MASTER OF SCIENCE (COMPUTER SCIENCE)

Vision

To create an excellent computer professionals for implementing real time applications according to the expectations of global standards and make them to involve in research activities towards the benefit of society.

Mission

- To Provide sufficient theoretical knowledge, technical skills in recent trends to the needs of IT Companies and Research area of computer Science.
- To make them strong in interdisciplinary domain for understanding the problems and to give effective solutions.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: To prepare the graduates to accept new and challenging roles in software Industry and Academia.

PEO2: To provide an excellent environment for effective learning in the core and selected areas.

PEO3 : To gain industrial experience from project development and impart knowledge by motivating the students to take part in co-curicular activities.

PROGRAMME OUTCOMES (PO)

After completion of the programme ,the graduates will be able to

PO1: Apply the various kinds of programming approaches in real time applications.

PO2: Perceive the knowledge in Operating systems, Networking and Mobile application development environments.

PO3: Apply the knowledge in Data science and in various complex environments.

PO4: Develop the practical knowledge in accordance with the needs of corporate standards.

PO5: Develop the technical skills in creating different types of real time applications.

PROGRAMME SPECIFIC OUTCOMES (PSO)

After completion of the programme, the graduates will be able to

PSO1: Apply the effective coding knowledge with successful result accomplishment.

PSO2: Deploy and control the Operating system, networking, cloud environment and expert systems.

PSO3: Manage ,analyze and visualize the Data in different perspectives.

PSO4: Familiarise with Machine learning, Mobile and IOT application development.

PSO5: Apply ethical, professional responsibilities,Project planning and development activities.

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.

MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME

The maximum duration for completion of the PG programme shall not exceed 8 Semesters

SCHEME OF EXAMINATION

Subject Code	Subject	Hrs of Instruction	Exam Duration in Hrs	Maximum Marks			Credit Points
				CA	CE	Total	
First Semester							
			Part A				
18PCSM101	Core I: Advanced Java Programming	5	3	25	75	100	4
18PCSM102	Core II: Design and Analysis of Algorithms	6	3	25	75	100	5
18PCSM103	Core III: Advanced Operating System	5	3	25	75	100	4
18PCSM104	Core IV: Network Security and Cryptography	5	3	25	75	100	4
18PCSMP101	Core Practical I: Advanced Java Programming	4	3	40	60	100	3
18PCSMP102	Core Practical II: PHP and MYSQL lab	4	3	40	60	100	3
			Non-Credit				
18PLS101	Career Competency Skills I	1	-	-	-	-	-
Total		**30**				**600**	**23**
Second Semester							
			Part A				
18PCSM201	Core V: C# and ASP .Net Framework	4	3	25	75	100	4
18PCSM202	Core VI: Data Mining and Warehousing	5	3	25	75	100	5
	Elective I	5	3	25	75	100	4
18PCSMP201	Core Practical III: C# and ASP.Net Framework	4	3	40	60	100	3
18PCSMP202	Core Practical IV : Data Mining	4	3	40	60	100	3

18PMACSI201	IDC I: : Discrete Mathematics	5	3	25	75	100	4
Part B							
18PVE201	Value Education : Human Rights	2	-	25	75	100	2
Non-Credit							
18PLS201	Career Competency Skills II	1	-		-	-	-
Total		**30**				**700**	**25**
Third Semester							
Part A							
18PCSM301	Core VII: Big Data Analytics	6	3	25	75	100	5
18PCSM302	Core VIII: Internet of Things	6	3	25	75	100	5
	Elective II	5	3	25	75	100	4
18PCSMP301	Core Practical V: Mobile Application Development	4	3	40	60	100	3
18PCSMP302	Core Practical VI: Network and IoT Lab	4	3	40	60	100	3
18PMACSI301	IDC II: Resource Management Techniques	5	3	40	60	100	4
Total		**30**				**600**	**24**
Fourth Semester							
Part A							
18PCSM401	Core IX: Python Programming	5	3	25	75	100	4
18PCSM402	Core X: Professional Ethics and Cyber Law	5	3	25	75	100	5
18PCSMP401	Core Practical VII: Python Programming Lab	4	2	40	60	100	3
18PCSPR401	Project & Viva -Voce	6		50	150	200	6
Total		**20**	**-**			**500**	**18**
					Grand Total	**2400**	**90**

LIST OF ELECTIVES

ELECTIVE – I

(Student shall select any one of the following subject as Elective in II semester)

