	M	M	M	M	M	M	S
CO2	S	M	S	M	S	M	S	M	S	M
CO3	M	M	S	S	M	M	S	M	S	M
CO4	M	S	M	S	M	S	S	M	S	S

6.   **S – Strongly Correlating   M- Moderately Correlating**

PCSP11	ADVANCED JAVA LAB		
	Semester I	**Credits: 5**	**Hours: 6**
Objectives	1. To develop programs using the fundamental concepts in Java		
	2. To implement GUI applications to handle events and to store the data in the database		
	3. To Test and debug Java programs for errors and exceptions		
	4. To create user defined packages		

LIST OF EXPERIMENTS

1. Simple Java program with JavaDoc comments
2. Programs using packages and classes, JAR file creation
3. Programs using inheritance and its types
4. Programs using Interface and exception handling
5. Implementation of Multithreading
6. Program to demonstrate the use of Collection Classes
7. Database Connectivity using JDBC
8. Implementation of Applets
9. Event driven windows based application in Java
10. Program in AWT and Events Handling.
11. Network Programming using RMI.
12. Implementation using Java Servlet

PCST21	ADVANCED OPERATING SYSTEM		
	Semester II	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To learn the concepts of operating systems. 2. To learn about the various issues in operating systems. 3. To appreciate the emerging trends in operating systems 4. To familiarize with the important mechanisms in operating systems.		

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 – IIPROCESS 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–IIISTORAGE 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 –IVI/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.

Course Outcome: Students will be able to gain:
CO1:Knowledge about advanced concepts in OS **K4**
CO2:Able to rectify the designing concepts of OS **K4**
CO3: Ability to develop OS for distributed systems **K3**
CO4:Understand the Mutual exclusion, Deadlock detection and file sharing in Distributed operating system **K2**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	M	S	M	M	S	S	M	M
CO2	M	S	M	M	S	M	M	S	S	M
CO3	S	M	S	S	M	S	S	M	S	S
CO4	M	S	S	M	S	M	M	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCST22	RELATIONAL DATABASE MANAGEMENT SYSTEM		
	Semester II	**Credits: 5**	**Hours: 6**
Cognitive Level	K3-Apply K4-Analyze K6-Create		
Objectives	1. To understand the overview of Data Base systems & Data Models. 2. To modify and maintain the database structure. 3. To Understand the needs of database processing and learn techniques for controlling the Consequences of concurrent data access. 4. The Students can able to handle the Database.		

Unit I: Introduction

Database Systems vs. File Systems- View of Data-Data Models-Database Languages-Transaction Manage

ment-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-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, Hentry F.Korth and S.Sudharssan, "Database System Concepts", 4th 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

Course Outcomes

After successful completion of the course, Student shell be able to:
CO1:Create E/R models from application descriptions.   **K6**
CO2:Improve the database design by normalization.   **K4**
CO3: Students can create database structure   **K3**
CO4: Create databases in an RDBMS and enforce data integrity constraints and queries using SQL   **K3, K4**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	M	S	S	S	M	M	S
CO2	M	S	M	M	S	M	S	S	M	S
CO3	M	M	S	S	M	S	S	M	S	M
CO4	S	M	M	S	M	S	M	M	S	S

S – Strongly Correlating   M- Moderately Correlating

PCST23	COMPUTER NETWORKS		
	Semester II	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K4-Analyze		
Objectives	1. To study layered architecture of computer networks and protocols. 2. To learn the various mediums used in the physical layer. 3. To study the functionalities of data link layer. 4. The students can familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.		

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, Second Edition, 1998.

Course Outcomes

After successful completion of the course, Student shall be able to:

CO1: Have a good understanding of the OSI Reference Model   **K2**

CO2. Students can understand TCP/IP Model and in particular have a good knowledge of
Layers.   **K2**

CO3:Identify the different types of network devices and their functions within a network **K4**

CO4: Students will Analysis the requirements for a given organizational structure. **K4**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	M	S	S	S	S	S	M	M
CO3	S	S	S	M	S	M	S	S	M	S
CO4	S	S	M	S	S	M	S	M	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSP22	RDBMS LAB		
	Semester II	**Credits: 5**	**Hours: 6**
Objectives	1. To practice to implement to create a database 2. To know how to handle records in a table. 3. To practice database management. 4. The Student can gain the in-depth knowledge in handling the database.		

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

PCST31	COMPILER DESIGN		
	Semester III	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K4-Analyze		
Objectives	1. To Understand the working of compiler 2. To learn the various parsing techniques and different levels of translation 3. To learn how to obtain specific object code from source language 4. To optimize the code and schedule for optimal performance.		

