# MASTER OF SCIENCE (COMPUTER SCIENCE)

# REGULATIONS

## ELIGIBILITY

A candidate who has acquired a Bachelor's degree in Computer Science or Computer Applications or Computer Technology or Information Technology or Information Science is permitted to appear and qualify for the **Master of Science (Computer Science) degree examination** of this College after a course of study of two academic years.

## DURATION OF THE COURSE

The course shall extend over a period of two years comprising of four semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

## OBJECTIVE OF THE COURSE

- To prepare graduate students for productive careers in software Industry and Academia.
- To provide an outstanding environment for Teaching and Research in the core and selected areas of discipline for the students.
- To prepare the students for the Industry by imparting the required Technical and Soft Skills along with Theory and Applications knowledge.
- To provide industrial experience by accommodating Industrial practices with real-time software projects.
- To impart updated knowledge by motivating the students to participate in project works, paper works and workshops.

## SCHEME OF EXAMINATION

| Subject Code | Subject | Hrs of Instruction | Exam Duration in Hrs | Maximum Marks | | | Credit Points |
|---|---|---|---|---|---|---|---|
| | | | | CA | CE | Total | |
| **First Semester** | | | | | | | |
| **Part A** | | | | | | | |
| 15PCSM101 | Core I: Advanced Java Programming | 4 | 3 | 25 | 75 | 100 | 4 |
| 15PCSM102 | Core II: Design and Analysis of Algorithms | 5 | 3 | 25 | 75 | 100 | 5 |
| 15PCSM103 | Core III: Open Source Software | 5 | 3 | 25 | 75 | 100 | 5 |
| | Elective I | 5 | 3 | 25 | 75 | 100 | 5 |
| 15PCSMP101 | Core Practical I: Advanced Java Programming | 3 | 3 | 40 | 60 | 100 | 2 |
| 15PCSMP102 | Core Practical II: PHP and MYSQL | 2 | 3 | 40 | 60 | 100 | 2 |
| 15PMACSI101 | IDC I: Numerical Methods And Statistics | 5 | 3 | 25 | 75 | 100 | 4 |
| **Non-Credit** | | | | | | | |
| 15PLS101 | Career Competency Skills I | 1 | - | - | - | - | - |
| **Total** | | **30** | | | | **700** | **27** |
| **Second Semester** | | | | | | | |
| **Part A** | | | | | | | |
| 15PCSM201 | Core IV: C# and ASP .Net Framework | 3 | 3 | 25 | 75 | 100 | 3 |
| 15PCSM202 | Core V: Distributed Operating System | 4 | 3 | 25 | 75 | 100 | 4 |
| 15PCSM203 | Core VI: Data Mining and Warehousing | 5 | 3 | 25 | 75 | 100 | 5 |
| | Elective II | 4 | 3 | 25 | 75 | 100 | 4 |
| 15PCSMP201 | Core Practical III: C# and ASP.Net Framework | 3 | 3 | 40 | 60 | 100 | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15PCSMP202 | Core Practical IV : Mobile Application Development | 3 | 3 | 40 | 60 | 100 | 2 |
| 15PMACSI201 | IDC II: Resource Management Techniques | 5 | 3 | 25 | 75 | 100 | 4 |
| **Part B** | | | | | | | |
| 15PVE201 | Value Education : Human Rights | 2 | - | 25 | 75 | 100 | 2 |
| **Non-Credit** | | | | | | | |
| 15PLS201 | Career Competency Skills II | 1 | - | | - | - | - |
| **Total** | | **30** | | | | **800** | **26** |
| **Third Semester** | | | | | | | |
| **Part A** | | | | | | | |
| 15PCSM301 | Core VII: Struts and Hibernate | 4 | 3 | 25 | 75 | 100 | 4 |
| 15PCSM302 | Core VIII: Big Data Analytics | 5 | 3 | 25 | 75 | 100 | 5 |
| 15PCSM303 | Core IX: Professional Ethics and Cyber law | 4 | 3 | 25 | 75 | 100 | 4 |
| | Elective III | 5 | 3 | 25 | 75 | 100 | 5 |
| | Elective IV | 5 | 3 | 25 | 75 | 100 | 5 |
| 15PCSMP301 | Core Practical V: Struts and Hibernate | 3 | 3 | 40 | 60 | 100 | 2 |
| 15PCSMP302 | Core Practical VI: Data Mining | 3 | 3 | 40 | 60 | 100 | 2 |
| **Non-Credit** | | | | | | | |
| 15PLS301 | Career Competency Skills III | 1 | - | | - | - | - |
| **Total** | | **30** | | | | **700** | **27** |
| **Fourth Semester** | | | | | | | |
| **Part A** | | | | | | | |
| 15PCSM401 | Core X: E-Commerce Technology ( Self Study & 100% Internal Evaluation) | - | 3 | 100 | - | 100 | 4 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 15PCSPR401 | Project & Viva -Voce | - | - | 50 | 150 | 200 | 8 |
| **Total** | | **-** | | | | **300** | **12** |
| | | | | | **Grand Total** | **2500** | **92** |

**LIST OF ELECTIVES**

**ELECTIVE – I**

Student shall select any one of the following subjects as Elective-I in I semester

| S.No | Subject Code | Name of the Subject |
|---|---|---|
| 1. | 15PCSEL101 | Network Security and Cryptography |
| 2. | 15PCSEL102 | TCP/IP |
| 3. | 15PCSEL103 | Advanced Networks |
| 4. | 15PCSEL104 | Ad hoc Wireless Networks |

**ELECTIVE – II**

Student shall select any one of the following subjects as Elective-II in II semester

| S.No | Subject Code | Name of the Subject |
|---|---|---|
| 1. | 15PCSEL201 | Object Oriented Software Engineering |
| 2. | 15PCSEL202 | Software Testing |
| 3. | 15PCSEL203 | Software Project Management |
| 4. | 15PCSEL204 | Software Architecture |

**ELECTIVE – III**

Student shall select any one of the following subjects as Elective-III in III semester

| S.No | Subject Code | Name of the Subject |
|---|---|---|
| 1. | 15PCSEL301 | Digital Image Processing and Pattern Recognition |
| 2. | 15PCSEL302 | Soft Computing |
| 3. | 15PCSEL303 | Cloud Computing |
| 4. | 15PCSEL304 | Parallel Processing |

**ELECTIVE – IV**

Student shall select any one of the following subjects as Elective-IV in III semester

| S.No | Subject Code | Name of the Subject |
|---|---|---|
| 1. | 15PCSEL305 | Embedded Systems |
| 2. | 15PCSEL306 | Remote Sensing and Geographical Information Systems |
| 3. | 15PCSEL307 | Information Retrieval |
| 4. | 15PCSEL308 | Bioinformatics |

**FOR COURSE COMPLETION**

Students shall complete:

- Inter Disciplinary Courses (IDC) in I and II Semesters.
- Value Education Course as Human Rights in II Semester.
- Chosen Elective in I, II and III Semesters.
- Self study and complete internal evaluation subject in IV Semester.
- Submission of project report at the end of IV Semester.

**TOTAL CREDIT DISTRIBUTION**

| Component | No of Papers | Credits | | Marks | |
|---|---|---|---|---|---|
| | | Credit | Total | Marks | Total Marks |
| **PART A** | | | | | |
| **Core** | 9 | 1X3<br>4X4<br>4X5 | 3<br>16<br>20<br>39 | 9x100 | 900 |
| **Core Practical** | 6 | 6x2 | 12 | 6x100 | 600 |
| **Inter Disciplinary Course** | 2 | 2X4 | 8 | 2x100 | 200 |
| **Elective** | 4 | 1X4<br>3X5 | 4<br>15<br>------<br>19<br>------ | 4x100 | 400 |
| **Self Study** | 1 | 1x4 | 4 | 1x100 | 100 |
| **Project** | 1 | 1x8 | 8 | 1x200 | 200 |
| **PART B** | | | | | |
| **Value Education** : Human Rights | 1 | 1x2 | 2 | 1x100 | 100 |
| **NON-CREDIT** | | | | | |
| 1 . Career Competency Skills I<br>2. Career Competency Skills II<br>3. Career Competency Skills III | 3 | --- | --- | --- | --- |
| **Grand Total** | | | **92** | | **2500** |

| 15PCSM101 | CORE I: ADVANCED JAVA PROGRAMMING | SEMESTER - I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To impart knowledge on advanced concepts in J2EE with database.
2. To learn Client/Server programming and Distributed application.

**CONTENTS**

**UNIT- I** **(10 Hours)**

Java 2 Enterprise Edition Overview: Java Byte code – The Advantages of Java – J2EE and J2SE. J2EE Multi-Tier Architecture: The Tier – J2EE Multi-Tier Architecture. JDBC Objects: The Concept of JDBC – JDB Driver Types – JDBC Packages – A brief Overview of JDBC Process – Database Connection – Statement Objects – ResultSet – Transaction Processing.

**UNIT - II** **(10 Hours)**

**Networks and HTTP**: The Internet - URIs, URLs and URNs - The Client-Server Model - The Transfer of Data and Network Protocols - The Hypertext Transfer Protocol (HTTP) - HTTP Methods - HTTP Status Codes. Java EE Architecture: Terminology- Servlet Basics: Generic Servlets - HTTP Servlets.

**UNIT - III** **(10 Hours)**

**Servlet Contexts:** The Interfaces. Request and Responses: The Interfaces – ServletRequest - HttpServletRequest - ServletResponse. RequestDispatcher & Wrappers: The RequestDispatcher Mechanism. Session Management: Operating with Sessions - The HttpSession Interface.

**UNIT - IV** **(10 Hours)**

**JSP Basics:** Introduction-Codeless JSP Pages - The JSP Life Cycle - Scripting Elements – Directives – Declarations – Scriptlets – Expressions – Comments - Implicit Objects. Security: Authentication Basics - Methods for Authentication - Declarative Authentication.

**UNIT - V** **(10 Hours)**

Creating and Deploying an Enterprise Bean: An Introduction to Enterprise Beans – Setting Security. Types of Enterprise Beans: Session Beans – The lifecycle of a session Bean – Coding the Home Interface – Coding the Remote Interface – Coding the Helper classes- Entity Beans – The Life Cycle of an Entity Bean – The Primary Key – Shared Access – The Transaction – Creating an Entity Bean Demonstrating Bean – Managed

Persistence – Coding the Home Interface – Coding the Remote Interface – Coding the Enterprise Bean Class – Connecting an Entity Bean to an SQL Database.

**TEXT BOOKS:**

1. *Jim Keogh, 2005*. **The Complete Reference.** McGraw-Hill .New Delhi. **(Unit I)**
2. *Charles Lyons.2009.* **SCWCD Study Companion with Java EE6 Preview**. [Second Edition]. Garner Press. UK. **(Unit II,III,IV)**
3. *Pallavi Jain and Shadab Siddiqui with NIIT. 2002.* **J2EE Professional Projects.** PHI Eastern Economy Edition. **(Unit V).**

**REFERENCE BOOKS:**

1. *Mark Cade and Humphrey Sheil. 2010.* **Sun Certified Enterprise Architect for Java EE Study Guide.** [Second Edition]. Prentice Hall. New Delhi
2. *Herbert Schildt*. 2011.**Java : The Complete Reference**. [Eighth Edition]. McGraw-Hill.New Delhi.
3. *Richard Monson-Haefel and Bill Burke. 2006*. **Enterprise JavaBeans 3.0. [**Fifth Edition]. O'Reilly Publication. New York.

| 15PCSM102 | CORE II: DESIGN AND ANALYSIS OF ALGORITHMS | SEMESTER - I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To introduce the classic algorithms in various domains, and techniques for designing efficient algorithms.
2. To create analytical skills, to enable the students to design algorithms for various real time problems and to analyze the algorithms.
3. To appreciate the impact of algorithm design in practice.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Introduction:** Algorithm - Algorithm Specification - Performance Analysis - Randomized Algorithms – Divide-And-Conquer: General Method - Binary Search - Finding the Maximum and Minimum - Merge Sort - Quick Sort – Selection - Strassen's Matrix Multiplication - Convex Hull.