S.No	Subject Code	Name of the Subject
1.	18PCSEL201	Object Oriented Software Engineering
2.	18PCSEL202	Software Testing
3.	18PCSEL203	Software Project Management
4.	18PCSEL204	Software Architecture

ELECTIVE – II

(Student shall select any one of the following subject as Elective in III semester)

S.No	Subject Code	Name of the Subject
1.	18PCSEL301	Digital Image Processing and Pattern Recognition
2.	18PCSEL302	Soft Computing
3.	18PCSEL303	Cloud Computing
4.	18PCSEL304	Parallel Processing

FOR COURSE COMPLETION

Students shall complete:

1. Inter Disciplinary Courses (IDC) in II and III Semesters.
2. Value Education Course as Human Rights in II Semester.
3. Chosen Elective in II and III Semesters.
4. Career Competency Skills papers as non credit course in I & II Semesters.
5. 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	10	5X5 5X4	25 20	10x100	1000
Core Practical	7	7x3	21	7x100	700
Inter Disciplinary Course	2	2X4	8	2x100	200
Elective	2	2X4	8	2x100	200
Project	1	1x6	6	1x200	200
PART B					
Value Education : Human Rights	1	1x2	2	1x100	100
NON-CREDIT					
1 . Career Competency Skills I 2. Career Competency Skills II	2	---	---	---	---
Grand Total			**90**		**2400**

18PCSM101	CORE I: ADVANCED JAVA PROGRAMMING	SEMESTER - I

Course Objectives

The course aims

- To impart knowledge on advanced concepts in J2EE with database
- To learn Client/Server programming and Distributed application
- To learn about overview of J2EE Architecture, concepts of JDBC and servlet

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	**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.	10	CO5

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*

Web References	
1	https://www.udemy.com/advanced-java-
2	programminghttps://www.tutorialspoint.com/java
3	https://www.roseindia.net/java/Advanced-Java-Tutorials.shtml

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define the Detailed Architecture of J2EE and JDBC
CO2	Explain the concepts of Network protocols used in Java packages
CO3	Analyze the details of Servlet environment and Interface mechanism
CO4	Evaluate the JSP Elements and Scripting for Authentication process
CO5	Apply the Life Cycle of Java Bean and interface with SQL

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	H	M
CO2	H	H	M	M	M
CO3	H	H	H	M	M
CO4	H	H	H	M	M
CO5	H	H	H	M	H

H-High; M-Medium; L-Low

18PCSM102	CORE II: DESIGN AND ANALYSIS OF ALGORITHMS	SEMESTER - I

Course Objectives

The course aims

- To introduce the classic algorithms in various domains and techniques for designing efficient algorithms
- To create analytical skills which enable the students to design algorithms for various real time problems
- To make clear understanding in categorization of various types of Algorithms

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**The Greedy Method:** The General Method - Knapsack Problem - Job Sequencing with Deadlines – Minimum - Cost Spanning Trees – Optimal Storage on Tapes – Single-Source Shortest Paths.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	***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 Algorithm – Genetic Algorithms Work – GA Works – Some GA Implementations.	10	CO5

Text Books

1 *Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran. 2008.* **Fundamentals of Computer Algorithms**. *[First Edition]. Galgotia Publication Pvt. Ltd. New Delhi. (Unit I to Unit 1V)*

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.*

Web References	
1	https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.html
2	nptel.ac.in/courses/106101060/
3	www.cse.iitd.ernet.in/~ssen/csl356/root.pdf

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Explain the Algorithmic specification details.
CO2	Define the concepts of Job Sequencing and path finding Algorithms
CO3	Apply the Algorithms used for Dynamic Programming
CO4	Evaluate the Different Traversal methods and Search Techniques
CO5	Define the Basics of Np Hard problem and Genetic Algorithms

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	L
CO2	H	H	M	M	L
CO3	H	H	M	H	M
CO4	H	H	H	M	M
CO5	M	H	H	H	L

H-High; M-Medium; L-Low

18PCSM103	CORE III: ADVANCED OPERATING SYSTEMS	SEMESTER - I

Course Objectives

The course aims

- To make a clear understanding of the advanced concepts and techniques of an operating system
- To learn the essential concepts of Deadlocks and Synchronization in various Operating System environment
- To gain Knowledge of Distributed Operating System