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.

Course Outcomes

1. Understand the working process of the compiler.   **K2**
2. Learn the various parsing techniques and different levels of translation. **K4**
3. Have a good understanding of specific object code from source language.   **K2**
4. Learn to optimize the code and schedule for optimal performance.   **K4**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	S	M	S	S	M	M
CO2	M	S	M	S	S	M	S	S	M	M
CO3	M	M	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	M	S	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCST32	SOFTWARE ENGINEERING		
	Semester III	**Credits: 5**	**Hours: 6**
Cognitive Level	K1-Recall K2-Understand K4-Analyze K5-Evaluvate K6-Create		
Objectives	1. To be aware of generic models to structure the software development process. 2. To understand fundamental concepts of requirements engineering and requirements 3. To understand different notion of complexity at both the module and system level. 4. To work as an individual and as part of a multidisciplinary team to develop and deliver quality software.		

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

Course Outcomes

After successful completion of the course, Student shall be able to:

1. Understands the process to be followed in the software development life cycle **K2**

2. Understand fundamental concepts of requirements engineering. **K1**

3. Find the practical solutions to the problems. **K4**

4. Student can work as an individual and as part of a multidisciplinary team to develop and deliver quality software **K5,K6**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	M	S	M	S	M	M	M
CO2	M	M	S	M	S	S	S	S	S	M
CO3	S	S	M	S	S	M	S	M	S	S
CO4	S	S	M	M	S	M	S	S	S	S

S – Strongly Correlating   M- Moderately Correlating

PCST33	WEB PROGRAMMING		
	Semester III	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K4-Analyze K6-Create		
Objectives	1. To learn to design web pages using HTML5 2. To gain knowledge on creating interactive web pages using JavaScript, jQuery 3. To know to use Cascading Style Sheets (CSS) and DOM. *4.* To learn to develop server side scripting using PHP		

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.

Course Outcome

1. Students will learn to design web pages using HTML.   **K6**

2. Able to gain knowledge on creating interactive web pages using JavaScript, Query. **K2,K4**

3. Able to write a program and to use Cascading Style Sheets (CSS) and DOM.   **K3**

4. Able to develop server side scripting using PHP   **K3**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	S	S	S	S	M	S	S
CO2	M	S	S	M	S	M	M	S	M	S
CO3	M	S	S	M	S	M	M	S	M	S
CO4	S	S	S	M	S	M	M	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSP33	WEB PROGRAMMING LAB		
	Semester III	**Credits: 5**	**Hours: 6**
Objectives	1. To develop the most important technologies that are being used today by web developers 2. To build a wide variety of web applications. 3. To develop Java based web programming. 4. To practice web applications using proven developer tools and message formats.		

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

PCST41	DIGITAL IMAGE PROCESSING		
	Semester IV	Credits: 5	Hours: 6
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To learn about the basic concepts of digital image processing and various image transforms. 2. To understand the image enhancement techniques 3. To expose the student to a broad range of image processing techniques and their applications. **4.** The Student can gain the Knowledge about the use of current technologies those are specific to image processing systems.		

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 enchantment 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.

Course Outcomes

After completion of the course, Student shall be able to

CO1. Understand how digital images are represented and manipulated in computer   **K2**

CO2. Develop a broad range of image processing techniques and their applications.   **K3**

CO3: Understand the different types of image transformations and image features.   **K4**

CO4: Understand the advancements in Computer Vision of Images.   **K4**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	S	M	M	S	M	M	M
CO2	S	S	S	M	S	S	S	S	M	S
CO3	M	M	S	S	S	M	S	M	S	M
CO4	S	S	M	M	S	S	M	M	S	S

S – Strongly Correlating   M- Moderately Correlating

PCST42	MOBILE COMPUTING		
	Semester IV	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply		
Objectives	1. To clearly understanding the mobile communications environment 2. To get clear idea about Satellite Systems. 3. To Interface a mobile computing system to hardware and networks. 4. The Student can develop their knowledge in mobile computing system and how to interact with servers and database systems.		

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.