**UNIT -II** **(10 Hours)**

**The Greedy Method:** The General Method - Knapsack Problem - Job Sequencing with Deadlines – Minimum-Cost Spanning Trees – Optimal Storage on Tapes – Single-Source Shortest Paths.

**UNIT- III** **(10 Hours)**

**Dynamic Programming:** The General Method- Multistage Graphs – All Pairs Shortest Path – Single-Source Shortest Paths: General Weights – Optimal Binary Search Trees – String Editing – 0/1- Knapsack - Reliability Design – The Traveling Salesperson Problem.

**UNIT -IV** **(10 Hours)**

**Basic Traversal And Search Techniques:** Techniques for Binary Trees – Techniques for Graphs – Connected Components And Spanning Trees – Biconnected Components and DFS. Backtracking: The General Method – The 8-Queens Problems – Some of Subsets – Graph Coloring – Hamiltonian Cycles - Knapsack Problem. Branch-And-Bound: The Method – 0/1 Knapsack Problem – Travelling Salesperson – Efficiency Considerations.

**UNIT -V** **(10 Hours)**

***NP*-Hard and *NP*-Complete Problems:** Basic Concepts – Cook's Theorem – NP-Hard Graph Problems - NP-Hard Scheduling Problems - NP-Hard Code Generation

Problems – Some Simplified NP-Hard Problems. Genetic Algorithms: Introduction – Use Genetic Algorithms – Genetic Algorithms Work – GA Works – Some GA Implementations.

**TEXT BOOKS:**

1. *Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran*. 2007. **Fundamentals of Computer Algorithms**. [First Edition]. Galgotia Publication Pvt. Ltd. New Delhi. (Unit-I to Unit-IV)
2. *Basu, S.K.* 2007**. Design Methods and Analysis of Algorithms**. [First Edition]. PHI Pvt. Ltd. New Delhi. ( Unit-V)

**REFERENCE BOOKS:**

1. *Anany Levitin*. 2005. **Introduction to the Design and Analysis of Algorithms**. [First Edition]. Pearson Education Asia. Beijing.
2. *Thomas H Cormen, Charles E Leiserson, Ronald L Rivest and Clifford Stein.* 2009**. Introduction to Algorithms**. [Third Edition] . PHI Pvt. Ltd. New Delhi.
3. *Sara Baase and Allen Van Gelder*. 2006. **Computer Algorithms – Introduction to Design and Analysis**. [Third Edition]. Pearson Education Asia. Beijing.

| 15PCSM103 | CORE III :OPEN SOURCE SOFTWARE | SEMESTER - I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To understand the Frame Work and Opportunities of Open Source software.
2. To get familiarize with the Open Source Application services and Implementation Process.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Open Source Software:** Definition and History - Where open source is successful: Analytical frame work – Open source is in widespread successful use – Open source: the Good, the Bad and the Ugly.

**UNIT- II** **(10 Hours)**

**Five Immediate open source opportunities :** Create an open source Lab- Migrate infrastructure to SAMBA – Build LAMP Applications – Bring New Desktop systems to the underserved- Migrate Applications and Database to Open source- Five More open source opportunities: Directory services – Email – Groupware and Collaboration – Complex Web Publishing – Manage User Desktop - Operating Systems: Contents of Operating system – Linux Distribution Vendors – Enterprise Distribution Vendors – Community supported Distribution Vendors.

**UNIT - III** **(10 Hours)**

**Open Source Server Applications:** Infrastructure services – web servers – Database servers- mail servers- open source Desktop Applications: Introduction – Geographical Desktops – Web browsers – The Office Suite- mail and Calendar clients - Personal software – How Open source software is Developed : Methodology – Languages used to Develop Open Source products.

**UNIT- IV** **(10 Hours)**

**MySQL** : Choosing a Data base for PHP: What is Database – Why a Database – Choosing Database - SQL Tutorial – PHP / MySQL Functions – Displaying Queries in Tables – Building Forms from Queries.

**UNIT- V** **(10 Hours)**

**PHP:** Getting Started with PHP – Adding PHP to HTML – Syntax and Variables: PHP Syntax is C-Like - Comments - Variables – Control and Functions: Boolean Expressions – Branching – Looping – Defining your own Functions - Database Connectivity: Connect, Fetch, and Display records.

**TEXT BOOKS:**

1) *Paul Kavanagh* . **Open Source Software Implementation & Management.** Elsevier Digital Press. (Unit I, II & III).
2) *Converse & Park With Morgan. 2007.* **PHP5 and MYSQL Bible.**Wiley –India. (Unit IV & V)

**REFERENCE BOOKS:**

1) *Karl Fogel*. **Producing Open Source Software.** 2005. O'Reilly.
2) *Stefan Koch.* **Free / Open Source Software Development**. 2005. Idea Group Publishing, USA.
3) *Michele E Davis and John A Phillips*. 2007. **Learning PHP and MYSQL**. [Second Edition]. O'reilly. New York.

| 15PCSMP101 | CORE PRACTICAL I : ADVANCED JAVA PROGRAMMING | SEMESTER - I |
|---|---|---|

**LIST OF PRACTICAL**

1) Develop program to connect database and get result set from database using JDBC API.
2) Develop program to connect database and insert new record to the existing table using JDBC API.
3) Develop program using HTTPServlet API and read request parameters from the HTML page and process the same and display it.
4) Develop program using HTTPServlet API and read request parameters from the HTML page store the same into HttpSession Object and process it.
5) Develop program using HTTPServlet API and read request parameters from the HTML page and process and store the same into Database.
6) Develop program using JSP API and read request parameters from the HTML page and validate the request values using database.
7) Develop program using JSP API and read request from the user and navigate to another JSP page.
8) Develop program using Statefull Session Bean API.
9) Develop program using Stateless Session Bean API.
10) Develop program using EntityBean API and insert new record to database.

| 15PCSMP102 | CORE PRACTICAL II : PHP & MYSQL | SEMESTER - I |
|---|---|---|

**LIST OF PRACTICAL**

1. Program to demonstrate the concept of User Defined Functions using PHP
2. Program to Pass Value from One form to another form using PHP
3. Program to demonstrate Techniques of Exception Handling using PHP.
4. Program to Display the records from MySQL using PHP
5. Program to Add, Edit and Delete the records from MySQL using PHP
6. Design a Web page to see the result for a candidate when the results are published on the web.

| 15PMACSI101 | IDC I:NUMERICAL METHODS AND STATISTICS (THEOREMS AND PROOF ARE NOT EXPECTED) | SEMESTER – I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To know how to solve algebraic equations and system of equations by using numerical methods.
2. To perform differentiation and integration using numerical methods.
3. To study about correlation, Regression and distributions.

**CONTENTS**

**UNIT – I** **(10 Hours)**

**Algebraic and Transcendental Equations**: Bisection Method –Iteration Method –The Method of False Position –Newton-Raphson –Method.

**(Chapter – 3 Sections: 3.1 – 3.4)**

**UNIT – II** **(10 Hours)**

**System of Linear Equation**: Gauss Elimination, Gauss Jordan method –Iteration Methods, Jacobi, Gauss Seidal Iteration, Gauss method to compute the inverse.

**(Chapter – 4 Sections: 4.1 – 4.3, 4.8, 4.9)**

**UNIT – III** **(10 Hours)**

Interpolation with equal intervals –Newton forward and backward formula -Central Difference Interpolation formula –Gauss forward and backward formula –Stirling's formula –Bessel's Formula.

**(Chapter – 6 Sections: 6.1 – 6.7) (Chapter – 7 Sections: 7.1 – 7.6)**

**UNIT – IV** **(10 Hours)**

Statistics – Definition – Limitations - Test of significance – Population and sample - Sampling methods – Large sample tests and Small Sample *t*-tests – Problems.

**Chapter: 12(12.1, 12.2, 12.9.1, 12.9.2, 12.13 and 12.14), 14 (14.2.9 and 14.2.10)**

**UNIT – V** **(10 Hours)**

Testing of significance – Parametric tests – Chi-Square test – Uses of Chi-Square test - *F* Test – ANOVA - One way classification – Two way Classifications.

**Chapter: 13(13.7.1 to 13.7.3), 14.5.5, 4.3* &4.4***

**TEXT BOOKS:**

*1. Kandasamy, P., Thilagavathy, K., Gunavathi, K.* 2008. **Numerical Methods.** S. Chand & Company Ltd, New Delhi.

*2.Gupta,S.C.and Kapoor,V.K.*1994. **Fundamentals of Mathematical Statistics**. Sultan Chand & Sons, New Delhi.

**REFERENCE BOOKS:**

1. *Kalavathy, S*. 2004. **Numerical Methods**.Vijay Nicole, Chennai.

2. *Sastry,S.S*. 2007.**Introductory Methods of Numerical Analysis**. Prentice Hall of IndiaPvt Ltd., New Delhi.

| 15PLS101 | CAREER COMPETENCY SKILLS I | SEMESTER – I |
|---|---|---|

**Total Hours : 15**

**OBJECTIVE:**

To enhance employability skills and to develop career competency.

**CONTENTS**

**UNIT – I** **(3 Hours)**

Solving Simultaneous Equations Faster - Number System: HCF, LCM - Decimals – Percentages- Averages

**UNIT – II** **(3 Hours)**

Powers and Roots -Problems on Trains- Problem on ages-Boats and Streams

**UNIT – III** **(3 Hours)**

Calendar-Clocks -Pipes and cisterns-Permutations and Combinations-Seating Arrangements

**UNIT – IV** **(3 Hours)**

Syllogism – Assertion and Reasons – Statements and Assumptions – Identifying Valid Inferences – Identifying strong arguments and weak arguments – Statements and Conclusions.

**UNIT – V** **(3 Hours)**

Reading comprehension – Self Introduction – News Paper Review – Book Review

| 15PCSM201 | CORE IV: C# AND ASP .NET FRAMEWORK | SEMESTER - II |
|---|---|---|

**Total Hours – 45**

**OBJECTIVES:**

1. To become skilled at Fundamental and Advanced concept of .NET Frame work.
2. To gain Knowledge of Web Application Architecture.

**CONTENTS**

**UNIT -I** **(9 Hours)**

**Introduction C# and the .NET Platform:** The Philosophy of .NET - Understanding the Previous State of Affairs - The .NET Solution - Introducing the Building Blocks of the .NET Platform ( the CLR,CTS and CLS) - An overview of .NET Assemblies - Understanding the Common Type System - Understanding the Common Language Specification - Understanding the Common Language Runtime - The Assembly/Namespace/Type Distinction.

**UNIT- II** **(9 Hours)**

**Core C# Programming Constructs:** The Anatomy of a Simple C# Program - System Data Types and C# Shorthand Notation - Understanding the System.String Type. Defining Encapsulated Class Types: Introducing the C# Class Type - Understanding Class Constructors - The Role of the this Keyword - Understanding the static Keyword.

**UNIT -III** **(9 Hours)**

**Understanding Structured Exception Handling:** The Role of .NET Exception Handling - The Simplest Possible Example -The Finally Block - The Interfaces of the System.Collections - The Class Types of System.Collections.Namespace. ADO.NET Part I The Connected Layer - A High-Level Definition of ADO.NET - Understanding ADO.NET Data Providers - Additional ADO.NET Namespaces - Understanding the Connected Layer of ADO.NET - Working with Data Readers.

**UNIT -IV** **(9 Hours)**

**Building Web Applications with ASP.NET:** The Role of HTTP - Understanding Web Applications and Web Servers - The Role of HTML - The Role of Client-Side Scripting - Building a Classic ASP Page - Problems with Classic ASP - The ASP.NET Namespaces - Details of an ASP.NET Website Directory Structure-Interacting with the Incoming HTTP Request -Interacting with the Outgoing HTTP Response - The Life Cycle of an ASP.NET Web Page

**UNIT- V** **(9 Hours)**

**ASP.NET State Management Techniques:** The Issue of State - ASP.NET State Management Techniques - Understanding the Role of ASP.NET View State - The Role of the Global.asax File - Understanding the Application/Session Distinction - Working with the Application Cache-Maintaining Session Data - Understanding Cookies.

**TEXT BOOK:**

1. *Andrew Troelsen* . 2007. **Pro C# 2008 and the .NET 3.5 Platform**. [Fourth Edition]. Apress. Bangalore.

**REFERENCE BOOKS:**

1. *Mike Snell, Glenn Johnson,Tony Northrup and GrandMasters*. 2009. **Microsoft .NET Framework 3.5 - ASP.NET Application Development**. [First Edition]. Microsoft Press. New York.
2. *John Sharp.* 2008. **Microsoft Visual C# 2008 Step by Step** . [First Edition]. Microsoft Press. New York.
3. *Christian Nagel, Bill Evjen, Jay Glymn, Karli Watson and Morgan Skinner*.2008. **Professional C# 2008**. [First Edition]. Wiley Publishing . New York.

| 15PCSM202 | CORE V: DISTRIBUTED OPERATING SYSTEM | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To enable students to learn the fundamental concepts of Distributed Operating system.
2. To design principle that brings about distributed operating system.

**CONTENTS**

**UNIT - I** **(12 Hours)**

**Distributed Computing System:** Definition - Distributed Computing System Models – Distributed Operating System – Issues in Designing a Distributed Operating System. Message Passing: Introduction – Desirable Features of a Good Message - Passing System – Issues in IPC by Message Passing – Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding of Message Data – Failure Handling.

**UNIT- II** **(10 Hours)**

**Remote Procedure Calls:** Introduction – The RPC Model – Transparency of RPC – Implementing RPC Mechanism – Stub Generation – RPC Messages – Marshaling Arguments and Results – Server Management – Communication Protocols for RPCs – Client-Server Binding. Distributed Shared Memory: Introduction – General Architecture of DSM Systems – Design and Implementation Issues of DSM – Granularity - Structure of Shared Memory Space – Replacement Strategy – Thrashing.

**UNIT- III** **(9 Hours)**

**Synchronization:** Introduction – Event Ordering – Mutual Exclusion – Deadlock – Election Algorithms.

**UNIT- IV** **(9 Hours)**

**Resource Management:** Introduction – Desirable Features of a Good Global Scheduling Algorithm – Task Assignment Approach – Load-Balancing Approach – Load-Sharing Approach. Process Management: Introduction – Process Migration – Threads.

**UNIT -V** **(10 Hours)**

**Distributed File Systems:** Introduction – Desirable Features of a Good Distributed File System – File Models – File-Accessing Models – File-Sharing Semantics – File-Caching Schemes – File Replication – Fault Tolerance – Atomic Transactions: Need of Atomic Transactions – Concurrency Control – Design Principles.

**TEXT BOOK:**

1. *Pradeep K Sinha*.2007. **Distributed Operating Systems: Concepts and Design**. [First Edition]. PHI. New Delhi.

**REFERENCE BOOKS:**

1. *Andrew S Tanenbaum*. 2001. **Modern Operating System**. [Third Edition]. PHI-Pearson Education Asia. New Delhi.
2. *William Stallings*. 2007. **Operating Systems Internals and Design Principles**. [Fifth Edition]. Prentice Hall of India. New Delhi.

| 15PCSM203 | CORE VI: DATA MINING AND WAREHOUSING | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To study the basic tasks, metrics, issues, and implication of data mining.
2. To gather knowledge on classification, clustering and association rules.

**CONTENTS**

**UNIT -I** **(10 Hours)**

**Data Warehouse and OLAP Technology:** An Overview - Data Warehouse – A Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation.

**UNIT -II** **(10 Hours)**

**Introduction:** Data mining - Data Mining Functionalities. Data Preprocessing: Preprocess the Data - Data Cleaning - Data Integration and Transformation - Data Reduction.

**UNIT -III** **(10 Hours)**

**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts and a Road Map - Efficient and Scalable Frequent Itemset Mining Methods - Mining Various Kinds of Association Rules. Classification and Prediction: Bayesian Classification - Classification by Backpropagation - Prediction.

**UNIT- IV** **(10 Hours)**

**Cluster Analysis:** A Categorization of Major Clustering Methods - Partitioning Methods- Hierarchical Methods – Grid-Based Methods –Model-Based Clustering Methods – Density-Based Methods .

**UNIT -V** **(10 Hours)**

**Applications and Trends in Data Mining:** Data Mining Applications - Data Mining System Products and Research Prototypes – Social Impacts of Data Mining – Trends in Data Mining - Mining the World Wide Web.

**TEXT BOOK:**

1. *Jiawei Han and Micheline Kamber*. 2006. **Data Mining Concepts and Techniques.** [Second Edition]. Elsevier Inc , San Francisco.

**REFERENCE BOOKS:**

1. *Arun K Pujari*. 2001**. Data Mining Techniques.** [First Edition]. Universities Press (India) Pvt.Limited.
2. *George M Marakas. 2002.* **Modern Data warehousing, Mining and Visualization*:* Core Concepts**. [First Edition]. Prentice Hall. New Delhi.
3. *Pang-Ning Tan, Michael Steinbach and Vipin Kumar*. 2006. **Introduction to Data Mining.** [First Edition]. Pearson Education. New Delhi.
4. *Soman, K. P, Shyam Diwakar and Ajay,V.* 2006. **Data Mining**. [First Edition]. Prentice Hall. New Delhi.

| 15PCSMP201 | CORE PRACTICAL III: C# AND ASP .NET FRAMEWORK | SEMESTER - II |
|---|---|---|

**LIST OF PRACTICAL**

**C#.NET**

1. Create a simple application in C# .Net using Console Application.
2. Create an application that should use this and static keywords.
3. Create and manage application that should use Try….Catch….Finally Blocks.
4. Create an application that uses System. Collections namespace.
5. Create and open a connection for a database and add, read and update records in a database.

**ASP.NET**

6. Create a simple application in ASP.NET.
7. Create an application that uses multiple forms.
8. Create an application to interact with Application–level variables that should use HttpApplicationState.
9. Create an application to interact with Session–level variables that should use HttpSessionState.
10. Create and open a connection to a database and add, read and update records in a database.

| 15PCSMP202 | CORE PRACTICAL IV : MOBILE APPLICATION DEVELOPMENT | SEMESTER - II |
|---|---|---|

**LIST OF PRACTICAL**

1. Develop an Application it shows Hello World message using Toast.
2. Develop an Application that contains one Textview, it shows the activity lifecycle of each stages , use the XML-based approach.
3. Develop an Login form Application it validate username and password statically.
4. Design an Activity that contains Name ,RollNo ,Dept ,Year , Current Percentage, it should be able to submit and preview the information on the mobile screen.
   Note : The screen should use only relative layout.
5. Create an app to show a list of student names in a listview, when you choose a student name, it should show student profile form on next activity.
6. Create an app to play an audio and video files.
7. Develop a Login form App it validate the username and password using Sqlite database.
8. Develop an app for file read and write operation using internal and external storage.
9. Create an app to show scale, transition, alpha and rotation animation
10. Develop app for JSON Parsing from URL.

| 15PMACSI201 | IDC II: RESOURCE MANAGEMENT TECHNIQUES | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To know the concepts of mathematical formulation and solving.
2. To find solution of Transportation and Assignment models.
3. To learn the concepts in CPM, PERT and Queuing models.

**CONTENTS**

**UNIT – I** **(10 Hours)**

**Linear Programming Problem:** Introduction - Linear Programming Problem - Mathematical Formulation of the Problem – Illustration on Mathematical Formulation of LPPs - Graphical Solution Method – Some Exceptional Cases - Simplex method –Big M method Only.

**(Chapter – 2 Sections: 2.1 – 2.4) (Chapter – 3 Sections: 3.1 – 3.3)**
**(Chapter – 4 Sections: 4.1 – 4.4)**

**UNIT – II** **(10 Hours)**

**Integer Programming:** Introduction – Pure and Mixed IPP - Construction of Gomory's constraints-Fractional Cut method.

**(Chapter –7 Sections: 7.1 – 7.6)**

**UNIT – III** **(10 Hours)**

**Transportation and Assignment Problem:**

Mathematical formulation of transportation problem-Methods for finding initial basic feasible solution –optimum solution -Degeneracy –Mathematical formulation of Assignment models –Hungarian Algorithm.

**(Chapter – 10 Sections: 10.5 – 10.9, 10.12, 10.13) (Chapter – 11 Sections: 11.1 –11.3)**

**UNIT – IV** **(10 Hours)**

**Queuing Models** :Pure Birth and Death model –Poisson model –Models (M/M/1) : (∞/FIFO), (M/M/1) : (N/FIFO).

**(Chapter – 21 Sections: 21.1 –21.9)**

**UNIT – V** **(10 Hours)**

**Network Scheduling by PERT /CPM:** Network Construction –Critical Path Method – Project Evaluation and Review Technique.

**(Chapter – 25 Sections: 25.1 –25.7)**

**TEXT BOOK:**

1. *Kanti Swarup, Gupta, P.K.and Man Mohan*.2014. **Operations Research**. Sultan Chand &Sons, New Delhi.

**REFERENCE BOOKS:**

1. *Sundaresan,V., Ganapathy Subramanian, K.S. and Ganesan,K.* 2007. **Resource Management Techniques**. [Fourth Edition]. AR Publication, Chennai.

2. *Sharma, J.K.*2007. **Introduction to Operations Research Theory and Applications.** [ThirdEdition].Mac Millan India Ltd.,New Delhi.

| 15PVE201 | VALUE EDUCATION: HUMAN RIGHTS | SEMESTER- II |
|---|---|---|

**Total Hours: 25**

**OBJECTIVE:**

1. To make the students to understand the concepts of human rights.

**CONTENTS**

**UNIT – I** **(5 Hours)**

Human Rights: Definition - Historical Evolution - Classification of Rights - Universal Declaration of Human Rights - International Covenants on Economic and Social Rights - Constitutional Provision for Human Rights – Fundamental Rights - Directive Principles of the State Policy – Indian Constitution.

**UNIT – II** **(5 Hours)**

Civil and Political Rights: Right to Work – Right to Personal Freedom – Right to Freedom of Expression - Right to Property - Right to Education - Right to Equality - Right to Religion - Right to Form Associations and Unions - Right to Movement – Right to Family – Right to Contract – Right to Constitutional Remedies – Right to Vote and Contest in Elections – Right to Hold Public Offices – Right to Petition – Right to Information – Right to Criticise the Government – Right to Democratic Governance.

**UNIT – III** **(5 Hours)**

Economic Rights: Right to Work – Right to Adequate Wages – Right to Reasonable Hours of Work – Right to Fair Working Conditions – Right to Self Government in Industry – Customer Rights – Social and Cultural Rights – Right to Life - Right to Clean Environment.