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO1. Understand the characteristics and limitations of mobile hardware devices including

their user-interface modalities **K2**

CO2. Design and develop context-aware solutions for mobile devices. **K3**

CO3. have clear idea about Satellite Systems **K2**

CO4. develop their knowledge in mobile computing system and how to interact with servers

and database systems. **K3**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	S	M	S	M	M	M
CO2	S	S	S	M	S	M	S	S	M	M
CO3	S	M	S	M	S	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSE11	**Elective I - COMPUTER GRAPHICS**		
	Semester I	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K6-Create		
Objectives	1. To Know and discuss hardware system architecture for computer graphics. 2. To understand the current 3D graphics API . 3. To explore the future trends in computer graphics and APIs. 4. To familiar with key algorithms for modeling and rendering graphical data		

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.

Course Outcomes

After successful completion of the course, Student shall be able to:
1. Explain Graphic primitives and the working of I/O devices **K2**
2. Apply geometric transformations in objects **K3**
3. Implement Graphic modeling process **K3**
4. Create interactive graphics applications in C++ using graphics application programming interfaces. **K6**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	M	S	S	M	M	S	M	M	S
CO2	S	S	M	M	S	M	S	S	S	M
CO3	M	M	S	M	S	S	M	S	S	M
CO4	S	S	M	M	S	M	M	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSE11	Elective I - SOFT COMPUTING		
	Semester I	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply		
Objectives	1. To give students knowledge of soft computing theories fundamentals, 2. To learn the fundamentals of non-traditional technologies and approaches to solving hard real-world problems. 3. To learn and apply artificial neural networks, fuzzy sets and fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience. 4. The Student can Familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations		

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 Defuzzificataions, 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.

Course Outcomes

After successful completion of the course, Student shall be able to:
1. Understand the knowledge of soft computing theories fundamentals,   **K2**
2. Discuss the fundamentals of non-traditional technologies and approaches to solving hard real-world problems.   **K2**
3. Apply artificial neural networks, fuzzy sets and fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience.   **K3**
4. Implement random search procedures in self-learning situations   **K3**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	M	M	S	M	M	M
CO2	M	S	S	M	S	M	S	M	M	M
CO3	S	S	S	M	S	M	S	S	S	M
CO4	S	M	S	M	S	S	M	S	M	S

S – Strongly Correlating   **M- Moderately Correlating**

PCSE22	Elective II - DATA WAREHOUSING AND DATA MINING		
	Semester II	**Credits: 5**	**Hours: 6**
Cognitive Level	K3-Apply K4-Analyze		
Objectives	1. To make the students to understand data mining principles and techniques 2. To discover the knowledge imbibed in the high dimensional system. 3. To study algorithms for finding the hidden interesting patterns in data. 4. Familiar with the developing areas – Web mining, Text mining and Big Data Mining Tools of Data mining.		

UNIT – I INTRODUCTION TO DATAWAREHOUSING

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 DATAWAREHOUSE 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.

Course Outcomes

After successful completion of this course, the students shall be able to

CO1: Identify the characteristics of data warehousing. **K4**

CO2: Identify the association rules for mining applications. **K4**

CO3: Design appropriate classification/clustering techniques for data mining problems

K3

CO4: Select appropriate tools for various data mining applications. **K4**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	M	S	S	M	S	S	M	M	M
CO2	M	S	S	S	M	S	S	S	M	M
CO3	S	S	M	M	S	M	S	M	S	S
CO4	S	S	M	M	S	M	S	S	S	S

S – Strongly Correlating   M- Moderately Correlating

PCSE22	Elective II - CRYPTOGRAPHY AND NETWORK SECURITY		
	Semester II	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To understand security design principles 2. To learn secure programming techniques 3. To Understand the security requirements in operating systems and databases 4. The Student can familiar with security applications in wireless environment.		

UNIT – IINTRODUCTION& 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 – IIBLOCK 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 – IIIHASH 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 – EI Gamal – Schnorr.

UNIT – IVSECURITY 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.

Course Outcomes

After completion of the Course, students shall be able to

CO1:	Learn and operate secure programming techniques	**K2**
CO2:	Understand the design issues in Network Security	**K2**
CO3:	Identify security threats, security services and mechanisms to counter them.	**K4**
CO4:	Be familiar with security applications in wireless environment	**K3**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	M	S	M	S	S	M	M
CO2	M	S	S	M	S	M	M	S	M	S
CO3	S	M	S	S	S	M	S	S	M	S
CO4	S	S	M	M	S	S	M	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSE33	Elective III - SOFTWARE PROJECT MANAGEMENT		
	Semester III	**Credits: 5**	**Hours: 6**
Cognitive Level	K2-Understand K4-Analyze		
Objectives	1. To estimate the cost associated with a project 2. To plan and monitor projects for the risk management *3.* To explore the process of monitoring and controlling 4. The Student can gain the in depth knowledge about software development standards and to know how to manage people and organization of teams.		