**UNIT – IV** **(5 Hours)**

Women's Rights: Right to Inheritance – Right to Marriage – Divorce and Remarry – Right to Adoption – Right to Education – Right to Employment and Career Advancement – Rights Relating to Dowry – Right for Equality – Right for Safe Working Conditions – Children's Rights – Right to Protection and Care – Right to Education – Issues Related with Infanticide – Street Children – Child Labour – Bonded Labour – Refugees Rights – Minority Rights – Dalit Rights – Tribal Rights – Nomads Rights.

**UNIT – V** **(5 Hours)**

Human Rights Violation: International, National, Regional Level Organizations to Protect Human Rights – UNO – National Commission for Human Rights – State Commissions – Non Governmental Organizations and Human Rights – Amnesty Terrorism and Human Rights – Emergency and Human Rights – Judiciary and Human Rights – Media and Human Rights - Police and Human Rights.

**REFERENCE BOOK:**

1. *Paul Singh.* **Human Rights and Legal System.** Himalaya Publishing House, New Delhi.

| 15PLS201 | CAREER COMPETENCY SKILLS II | SEMESTER - II |
|---|---|---|

**Total Hours: 15**

**CONTENTS**

**OBJECTIVE:**

To enhance employability skills and to develop career competency

**UNIT – I** **(3 Hours)**

Assertiveness and Self Confidence-Career Opportunities-Industry expectations (Skill set)

**UNIT – II** **(3 Hours)**

Campus to Corporate-Effective Communication

**UNIT – III** **(3 Hours)**

Situational Dialogues / Role Play (Telephonic Skills) - Oral Presentations-Prepared -'Just A Minute' Sessions (JAM)

**UNIT – IV** **(3 Hours)**

Body Language-Dress code-Telephone etiquettes- Email etiquettes-Group Discussion-Creativity-Presentation skills

**UNIT – V** **(3 Hours)**

Interviewing Techniques- Do's and Don'ts of Interview- Mock Interview.

| 15PCSM301 | CORE VII: STRUTS AND HIBERNATE | SEMESTER- III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To understand the concept of MVC design pattern.
2. To study the concept of ORM.

**CONTENTS**

**UNIT- I** **(8 Hours)**

**The Struts Framework:** An Introduction to Struts - A Brief History of Web Application Development - Two Development Models - A Closer Look at the Model-View-Controller Architecture - Enter Struts - Basic Components of Struts - Acquiring Struts.

**UNIT- II** **(11 Hours)**

**The Model Layer:** Struts and the Model. The View Layer: Struts and the View Layer - The Controller Layer: Struts and the Controller Layer - The ActionServlet Class - The RequestProcesor Class - The Action Class - The ActionForward Class.

**UNIT- III** **(11 Hours)**

**The Struts Configuration File:** Configuring the web.xml Deployment Descriptor - The Struts Configuration File Tags. The Struts Tag Libraries: The HTML Tag Library.

**UNIT- IV** **(10 Hours)**

**Understanding object/relational** applications - Persistance layers and alternatives: Layered architecture - Hand-coding a persistence layer with SQL/JDBC.**persistence:** Persistance: Understanding SQL - Using SQL in Java -Persistence in object-oriented

**UNIT -V** **(10 Hours)**

**Understanding object/relational persistence:** Object/relational mapping: Definition of ORM - Generic ORM problems. Introducing Hibernate, EJB3, and JPA- Starting a project: Starting a Hibernate project - Selecting a development process - Setting up the project - Hibernate configuration and startup – Running and Testing the application.

**TEXT BOOKS:**

1. *James Holmes*. 2007. **The Complete Reference - Struts.** [Second Edition]. McGraw Hill/Osborne. New Delhi. **(Unit: I, II, & III)**
2. *Christian Bauer and Gavin King*. 2007. **Java Persistence with Hibernate Revised Edition of Hibernate In Action.** [Second Edition]. Manning. U.S. **(Unit: IV &V)**

**REFERENCE BOOKS:**

1. *Donald Brown, Chad Michael Davis and Scott Stanlick* .2008. **Struts 2 in Action.** [First Edition]. Manning. U.S.
2. *Dave Minter and Jeff Linwood.* 2006. **Beginning Hibernate From Novice to professional**. [First Edition]. Apress. Bangalore.

| 15PCSM302 | CORE VIII: BIG DATA ANALYTICS | SEMESTER- III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To focus beyond the basic level of understanding that is typically offered at Fundamentals of Big Data Analytics course.
2. To establishes a baseline that can be enhanced by further formal training and additional real-world experience in the Big Data Analytics.

**CONTENTS**

**UNIT- I** **(10 Hours)**

Fundamentals of Big Data, **Examining Big Data Types:** Defining Structured Data, Defining unstructured Data, Putting Big Data Together. **Old Meets Now:** Distributed Computing- A Brief History of Distributed Computing – Understanding the Basics of Distributed Computing. **Digging into Big Data Technolgy Components:** Exploring Big Data Stack – Layer 0 to Layer 4.

**UNIT- II** **(10 Hours)**

**Virtualization and How it Supports Distributed Computing:** Understanding the Basics of Virtualization – Managing Virtualization with Hipervisor – Abstraction and Virtualization – Big Data Management – Map Reduce Fundamentals – Exploring the World of Hadoop.

**UNIT- III** **(10 Hours)**

The Hadoop foundation and Eco Systems – Appliances and Big Data Warehouses – **Analytics and Big Data:** Defining Big Data Analytics – Understanding Text Analytics and Big Data – Customized Approaches for Analysis of Big Data.

**UNIT- IV** **(10 Hours)**

**Big Data Implementation:** Integrating Data Sources – Dealing with Realtime Data Streams and Complex Event Processing – Operationalizing Big Data – Applying Big Data in your Organization - Security and Governance for Big Data Environments.

**UNIT- V** **(10 Hours)**

**Big Data Solutions in Real World**: The Importance of Big Data to Business. Analyzing the Data in Motion - Improving Business with Big Data Analytics – Ten Big Data Best Practices – Ten Great Big Data Resources.

**TEXT BOOK:**

1. *Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman*. 2014. **Big Data for Dummies.** John Wiley.

**REFERENCE BOOKS:**

1. *Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis.*2012. **Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data.**
   McGraw-Hill.
2. *Lin and Chris Dyer,*2010. **Data-Intensive Text Processing with MapReduce Jimmy.** Morgan &Claypool Synthesis.

| 15PCSM303 | CORE IX: PROFESSIONAL ETHICS AND CYBER LAW | SEMESTER- III |
|---|---|---|

**Total Hours : 50**

**OBJECTIVES:**

1. To appreciate the innate and inseparable relationship between 'values' and 'skills'
2. To facilitate the development of a holistic perspective in their minds towards life profession and personal happiness
3. To give importance of cyber law.

**CONTENTS**

**UNIT - I** **(10 Hours)**

**Ethics and Human Values :** Definition and meaning of Ethics and values– The five basic human values - The sub values- The importance of human values- Relevance of values in professional life- Standard of living vs Standard of life – Values and career.

**UNIT - II** **(10 Hours)**

**Professional Ethics :** Definition and meaning- Kohlberg's theory – Gilligan's theory - Professional ethics and Business Ethics-Need for professional ethics- Importance of professional ethics- Benefits of following professional ethics- Consequences of unprofessional conduct -Training in professional ethics.

**UNIT - III** **(10 Hours)**

**Professional Ethics for IT Professionals :** Professional vs Expert – Professional responsibility – Striving for technical excellence- Maintaining professional honesty and integrity - Privacy and confidentiality. Whistle blowing.

**UNIT -IV** **(10 Hours)**

Interpersonal Relationship- Meaning and importance of Interpersonal Relationship - Collegiality and Loyalty – Authority and responsibility- Respect for authority- Conflicts, collaboration and cooperation

**UNIT- V** **(10 Hours)**

**Cyber Law :** Information Technology Act ,2000: Digital Signature - Electronic Governance - Electronic Records – Certifying –authorities - Civil Wrongs under IT Act- Offences under IT Act - Other Cyber crimes

**TEXT BOOKS:**

1. *Merunandan, K.B. and Venkatesh, B.R.* 2011. **Introduction to the Constitution of India & Professional Ethics for All Engineering Courses**. [Third Edition]. Meragu Publication. Bangalore. **(Unit I,II & III)**
2. *Diana Dwyayer.* 2012. **Interpersonal Relationship**. [First Edition]. Routledge Taylor and Franeis, India. **(Unit IV)**
3. *Apar Gupta.* 2011. **Commentary on Information Technology Act. [**Second Edition**].** Kindle Publications, New Delhi. **(Unit V)**

**REFERENCE BOOKS:**

1. *Gaur, R.R, Sanga, R. and Bagaria, G.P*. 2010. **Foundation Course in Human Values & Professional Ethics**. [First Edition]. Excel Books, New Delhi.
2. *Pandey ,V.C.* 2012. **Education Culture & Human Values**. [First Editon]. Isha Books, Kolkata.
3. *John R Boatright*. 2003. **Ethics and the Conduct of Business**.[Fourth Edition]. Pearson Education, New Delhi.
4. *Nagarajan, R.S.* 2006**. A TEXT BOOK: on Professional Ethics and Human Values**. **[**First Edition**].** New age international (P) Limited, New Delhi.

| 15PCSMP301 | CORE PRACTICAL V : STRUTS AND HIBERNATE | SEMESTER - III |
|---|---|---|

**LIST OF PRACTICAL**

1. Develop program to receive Http Request Parameter from JSP page and process the same in Servlet.
2. Develop program that should use JSP custom tag.
3. Develop program to design MVC using JSP, Servlet and POJO or Java class.
4. Develop simple program using Struts framework
5. Develop program to validate user request using Struts framework.
6. Develop program using Struts framework that should use struts Form tag library.
7. Develop program using Struts framework that should use Exception Handling mechanism provided by the struts.
8. Develop program using Struts framework that should use tiles struts tag library.
9. Develop program using Hibernate framework that use Many-to-One mapping.
10. Develop program using Hibernate framework that use One-to-One mapping.

| 15PCSMP302 | CORE PRACTICAL VI : DATA MINING | SEMESTER - III |
|---|---|---|

**LIST OF PRACTICAL**

1. Design a multi dimensional data model using star/ snowflake schema technique for any business fact corresponding to a department of an organization. Implement the designed schema using a data warehouse tool (Oracle business intelligent 11g or SQL Server business intelligence development studio2008: Analysis Services).
2. Use of ETL tool (Integration services) for extracting data from various data sources, transform it into unique schema, and load it to destination tables in DWH and generate reports (Reporting Services)
3. Implementing and understanding data preprocessing methods on Weka.
4. Implementation of K-Means algorithm.
5. Implementing Apriori algorithm.
6. Implementation of FP-growth algorithm.
7. Implementation of DB-SCAN algorithm.
8. Implementation of Bayesian classification algorithm.
9. Implementation of K-means algorithm for generating association rules from a given large item set using Weka and verifying the results using MATLAB
10. Study of Rapid Miner.

| 15PLS301 | CAREER COMPETENCY SKILLS III | SEMESTER- III |
|---|---|---|

**Total Hours : 15**

**OBJECTIVE:**

To enhance the students Technical knowledge and Programming skills in latest Technologies.

**CONTENTS**

**UNIT - I** **(3 Hours)**

C++ Functions -Inheritance - C++ pointers - C++ error handing.

**UNIT –II** **(3 Hours)**

Java Basics: Java Packages – Classes and Objects – Java Garbage Collections - Java Threads

**UNIT - III** **(3 Hours)**

Advanced Java: Swing - Java2EE – Servlets - Struts

**UNIT-IV** **(3 Hours)**

. NET Framework: Dynamic Language Runtimes (DLR) – Common Type systems (CTS) - Metadata and self Describing Components.