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, Gopalaswamy, "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

Course Outcomes

After completion of the Course, Students shall be able to

1. Learn how to estimate the cost associated with a project   **K2**

2. Plan and monitor projects for the risk management   **K4**

3. Learn the process of monitoring and controlling   **K2**

4. Gain the in-depth knowledge about software development standards and to know how to manage people and organization of teams with their own.   **K4**

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	S	M	S	S	M	S	S	M
CO2	S	S	M	M	S	M	M	S	S	M
CO3	M	M	S	S	M	M	S	M	S	M
CO4	S	S	S	M	S	S	S	S	M	S

S – Strongly Correlating   M- Moderately Correlating

PCSE33	Elective III - BIG DATA ANALYTICS		
	Semester III	**Credits: 5**	**Hours: 6**
Cognitive Level	K1-Recall K2-Understand K3-Apply		
Objectives	1. To know the fundamental concepts of big data and analytics. 2. To explore tools and practices for working with big data 3. To know about the research that requires the integration of large amounts of data. 4. The Student can gain the In depth knowledge in stream computing and about the research that requires the integration		

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-operationalzed 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 eith 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.

Course Outcomes

After completion of the Course, students shall be able to

1. Know the fundamental concepts of big data and analytics.   **K1**
2. Utilise the tools and practices for working with big data   **K3**
3. Understand about the research that requires the integration of large amounts of data. **K2**
4. Gain the In depth knowledge in stream computing   **K2**

Mapping of Cos with Pos and PSOs :

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	M	S	S	M	S	S	M	M	S
CO2	M	S	S	M	S	M	S	S	M	S
CO3	S	S	M	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	M	S	S	S

S – Strongly Correlating   M- Moderately Correlating

Courses having focus on employability/ entrepreneurship/ skill development

Name of the Course	Course Code	Name of the Programme	Activities with direct bearing on Employability/ Entrepreneurship/ Skill development
Advanced Java Programming	PCST11	M.Sc. Computer Science	Programmer
Data Structures and Algorithms	PCST12	M.Sc. Computer Science	Problem Solving Skills in Programming
Relational Database Management System	PCST22	M.Sc. Computer Science	Database Administrator
Computer Networks	PCST23	M.Sc. Computer Science	Network Engineer
Web Programming	PCST33	M.Sc.Computer Science	Web Programmer
Software Engineering	PCST32	M.Sc. Computer Science	Software Project Manager
Mobile Computing	PCST42	M.Sc. Computer Science	Mobile Application Developer
Big Data Analytics	PCSE33	M.Sc. Computer Science	Data Scientist
Cryptography & Network Security	PCSE22	M.Sc. ComputerScience	Network Engineer and Data Scientist
Software Engineering	PCAC32	MCA	Software Project Manager
Mobile Computing	PCAE33	MCA	Mobile Application Developer
Software Project Management	PCAE55	MCA	Software Project Manager
C Programming Lab	PCAP11	MCA	Programmer
Microprocessor Lab	PCAP12	MCA	Embedded System Developer
C++ Lab	PCAP21	MCA	Programmer

Multimedia Lab	PCAP22	MCA	Multimedia Application Developer
JAVA Programming Lab	PCAP31	MCA	Web Application Developer
Object Oriented Programming Lab	PCAP32	MCA	Programmer
Relational Database Management System	PCAP41	MCA	Database Administrator
RDBMS Lab	PCAP41	MCA	Database Administrator
Python Programming	PCAP42	MCA	Programmer and Data Analyst
Python Lab	PCAP42	MCA	Programmer, Data Analyst
Project (Internship)	PCAP61	MCA	Application Developer
C Programming, and Data Structures	PCAT11	MCA	Programmer
System Software	PCAT12	MCA	Software Developer
C++ Programming	PCAT21	MCA	Programmer
Operating System	PCAT22	MCA	System Software Developer
Multimedia and Applications	PCAT23	MCA	Mulimedia Application Developer
Java Programming	PCAT31	MCA	Programmer
Computer Networks	PCAT42	MCA	Network Engineer
Computer Graphics	PCAT43	MCA	Multimedia Application Developer
Web Programming	PCAT51	MCA	Web Programmer
Principles of Compiler Design	PCAT52	MCA	System Software Developer
Digital Image Processing	PCAT53	MCA	Image Analyst
Project (Internship)	PCAP61	MCA	Software Developer