**UNIT-V** **(3 Hours)**

. NET Framework Security – Profiling – side by side Execution.

| 15PCSM401 | CORE X : E-COMMERCE TECHNOLOGY (SELF STUDY & 100% INTERNAL EVLAUATION) | SEMESTER - IV |
|---|---|---|

**OBJECTIVES:**

1. To understand E-Commerce Business Models and its basic concepts.
2. To know how the Internet Technology involved in building E-commerce Web sites and Electronic Payment systems
3. To know about the Role of Ecommerce in Retailing and Service Industries.

**UNIT - I**

**Electronic-commerce:** What is E-Commerce - Difference between E-commerce and E-Business-Seven unique features of E-commerce Technology-Types of E-Commerce. **E-Commerce Business Models and Concepts:** E-Commerce Business Models – Major Business-to-Consumer (B2C) Business Model- Major Business-to-Business (B2B) Business Model-Business Models in Emerging E-Commerce Areas.

**UNIT - II**

**The Internet and World Wide Web: E-Commerce Infrastructure:** The Internet Technology Background- The Internet Today-The World Wide Web – The Internet and the Web : Features.

**UNIT - III**

**Building an E-commerce Website:** A Systematic Approach-Choosing the server software-Choosing the hardware for an E-Commerce site-other E-Commerce site Tools. **Security and Encryption:** Security Threats in E-Commerce Environment- Technology Solutions-Policies, procedures and laws.

**Unit –IV**

**Electronic payment systems:** Payment Systems- Credit card E-Commerce Transactions-E-Commerce digital payment Systems in the B2C arena-b2B Payment Systems.

**Unit –V**

**E-commerce in Action: Retailing on the Web:** The Retail Sector- Analysing Viability of on-line form-E-Tailing Business Models. **On-Line Service industry:** On-line financial services-On-line travel services-Career services.

**TEXT BOOK:**

1. *Laudon, K. C. & Traver, C. G.* **E-Commerce Business. Technology. Society.** Pearson Education.

**REFERENCE BOOKS:**

1. *Rayport, Jeffrey & Jaworski, Bernard.* ***Ecommerce.*** Burr ridge, IL: Irwin / McGraw-Hill.
2. *William Stallings.* 2011. **Cryptography and Network Security – Principles and Practices.**[Fifth Edition]. Pearson Education, New Delhi

| 15PCSEL101 | ELECTIVE I: NETWORK SECURITY AND CRYPTOGRAPHY | SEMESTER I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To impart basic categories of threats to computers and networks.
2. To study Intrusions and intrusion detection.
3. To acquire fundamental ideas of public-key cryptography.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Classical Encryption Techniques:** Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Block Cipher Principles – The Data Encryption Standard – Advanced Encryption Standard: AES Structure – AES Transformation Functions - Block Cipher Operation: Electronic Code Book – Cipher Block Chaining Mode – Cipher Feedback Mode – Output Feedback Mode – Counter Mode.

**UNIT- II** **(10 Hours)**

**Introduction to Number Theory:** Fermat's and Euler's Theorems – The Chinese Remainder Theorem – The RSA Algorithm - Other Public-Key Cryptosystems: Diffie-Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography.

**UNIT- III** **(10 Hours)**

**Cryptographic Hash Functions:** Two Simple Hash Functions – Hash Functions Based on Cipher Block Chaining - Message Authentication Codes: Message Authentication Functions – Security of MACs – Digital Signatures: Introduction - Digital Signature Standard.

**UNIT- IV** **(10 Hours)**

**User Authentication:** Kerberos – Electronic Mail Security: Private Good Privacy - IP Security: IP Security Overview – IP Security Policy - Encapsulation Security Payload – Transport Level Security: Web Security Considerations – Secure Socket Layer and Transport Layer Security.

**UNIT- V** **(10 Hours)**

**Intruders:** Intrusion Detection – Password Management – Malicious Software: Types of Malicious Software – Virus Countermeasures – Worms – Distributed Denial of Service Attacks – Firewalls: Types of Firewalls - Firewall Location and Configurations.

**TEXT BOOK:**

1. *William Stallings.* 2011. **Cryptography and Network Security – Principles and Practices.** [Fifth Edition]. Pearson Education, New Delhi.

**REFERENCE BOOKS:**

1. *Atul Kahate*. 2003. **Cryptography and Network Security**. [Second Edition.]. Tata McGraw Hill, New Delhi.
2. *Bruce Schneier*. 2001. **Applied Cryptography. [**Second Edition**].** John Wiley & Sons Inc, New York.

| 15PCSEL102 | ELECTIVE I: TCP/IP | SEMESTER I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To understand the principles used by TCP/IP applications and the position of network protocols in OSI Model.
2. To identify the core protocols and its functions.

**CONTENTS**

**UNIT- I** **(9 Hours)**

**Introduction:** Protocols and Standards. The OSI Model and the TCP/IP Protocol Suite: The OSI model – TCP/IP Protocol Suite – Addressing. Underlying Technologies: Local Area Networks (LAN) – Point-To-Point WANS - Connecting Devices.

**UNIT- II** **(11 Hours)**

Introduction to IP Addresses –Subnetting and Supernetting – Delivery of IP packets – Routing – Datagram – IP package – ARP – RARP – Internet control message protocol(ICMP) : –Types of Messages and Message Format – Error Reporting– Internet group management protocol(IGMP) : –IGMP Messages–IGMP Operation.

**UNIT- III** **(11 Hours)**

User Datagram Protocol (UDP) – UDP Operation – UDP Package. Transmission Control Protocol (TCP): TCP Services – A TCP Connection – State Transition Diagram – Flow Control – Error Control – Congestion Control.

**UNIT- IV** **(9 Hours)**

**Host Configuration:** BOOTP and DHCP: BOOTP – DHCP. Domain Name System (DNS): Name Space – Distribution Of Name Space – Resolution – DNS Messages. Remote Login: TELNET: Network Virtual Terminal (NVT) – NVT Character Set – Controlling the Server.

**UNIT -V** **(10 Hours)**

**File Transfer Protocol (FTP):** Connections – Communication. Message Transfer Agent: SMTP – SNMP: PDUs – Format. HTTP:HTTP Transaction – Persistent versus Nonpresistent Connection – Proxy Server.

**TEXT BOOK:**

1. *Behrouz A. Forouzan*.2008. **TCP/IP Protocol Suite.** [Third Edition]. Tata McGraw Hill, New Delhi.

**REFERENCE BOOKS:**

1. *Douglas. Comer and David L. Stevens* . 1994. **Internetworking with TCP/IP – Volume I and III .** [Second Edition]. Prentice-Hall of India Pvt. Ltd, New Delhi.
2. *Mahbub Hassan and Raj Jain*. 2004. **High Performance TCP/IP Networking : C*o*ncepts, Issues and Solutions .** [First Edition]. PHI, New Delhi.

| 15PCSEL103 | ELECTIVE I: ADVANCED NETWORKS | SEMESTER - I |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To learn relationship between network layers.
2. To acquire knowledge on network services and functions of each of the layers.

**CONTENTS**

**UNIT – I** **(10 Hours)**

**Introduction:** Data Communications – Networks. Network Models: Layers in the OSI Model. Data and Signals: Analog and Digital - Periodic Analog Signals – Digital Signals: Bit Rate – Bit Length – Digital Signal as a Composite Analog Signal – Transmission Impairment: Attenuation – Distortion – Noise.

**UNIT- II** **(10 Hours)**

**Bandwidth Utilization:** Multiplexing and Spreading: Multiplexing: Frequency-Division Multiplexing – Wavelength-Division Multiplexing – Synchronous Time-Division Multiplexing – Statistical Time-Division Multiplexing. Switching: Circuit-Switched Networks – Datagram Networks – Virtual-Circuit Networks.

**UNIT- III** **(10 Hours)**

**Using Telephone and Cable Networks for Data Transmission:** Telephone Network – Dial-Up Modems – Digital Subscriber Line. Wireless WANs: Cellular Telephone and Satellite Networks: Cellular Telephony – Satellite Networks.

**UNIT -IV** **(10 Hours)**

**Virtual-Circuit Networks:** Frame Relay and ATM – Frame Relay: Architecture – Frame Relay Layers – Extended Address – FRADs – VOFR – LMI – ATM. Network Layer: Logical Addressing : IPv4 Addresses – IPv6 Addresses.

**UNIT- V** **(10 Hours)**

**Network Layer:** Delivery, Forwarding and Routing: Forwarding: Forwarding Techniques – Forwarding Process – Routing Table – Unicast Routing Protocols – Multicast Routing Protocols. WWW and HTTP: Architecture – Web Documents.

**TEXT BOOK:**

1. Behrouz A Forouzan . 2006. **Data Communications and Networking.** [Fourth Edition]. Tata McGraw-Hill, New Delhi.

**REFERENCE BOOKS:**

1. William Stallings. 1997. **Data and Computer Communication**. [Fifth Edition]. PHI, New Delhi.
2. Andrew S Tanenbaum. 2003. **Computer Networks .** [Fourth Edition].PHI, New Delhi.

| 15PCSEL104 | ELECTIVE I: AD HOC WIRELESS NETWORKS | SEMESTER - I |
|---|---|---|

**Total Hours - 50**

**OBJECTIVES:**

1. Facilitate the thoughtful advances in the mobile ad hoc networks.
2. To endorse the protocols behind the functioning of mobile ad hoc networks.
3. To know Advances in wireless local-area network technology and the growing interest in public safety communications.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Introduction:** Characteristics of the Wireless Channel – Modulation Techniques – Multiple Access Techniques - Ad Hoc Wireless Networks: Introduction – Issues in Ad Hoc Wireless Networks.

**UNIT- II** **(10 Hours)**

**Routing Protocols for Ad Hoc Wireless Networks:** Classifications of Routing Protocols – Table - Driven Routing Protocols – On-Demand Routing Protocols – Hybrid Routing Protocols – Hierarchical Routing Protocols.

**UNIT -III** **(10 Hours)**

**Multicast Routing in Ad Hoc Wireless Networks:** Classification of Multicast Routing Protocols – Tree-Based Multicast Routing Protocols – Mesh-Based Multicast Routing Protocol.

**UNIT- IV** **(10 Hours)**

**Wireless Sensor Networks:** Introduction – Sensor Network Architecture – Data Dissemination – Data Gathering – Location Discovery – Quality of a Sensor Network.

**UNIT- V** **(10 Hours)**

**Recent Advances in Wireless Networks:** Introduction – Ultra-Wide-Band Radio Communication – Wireless Fidelity Systems – The Service Provider Models, Issues, Interoperability – Optical Wireless Networks – The Meghadoot Architecture.

**TEXT BOOK:**

1. *Siva Ram Murthy, C. and Manoj, B.S*. 2012. **Ad hoc Wireless Networks Architectures and Protocols** . [Second Edition]. Pearson Education, New Delhi.

**REFERENCE BOOK:**

1. *Charles E Perkins*. 2000. **Ad hoc Networking . [**First Edition**]**. Addison – Wesley, Boston.

| 15PCSEL201 | ELECTIVE II: OBJECT ORIENTED SOFTWARE ENGINEERING | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To acquire knowledge on basic concepts in Software engineering.
2. To know how to design and test a system using object oriented concepts.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Introduction to Software Engineering :** Introduction: Software Engineering Failures – Software Engineering – Software Engineering Concepts - Software Engineering Development Activities. Modeling Concepts – A Deeper View into UML - Project Organization and Communication : Project Organization Concepts – Project Communication Concepts - Organizational Activities.

**UNIT - II** **(10 Hours)**

Requirements Elicitation - Requirements Elicitation & its Activities - Managing Requirements Elicitation - Analysis: An Overview of Analysis – Analysis Concepts - Analysis Activities: From Use Cases to Objects - Managing Analysis.

**UNIT -III** **(8 Hours)**

System Design: An Overview of System Design – System Design Concepts – System Design Activities: From Objects to Subsystems – Addressing Design Goals - Managing System Design.

**UNIT- IV** **(10 Hours)**

**Object Design:** Reusing Pattern Solutions: Reuse Concepts: Solution Objects – Inheritance and Design Patterns – Reuse Activities: Selecting Design Patterns and Components – Managing Reuse – Interface Specification Concepts – Interface Specification Activities -Managing Object Design.

**UNIT - V** **(12 Hours)**

**Testing:** Testing Concepts - Testing Activities - Managing Testing - Configuration Management: An Overview of Configuration Management - Configuration Management Concepts - Configuration Management Activities - Managing Configuration Management.

**TEXT BOOK:**

1. *Bernd Bruegge and Allen. H. Dutoit.* 2011. **Object Oriented Software Engineering: Using UML, Patterns and Java**. [Second Edition]. Pearson Education Asia, New Delhi.

**REFERENCE BOOKS:**

1. *Timothy C Lethbridge and Robert Laganiere*. 2005. **Object-Oriented Software Engineering: Practical Software Development Using UML and Java**. [Second Edition]. McGraw-Hill Higher Education, New Delhi.
2. *Stephen R Schach*. 2004. **An Introduction to Object Oriented Systems Analysis and Design with UML and the Unified Process**. [First Edition]. Tata McGraw-Hill, New Delhi.

| 15PCSEL202 | ELECTIVE II: SOFTWARE TESTING | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To Perform effective and efficient structural testing of a software.
2. To Integrate and test the various units and components of your software system.
3. To Perform effective and efficient functional testing of software.
4. To Select the appropriate tests to regression test your software after changes have been made.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Assessing Testing Capabilities and Competencies:** The Three-Step Process to Becoming a World-Class Testing Organization – Creating an Environment Supportive of Software Testing: Minimizing Risks: Risks Associated with Implementing Specifications – Writing a Policy for Software Testing – Testing - An Organizational Issue.

**UNIT -II** **(10 Hours)**

**Building the Software Testing Process:** Software Testing Guidelines – Workbench Concept – Customizing the Software-Testing Process – Selecting and Installing Software Testing Tools: Integrating Tools into the Tester's Work Processes – Tools Available for Testing Software - Selecting and Using Test Tools – Training Testers in Tool Usage – Appointing Tool Managers.

**UNIT- III** **(10 Hours)**

**Verification Testing:** Objective: – Workbench – Input – Do Procedures: Task 1: Test During the Requirements Phase – Task 2: Test During the Design Phase – Task 3: Test During the Programming Phase – Validation Testing: Objective: – Workbench – Input – Do Procedures: Task 1: Build the Test Data – Task 2: Execute Tests –Task 3: Record Test Results – Post-Implementation Analysis: Workbench – Do Procedures: Establish Assessment Objectives.

**UNIT -IV** **(10 Hours)**

**Software Development Methodologies:** Overview – Methodology Types – Software Development Life Cycle – Defining Requirements – Methodology Maturity – Competencies Required– Configuration-Management Controls – Testing Client / Server Systems : Overview – Workbench – Input – Do Procedures: Task 1: Assess Readiness – Taks 2: Assess Key Components – Task 3: Assess Client Needs.

**UNIT -V** **(10 Hours)**

**Rapid Application Development Testing:** Overview – Obejctive – Concerns – Workbench – Input – Do Procedures: Test Within Iterative RAD – Spiral Testing – Check Procedures Output – Guidelines – Testing Internal Controls: Overview – Internal Controls: Control Objectives – Preventive Controls – Detective Controls – Corrective Controls – Cost/Benefit Analysis - Testing Web-Based Systems: Overview – Workbench – Input – Do procedures: Task 1: Select Web-Based Risks to Include in the Test Plan – Task 2: Select Web-Based Tests – Task 3: Select Web-based Test Tools – Task 4: Test Web-Based Systems.

**TEXT BOOK:**

1. *William E Perry.* 2006. **Effective Methods for Software Testing.** [Third Edition]. Wiley Publication, New Delhi.

**REFERENCE BOOKS:**

1. *Edward Kit.* 1995. **Software Testing in the Real World – Improving the Process**. [Second Edition]. Addison-Wesley, Boston.
2. *Elfriede Dustin*. 2003. **Effective Software Testing: 50 Specific ways to improve your testing. [**Second Edition**].** Pearson Education, New Delhi.

| 15PCSEL203 | ELECTIVE II: SOFTWARE PROJECT MANAGEMENT | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To know how a project can be broken down into stages and its contribution to the project.
2. Enables to select appropriate techniques for various stages of a project and apply them in practical situations.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Introduction to Software Project Management**: Introduction - Software Project Management Importance – Activities Covered by Software Project Management – Plans, Methods and Methodologies – Categorizing Software Projects – Setting Objectives - Management – Management Control – Step Wise : An Overview of Project Planning.

**UNIT -II** **(10 Hours)**

**Selection of an Appropriate Project Approach**: Choosing Methodologies and Technologies – Choice of Process Models – The Waterfall Model – The Spiral Model – Software Prototyping – Other ways of Categorizing Prototypes - Software Effort Estimation: The Basis for Software Estimating – Software Effort Estimation Techniques – Expert Judgment – Estimating by Analogy.

**UNIT- III** **(10 Hours)**

**Activity Planning**: The OBJECTIVE::s of Activity Planning – Project Schedules – Projects and Activities – Sequencing and Scheduling Activities – Network Planning Models – Formulating a Network Model – Adding the Time Dimension – The Forward Pass –The Backward Pass – Identifying the Critical Path - Risk Management: Risk – Categories of Risk – A Framework for Dealing with Risk – Risk Identification - Risk Assessment – Risk Planning – Risk Management – Applying the PERT Technique.

**UNIT -IV** **(10 Hours)**

**Resource Allocation:** The Nature of Resources – Identifying Resource Requirements – Scheduling Resources – Creating Critical Paths – Counting the Cost – Cost Schedules – Monitoring and Control: Creating the Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value Analysis – Prioritizing Monitoring.

**UNIT- V** **(10 Hours)**

**Software Quality**: The Place of Software Quality in Project Planning – The Importance of Software Quality – Defining Software Quality – Product Versus Process Quality Management – Techniques to help Enhance Software Quality – Quality Plans.

**TEXT BOOK:**

1. *Bob Hughes , Mike Cotterell and Rajib Mall*. 2011. **Software Project Management**. [Fifth Edition]. Tata Mc-Graw Hill, New Delhi.

**REFERENCE BOOKS:**

1. *Walker Royce*. 2007. **Software Project Management**. [Second Edition]. Pearson Education, New Delhi.
2. *Andrew Stellman and Jennifer Greene*. 2005. **Applied Software Project Management.** [First Edition]**.** O'Reilly Publications, New York.
3. *Pankaj Jalote.* 2002. **Software Project Management in Practice**. [First Edition]. Pearson Education, New Delhi.

| 15PCSEL204 | ELECTIVE II: SOFTWARE ARCHITECTURE | SEMESTER - II |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To work from stakeholder requirements to create system interfaces that support partitioning.
2. To use different viewpoints to organize partitioning to support deployment, maintenance and functional extension.
3. To document system commonalities and variability.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**The Architecture Business Cycle:** Where Do Architectures Come From – Software Processes and the Architecture Business Cycle - What Makes a Good Architecture.

**UNIT -II** **(10 Hours)**

**Software Architecture:** Software Architecture Is and What it Isn't – Other Points of View – Software Architecture Importance.

**UNIT- III** **(10 Hours)**

**Understanding Quality Attributes:** Functionality and Architecture – Architecture and Quality Attributes – System Quality Attributes – Quality Attribute Scenarios in Practice.

**UNIT -IV** **(10 Hours)**

**Achieving Qualities:** Introducing Tactics – Availability Tactics – Modifiability Tactics – Performance Tactics – Security Tactics – Testability Tactics.

**UNIT -V** **(10 Hours)**

**Documenting Software Architectures:** Uses of Architectural Documentation - Views – Choosing the Relevant Views – Documenting a View – Unified Modeling Language.

**TEXT BOOK:**

1. *Len Bass, Paul Clements and Rick Kazman*. 2010. **Software Architecture in Practice.** [Second Edition]. Pearson Education Inc, New Delhi.

**REFERENCE BOOKS:**

1. *Peter Eeles and Peter Cripps*. 2010. **The Process of Software Architecting 2010**. [First Edition]. Addison –Wesley, Boston.
2. *Nick Rozanski and Eóin Woods*. 2012. **Software Systems Architecture**. [Second Edition]. Addison –Wesley, Boston.
3. *Richard N.Taylor and Nenad Medvidovic Eric M. Dashofy*. 2010. **Software Architecture: Foundations, Theory, and Practice Author**. [First Edition]. John Wiley and Sons, New York.

| 15PCSEL301 | ELECTIVE III: DIGITAL IMAGE PROCESSING AND PATTERN RECOGNITION | SEMESTER- III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To acquire basic concepts of signals.
2. Gather knowledge on mathematical transformations used in image processing.
3. To impart knowledge about image enhancement and pattern recognition.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Introduction:** The World of Signals: One-Dimensional Signals - Two-Dimensional Signals - Three-Dimensional Signals – Multidimensional Signals. Digital Image Processing: Elements of an Image Processing System. Mathematical Preliminaries: Laplace Transform - Fourier Transform – Z-Transform - Cosine Transform - Wavelet Transform.

**UNIT - II** **(10 Hours)**

**Image Enhancement:** Grayscale Transformation - Piecewise Linear Transformation - Bit Plane Slicing - Histogram Equalization – Smoothing Filter - Sharpening Filter - Image Blur Types and Quality Measures.

**UNIT - III** **(10 Hours)**

**Image Segmentation:** Threasholding - Object (Component) Labeling - Locating Object Contours by the Snake Model-Edge Operators - Edge Linking by Adaptive Mathematical Morphology - Automatic Seeded Region Growing – Applications: Potentional in Medical Image Analysis.

**UNIT - IV** **(10 Hours)**

**Feature Extraction:** Fourier Descriptor and Moment Invariants - Shape Number and Hierarchical Features - Corner Detection - Hough Transform - Principal Component Analysis - Linear Discriminate Analysis.

**UNIT - V** **(10 Hours)**

**Pattern Recognition:** The Unsupervised Clustering Algorithm - Bayes Classifier – Support Vector Machine - Neural Networks - The Adaptive Resonance Theory

Network: The ART1 Model and Learning Process - The ART2 Model-Applications: Solar Image Processing and Analysis.

**TEXT BOOK:**

1. *Frank Y Shih.* 2010. **Image processing and pattern recognition: Fundamentals and Techniques** . [First Edition]. John Wiley and Sons, New York. IEEE Press.

**REFERENCE BOOKS:**

1. *Bernd Jahne.* 2009. **Digital Image Processing .** [sixth revised and extended edition]. Springer New York . [First Indian Edition].
2. *Tamal Base.* 2004. **Digital Signal and Image Processing** . John Wiley & Sons Inc, New York. [Wiley Student Edition].
3. *Krishnamorthy, R.* 2010. **Advances in Image Processing , Mining and Computing Technology .** [First Edition]. ACME Learning Private Limited, New Delhi.
4. *Rafael C Gonzalez, Richard E Woods.* 2008. **Digital Image Processing**. [Third Edition]. Pearson Education Inc, New Delhi.

| 15PCSEL302 | ELECTIVE III: SOFT COMPUTING | SEMESTER- III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. Introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
2. Provide the mathematical background for carrying out the optimization associated with neural network learning.

**CONTENTS**

**UNIT - I** **(10 Hours)**

**Introduction to Artificial Intelligence and Soft Computing:** Artificial Intelligence -The Turing Test - Soft Computing - Fuzzy Logic- Genetic Algorithms: Probabilistic Computing - Rough Sets – Other Domains of AI: Swarm Intelligence- Chaos - Export Systems - Hybrid Intelligent Systems.

**UNIT - II** **(10 Hours)**

Overview of Neural Networks - Basic Concepts –Biological Neuron- Modeling and Artificial Neuron- Major Components of an Artificial Neuron - Neural Network Architectures –Learning Technologies –Advantages and Disadvantages of Neural Network – Application Areas of Neural Network.

**UNIT - III** **(10 Hours)**

**Learning in Feedforward Networks:** The Preceptron- LMS Learning Rule - Steepest Descent Algorithm - Multilayer Preceptorn - Back Propagation- Applications of Back Propagation Model - Neural Networks as Associate Memory.

**UNIT - IV** **(10 Hours)**

**Introduction to Fuzzy Logic and Fuzzy set Theory:** Crisp Sets – An Overview of Fuzzy Sets – Types of Membership Functions - Operations on Fuzzy Sets - Properties of Fuzzy Sets – Some Basic Concepts About Fuzzy Sets - Geometric Representation of Fuzzy Sets - Fuzzy and Crisp Relations

**UNIT - V** **(10 Hours)**

**Fuzzy Rules and Fuzzy Rule-Based System:** Classical Logic: An Overview of Predicate Logic - Fuzzy Proposition Logic - Fuzzy if-then rules - Fuzzy Inference Systems - Fuzzy Controllers - Genetic Algorithms - Fundamental of Genetic

Algorithm – The Algorithm Encoding – The GA Operators - Advantages , Limitations and Applications of Genetic Algorithms - Related Techniques.

**TEXT BOOK:**

1. *Manish Mahajan, Rajdev Tiwari*. 2010. **Introduction to Soft Computing**.[First Edition]. ACME Learning Private Limited, New Delhi.

**REFERENCE BOOKS:**

1. *Jang, Chuen-Tsai Sun and Eiji Mizutani*. 1997. **Neuro-Fuzzy and Soft Computing A Computational approach to learning and machine intelligence**. [First Edition]. Prentice-Hall Inc, New Delhi.
2. *Sivanandam, S.N. and Deepa, S.N.* 2007. **Principles Of Soft Computing**. [First Edition]. Wiley-India, New Delhi.
3. *Andrea Tettamanzi and Marco Tomassini*. 2010. **Soft Computing: Integrating Evolutionary, Neural, and Fuzzy Systems**. [First Edition]. Springer, US.

| 15PCSEL303 | ELECTIVE III: CLOUD COMPUTING | SEMESTER - III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To gather knowledge on the emerging area cloud computing and how it relates to traditional models of computing.
2. To know about cloud architecture, Virtualization Technologies.
3. To study about cloud Security and Service Oriented Architecture.

**CONTENTS**

**UNIT - I** **(11 Hours)**

**Cloud Computing Basics:** Definition - Cloud types: The NIST Model - The Cloud Cube Model - Deployment Models - Service Models - Characteristics of Cloud Computing: Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing - Assigning the role of Open Standards. Measuring the cloud's value - Cloud Architecture: Exploring the cloud computing stack.

**UNIT -II** **(10 Hours)**

**Understanding Services and Applications by Type:** Defining Infrastructure as a Service - Defining Platform as a Service - Defining Software as a Service – Defining Identity as a Service - Understanding Abstraction and Virtualization: Virtualization Technologies – Load Balancing and Virtualization - Understanding Hypervisors- Machine Imaging – Porting Applications

**UNIT - III** **(10 Hours)**

**Platform as a Service:** PaaS Applications Frameworks – Using Amazon Web Services: Amazon Web service components and Services – Working with Elastic Compute Cloud (EC2) – Working with Amazon Storage systems - Understanding Amazon Database Services

**UNIT - IV** **(9 Hours)**

**Microsoft Cloud Services:** Exploring Microsoft Cloud services – Windows Azure Platform - Cloud Security : Securing the Cloud – Securing Data –Establishing Identity and Presence.

**UNIT - V** **(10 Hours)**

**Service Oriented Architecture :** Introduction – Event driven Service Oriented Architecture –Enterprise Service Bus – Service Catalogs – SOA Communications – Managing and Monitoring SOA - Cloud Storage: Provisioning Cloud Storage -

Unmanaged Cloud Storage - Managed Cloud Storage – Creating Cloud Storage Systems – Virtual Storage Containers.

**TEXT BOOK:**

1. *Barrie Sosinsky*. 2011**. Cloud Computing Bible.** [First Edition].Wiley Publishing, New Delhi.

**REFERENCE BOOKS:**

1. *Haley Beard*. 2008. **Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs .** [First Edition]. Emereo Pvt. Limited, Cyprus.
2. *George Reese.* 2009. **Cloud Application Architectures: Building Applications and Infrastructure in the Cloud.** [First Edition]. Oreily's Publications, New York.

| 15PCSEL304 | ELECTIVE III: PARALLEL PROCESSING | SEMESTER - III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To study the concepts of computer architectures.
2. To understand the methods of parallel processing.
3. To study about various architectures- based on pipeline, array and multiprocessing systems.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Computer Evolution and Function:** Computer Evolution and Performance - A Brief History of Computers - Designing for Performance - Pentium and PowerPC Evolution - Computer Components - Computer Function - Interconnection Structures - Bus Interconnection - PCI.

**UNIT -II** **(10 Hours)**

**Cache Memory:** Computer Memory System Overview - Cache Memory Principles - Elements of Cache Design - Cache Size– Mapping Function– Multilevel Caches- Pentium IV Cache Organization– Performance Characteristics of Two-Level Memories - Semiconductor Main Memory- Error Correction– Advanced DRAM Organization.

**UNIT- III** **(10 Hours)**

**Peripherals:** Magnetic Disk Read and Write Mechanisms- Optical Memory– Programmed I/O – Interrupt-Driven I/O- Intel 82C59 A Interrupt Controller– The Intel 82C55A Programmable Peripheral Interface – Types of Interfaces - Fire Wire Serial Bus- InfiniBand.

**UNIT- IV** **(10 Hours)**

**Operating System Support and Processor :** Types of Operating Systems – Scheduling - Memory Management - Processor Organization - Register Organization – Instruction Cycle - Instruction Pipelining– Characteristics of RISC Architecture– CISC Verses RISC Characteristics– RISC Pipelining– MIPS R4000.

**UNIT- V** **(10 Hours)**

**Parallel Processing:** Instruction-Level Parallelism And Superscalar Processors: Super Scalar verses Super pipelined Systems- Multiple Processor Organizations- Symmetric Multiprocessors Organizations - Cache Coherence and the MESI Protocol- Multithreading and Chip Multiprocessors – Clusters – Integer Arithmetic- Floating Point Arithmetic- Vector Computation.

**TEXT BOOK:**

1. *William Stallings*. 2009. **Computer Organization & Architecture**. [Eighth Edition]. PHI, New Delhi.

**REFERENCE BOOKS:**

1. *Kai Hwang, Faye A. Briggs*. 2000. **Computer Architecture And Parallel Processing**. [Second edition]. McGraw Hill, New Delhi.
2. *John.P.Hayes*. 1998. **Computer System Architecture and Parallel Processing**. [Third Edition]. McGraw Hill, New Delhi.

| 15PCSEL305 | ELECTIVE IV : EMBEDDED SYSTEMS | SEMESTER - III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1) To study the basics of Embedded systems and its components.
2) To understand the Architecture and Development tools of Embedded Systems.

**CONTENTS**

**UNIT – I** **(10 Hours)**

**Embedded Systems:** Telegraph – Barcode Scanner-laser Printers. **Typical hardware:** terminology-gates-D Flip flop- Clocks. Memory: Read only memory-ROM variants-Random access memory.

**UNIT – II** **(10 Hours)**

Microprocessors - Busses- Universal Asynchronous Receiver Transmitter (UART) - Programmable Array Logic(PAL)-Field Programmable Gate Arrays(FPGA)- Watchdog Timer-Built –Ins on the Microprocessor.

**UNIT – III** **(10 Hours)**

**Architecture of Embedded Software:** Round Robin- Round Robin with interrupts-Function queue scheduling architecture- Real time system architecture.

**UNIT – IV** **(10 Hours)**

**Introduction to Real Time Operating System:** Tasks and Task States- Tasks and Data-**Semaphores and Shared Data:** RTOS Semaphores - Initialization-Reentrancy - Multiple Semaphores - Semaphores as Signaling Device.

**UNIT – V** **(10 Hours)**

**Underground Tank Monitoring System:** Initial questions- Resolving Timing Problems- dividing the work into tasks- Dealing with Shared Data-conclusion. Embedded Software development tools - Host and Target machines - Linker/Locators for Embedded software- getting embedded software into target system.

**TEXT BOOK:**

1. *David E Simon.2014.* **An embedded software primer**. [Second edition].Pearson Education, New delhi

**REFERENCE BOOKS:**

1. *Raj Kamal.2008.* **Embedded System, Architecture, Programming and Design.** [Second Edition] .Tata McGraw Hill, New Delhi.
2. *Tim Wilmshurst.2007.* **A Small Scale Embedded System Design.** [First Edition].Palgrave Publishers, New Delhi.

| 15PCSEL306 | ELECTIVE IV : REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM | SEMESTER- III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To understand the Basics of Remote sensing System, Satellite products and Remote sensors in Detail.
2. To get Familiar with GIS Components, GIS Data Analysis and GIS Applications.

**CONTENTS**

**UNIT- I** **(10 Hours)**

**Remote Sensing:** Introduction – Remote sensing system – Historical development of remote sensing – Multi concept of remote sensing – advantages and Disadvantages of Remote sensing – Some Applications of Remote Sensing – Electromagnetic Radiation . Sensors and Platform: Introduction – Broad classification of sensors and platform – Land observation satellite and sensors – High resolution sensors – Earth observing 1 (E O-1) – The weather satellites – Marine observation satellites and sensors.

**UNIT- II** **(10 Hours)**

**Satellite Data Products:** Introduction – Data Reception, Transmission and Processing – Remote Sensing Data – Data Products – Referencing scheme – Standard products – Digital Image Processing – Applications of remote sensing.

**UNIT- III** **(10 Hours)**

**Remote Sensors:** Classification of remote sensors – Selection of sensor parameters – Spatial resolution - Spectral resolution – Radiometric resolution – Temporal Resolution . Optical-Infrared Sensors: Quality of Image in optical systems – Imaging mode – Photographic camera – Television Camera – opto-Mechanical scanner- Opto-Mechanical scanner operated from satellite – Pushbroom Cameras.

**UNIT- IV** **(10 Hours)**

**Geographical Information System:** Introduction – Definition of GIS – Components of GIS – Geographical concepts – input data for GIS – Types of output products – Applications of GIS – GIS Data –Spatial Data Analysis.

**UNIT- V** **(10 Hours)**

**GIS Application:** Introduction – Problem identification – Designing a Data model – Project Management –Implementation problem – Project Evaluation – Future Trends.

**TEXT BOOKS:**

1. *A.M. Chandra & S.K Ghosh*. 2007. **Remote Sensing And Geographical Information System**. Narosa Publishing Pvt Ltd. **(Units I, II, III & V)**.
2. *George Joseph* .2011. **Fundamentals of Remote Sensing**. [Second Edition]. Universities Press[India] Pvt . Ltd. **(Unit IV)**

**REFERENCE BOOKS:**

1. *A.P. Cracknell & L.W.B Haynes.*2003. **Introduction to remote Sensing**. Taylor & Francis.
2. *Dr. Millea Cooke.* 2013. **Remote Sensing, GIS and Wetland Management**. Random Exports., New Delhi.
3. *Peter. M. Atkinson and Nicholas. J. Tate*. 2013. **Advances in Remote Sensing and GIS Analysis**. Wiley India Pvt, Ltd.

| 15PCSEL307 | ELECTIVE IV: INFORMATION RETRIEVAL | SEMESTER- III |
|---|---|---|

**Total Hours - 50**

**OBJECTIVES:**

1) To understand the components of Information Retrieval process in web.
2) To know about the Retrieval queries, Index construction and various retrieval Models available in Web Searching.

**CONTENT**

**UNIT - I** **(10 Hours)**

Introduction -History of IR- Components of IR – Issues –Open source Search engine Frameworks - The impact of the web on IR – The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

**UNIT - II** **(10 Hours)**

Boolean Retrieval: An example for Boolean retrieval - A first take at building an inverted index - Processing Boolean queries - The term vocabulary and postings lists - Dictionaries and tolerant retrieval: Search structures for dictionaries - Wildcard queries - Spelling correction - Phonetic correction

**UNIT - III** **(10 Hours)**

Index Construction : Hardware basics - Blocked sort-based indexing - Single-pass in-memory indexing - Distributed indexing - Dynamic indexing - Other types of indexes. Index compression : Statistical properties of terms in information retrieval - Dictionary compression - Postings file compression. Scoring, term weighting and the vector space model : Parametric and zone indexes - Parametric and zone indexes - Term frequency and weighting - The vector space model for scoring - Variant tf-idf functions.

**UNIT - IV** **(10 Hours)**

Computing scores in a complete search system : Efficient scoring and ranking - Components of an information retrieval system - Vector space scoring and query operator interaction - Evaluation in information retrieval - Relevance feedback and query expansion : Relevance feedback and pseudo relevance feedback - Global methods for query reformulation.

**UNIT - V** **(10 Hours)**

XML retrieval: Basic XML concepts - Challenges in XML retrieval - A vector space model for XML retrieval - Text-centric vs. data-centric XML retrieval - Probabilistic information retrieval: The Probability Ranking Principle - Language models for information retrieval: Language models. Text classification and Naive Bayes: The text classification problem - Naive Bayes text classification.

**TEXT BOOK**

1. *C. Manning, P. Raghavan, and H. Schütze*. 2008. **Introduction to Information Retrieval.** Cambridge University Press.

**REFERENCE BOOKS:**

1. *Ophir Frieder.2004.* **Information Retrieval. Algorithms and Heuristics: The Information Retrieval Series**.[ 2nd Edition].Springer.
2. *Manu Konchad.. 2008.* **Building Search Applications: Lucene, Ling Pipe.[**First Edition]. Gate Mustru Publishing.

| 15PCSEL308 | ELECTIVE IV : BIOINFORMATICS | SEMESTER - III |
|---|---|---|

**Total Hours: 50**

**OBJECTIVES:**

1. To learn the basic concepts and principles of Bioinformatics.
2. To learn how to formulate computational problems in biological science.

## CONTENTS

**UNIT - I** **(9 Hours)**

**Introduction :** Definition - dawn of sequencing - biological sequence/structure deficit - Genome projects - Important of Bioinformatics - Pattern recognition and prediction - Folding problem - Sequence analysis - Homology and Analogy. **Information Networks**: EMBnet – NCBI - Bioinformatics programme in India.

**UNIT - II** **(12 Hours)**

**Protein Information Resources:** Biological databases - primary sequence databases - composite protein sequence databases - Secondary databases - Composite protein pattern databases - Structure classification databases.**Genome Information Resources:** DNA Sequence Databases - Specialised Genomic Resources.

**UNIT - III** **(11 Hours)**

**DNA Sequence Analysis:** Importance of DNA Analysis - Gene Structure and DNA Sequences -Features of DNA Sequence Analysis - Issues in the Interpretation of EST searches - Approaches to Gene Hunting – Profile of a cell - Approaches to EST Analysis - Effects of EST data on DNA databases.**Pairwise Alignment Techniques:** Database searching Alphabets and complexity - Algorithms and programs - Comparing Two sequences - Sub-sequences - Identity and similarity - The Dotplot - Local and Global similarity - Global ,Local Alignment Algorithm - Pairwise database searching.

**UNIT - IV** **(10 Hours)**

**Multiple Sequence Alignment:** Definition and Goal-The Consensus - Computational Complexity - Manual methods - Simultaneous Methods - Progressive methods - Databases of Multiple Alignments - Searching databases with Multiple Alignments. **Secondary Database Searching:** Important and need of secondary database searches - Building a sequence search protocol : A practical Approach.

**UNIT - V** **(8 Hours)**

**ANALYSIS PACKAGES:** Importance – Commercial Databases - Commercial Software -Comprehensive Packages - Packages Specializing in DNA Analysis - Intranet Packages - Internet Packages - LIMS.

**TEXT BOOK:**

1. *T K Attwood , D J Parry-Smith , Samiron Phukan.* 2008. **Introduction to Bioinformatics.** Pearson Education, New Delhi.

**REFERENCE BOOKS:**

1. *Jean-Michel Claverie , Cerdric Notredame.* 2003. **Bio-Informatics - A Beginner's Guide.** Wiley DreamTech India Pvt.Ltd.
2. *Ruchi Singh, Richa Sharma.* 2010. **Bioinformatics – Basics , Algorithms and Applications.** Universities Press (India) Pvt. Ltd.
3. *Yi-Ping phoebe chen. 2007.* **Bioinformatics Technologies.** Springer International Edition.

# GUIDELINES

## 1. SUBMISSION OF RECORD NOTE BOOKS FOR PRACTICAL EXAMINATIONS AND PROJECT DISSERTATION

Candidates appearing for Practical Examinations and Project Viva Voce shall submit Bonafide Record Note Books/ Dissertation prescribed for Practical/ Project Viva Voce Examinations, otherwise the candidates will not be permitted to appear for the Practical/ Project Viva-Voce Examinations.

## 2. PASSING MINIMUM AND INTERNAL MARK DISTRIBUTION (Theory, Practical and Project)

### (i) THEORY

The candidate shall be declared to have passed the Examination, if the candidate secures not less than 38 marks in Comprehensive Examination and not less than 50 marks including internal marks for each theory paper.

| **Continuous Assessment (CA) (25 Marks)** | |
|---|---|
| Attendance | 5 Marks |
| Assignment | 5 Marks |
| Seminar | 5 Marks |
| Internal Examinations (Test 1, Test 2 and Model) | 10 Marks |
| **Total** | **25 Marks** |

**External Marks (CE): 75 Marks**

### (ii) PRACTICAL

The candidate shall be declared to have passed the Examination, if the candidate secure not less than 50 marks put together out of 100 in the Comprehensive Examination in each practical paper with a passing minimum of 30 marks in external out of 60.

| **Continuous Assessment (CA) (40 Marks)** | |
|---|---|
| Experiment | 10 Marks |
| Attendance | 5 Marks |
| Record | 5 Marks |
| Internal Examinations (Test 1 and Test 2) | 20 marks |
| **Total** | **40 Marks** |

**External Marks (CE): 60 Marks**

| **Comprehensive Examination(CE) (60 Marks)** | |
|---|---|
| Problem Understanding | 10 Marks |
| Implementation | 40 Marks |
| Debugging and Modification | 5 Marks |
| Correct Output and Viva | 5 Marks |
| **Total** | **60 Marks** |

**(iii) PROJECT EVALUATION**

- The project work shall be carried out by each student in the IV semester and has to be completed at the end semester.
- Upon completion of the project work/ dissertation the candidate will be required to appear for a viva-voce conducted by an external examiner.
- The student has to attend 3 reviews before completing his/her Project.
- Two reviews will be reviewed by internal subject experts and one review by External Resource Person.
- A candidate failing to secure the prescribed passing minimum in the dissertation shall be required to re-submit the dissertation with the necessary modifications.

**INTERNAL MARK DISTRIBUTION**

| | | |
|---|---|---|
| Project Review I | : | 10 Marks |
| Project Review II | : | 10 Marks |
| Project Review III | : | 10 Marks |
| Dissertation work | : | 20 Marks |
| **Total** | **:** | **50 Marks** |

**EXTERNAL MARK DISTRIBUTION**

| **Comprehensive Examination(CE) (150 Marks)** | |
|---|---|
| Evaluation of Dissertation | 100 Marks |
| Viva-voce | 50 Marks |
| **Total** | **150 Marks** |

The candidate shall be declared to have passed the Examination, if the candidate secure not less than 100 marks put together out of 200 in the Comprehensive Examination in the Project with a passing minimum of 75 marks in External out of 150.

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**(iv) SELF STUDY EVALUATION – THEORY (100% Internal Evaluation)**

The candidate shall be declared to have passed the Examination, if the candidate secure not less than 50 marks put together out of 100 in the Comprehensive Examination.

| **Continuous Assessment (CA) (100 Marks)** | |
|---|---|
| Internal Test 1 | 100 Marks |
| Internal Test 2 | 100 Marks |
| Model | 100 Marks |
| **Total** | **300 Marks** |
| The Total Marks will be converted to 100 marks | |

**(v) NON-CREDIT – CAREER COMPETENCY SKILLS**

**METHODOLOGY OF ASSESSMENT**

**1. On Line Objective Examination (Multiple Choice questions) - Semester I & III**

- 100 questions-100 minutes
- Twenty questions from each UNIT.
- On line examination will be conducted.

**2. Viva Voce- Semester II**

- A Student has to come in proper dress code and he/she should bring 2 copies of Resume for the Viva Voce.
- A student may be asked to
  - Give Self Introduction
  - Submit the resume to the examiner(s) and answer the questions based on it.
  - Speak on any given topic for at least two minutes.
  - Give a presentation for 10 minutes on a topic of their choice.
  - Sit with other students in a Group for a Discussion.

## 1. QUESTION PAPER PATTERN AND MARK DISTRIBUTION

**Theory**

**Question paper Pattern and Mark Distribution (75 Marks)**

1. **PART-A (5 x 5 = 25 Marks)**
   Answer ALL questions
   One question from each unit with internal choice

2. **PART-B (5 x 10 = 50 Marks)**
   Answer ALL questions
   One question from each unit with internal choice

**Question Paper Pattern and Mark Distribution – Self Study 100% Internal Evaluation (For 100 marks)**

**1 .PART –A (5 x 5= 25 Marks)**
Answer ALL questions
One question from each UNIT with Internal Choice

**2 .PART –B (5 x 15 = 75Marks)**
Answer ALL questions
One question from each UNIT with Internal Choice

**Practical Question Paper Pattern**

Two Questions (one simple and one complex question) may be taken from the list of practical problems.

**INTER DISCIPLINARY COURSES OFFERED TO OTHER DEPARTMENTS**

The department offers the following papers as Inter Disciplinary courses

| S.No | Subject Code | Subject | Semester | Department |
|---|---|---|---|---|
| 1 | 15PCSENIP201 | Inter Disciplinary Course I : Computer Applications | II | English |
| 2 | 15PCSENIP301 | Inter Disciplinary Course II: Computers for Communication and E-learning | III | |
| 4 | 15PCSMAI301 | Inter Disciplinary Course : Programming in C++ | III | Mathematics |
| 5 | 15PCSMAIP301 | Inter Disciplinary Course Practical: Programming in C++ | III | |
| 6 | 15PCSPHI201 | Inter Disciplinary Course – I Numerical Methods and Programming in C | II | Physics |
| 7 | 15PCSPHIP201 | Inter Disciplinary Course Practical – I : Numerical Methods Using C | II | |