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**Overview of Operating Systems:** OS and the Computer System – Efficiency, System Performance and User Convenience – Classes of Operating Systems. **Scheduling:** Non-preemptive Scheduling Policies – Preemptive Scheduling Policies – Scheduling in Practice – Real Time Scheduling.	10	CO1
II	**Memory Management :** Managing the Memory Hierarchy – Static and Dynamic Memory Allocation – Memory Allocation to a Process – Reuse of Memory – Contiguous Memory Allocation – Noncontiguous Memory Allocation – Paging – Segmentation – Segmentation with Paging – Kernel Memory Allocation**. Virtual Memory:** Demand Paging – Page Replacement Policies – Memory Allocation to a Process – Shared Pages – Memory Mapped Files.	10	CO2
III	**Deadlock:** Definition – Deadlocks in Resource Allocation – Handling Deadlocks -Deadlock Detection and Resolution – Deadlock Prevention – Deadlock Avoidance.	10	CO3
IV	**Synchronization and Scheduling in Multiprocessor Operating Systems(with case study):** Architecture of Multiprocessor Systems – Multiprocessor Operating Systems – Kernel Structure - Process Synchronization – Process Scheduling.	10	CO4
V	**Distributed Operating Systems:** Features of Distributed Systems – Nodes of a Distributed System – Network Operating Systems – Distributed Operating Systems- Reliable Interposes Communication – Distributed Computation Paradigms.	10	CO5

Text Book

1 *Dhamdhere D.M. 2010.* **Operating Systems – A Concept based Approach**. *[Second Edition]. Tata McGraw Hill. 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.*

Web References	
1	https://www.tutorialspoint.com/operating_system/index.html
2	https://www.studytonight.com/operating-system/
3	https://www.csitquestion.com/operating-system/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define the Fundamental concepts of an Operating System and Scheduling policies
CO2	Explain the Detailed Memory Management techniques and Virtual Memory concepts
CO3	Apply the Scheduling Task in Multiprocessor Architecture
CO4	Analyze the Deadlock and Resource Allocation concepts
CO5	Evaluate the Detailed Architecture of Distributed Operating Systems

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	H	H	M	L
CO2	M	H	H	H	L
CO3	M	H	M	H	L
CO4	M	H	M	H	L
CO5	M	H	H	H	M

H-High; M-Medium; L-Low

18PCSM104	CORE IV: NETWORK SECURITY AND CRYPTOGRAPHY	SEMESTER - I

Course Objectives

The course aims

- To impart basic categories of threats to computers and networks
- To study about the Intrusions and intrusion detection systems
- To acquire fundamental ideas of public-key cryptography techniques

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	**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.	10	CO5

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.*

Web References	
1	https://www.tutorialspoint.com/cryptography/
2	https://www.tutorialspoint.com/network_security/index.htm
3	nptel.ac.in/courses/106105031/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Apply the basic techniques and advanced standards of Encryption
CO2	Familiar with the number Theory implementation in various cryptosystems
CO3	Define Hash function and Digital Signature conceptions
CO4	Analyze the User Authentication and web Security considerations
CO5	Expertise about Intrusion Detection, types of Virus, Worms and Firewalls

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	L
CO2	M	H	M	H	M
CO3	M	H	H	H	M
CO4	M	H	H	H	L
CO5	M	H	M	H	M

H-High; M-Medium; L-Low

18PCSMP101	CORE PRACTICAL I : ADVANCED JAVA PROGRAMMING	SEMESTER - I

Course Objectives:

The Course aims

- To make clear understanding on Advanced Java programming concepts and syntax
- To make them strong in Servlet API programming skills
- To enhance the real time programming skills in Session management and other APIs

Total Hours:40

PROGRAM	CONTENTS	Hrs.	CO
1	Develop program to connect database and get result set from database using JDBC API	**04**	**CO1**
2	Develop program to connect database and insert new record to the existing table using JDBC API .	**04**	**CO1**
3	Develop program using HTTPServlet API and read request parameters from the HTML page and process the same and display it	**04**	**CO2**
4	Develop program using HTTPServlet API and read request parameters from the HTML page store the same into HttpSession Object and process it	**04**	**CO2**
5	Develop program using HTTPServlet API and read request parameters from the HTML page and process and store the same into Database	**04**	**CO3**
6	Develop program using JSP API and read request parameters from the HTML page and validate the request values using database	**04**	**CO3**
7	Develop program using JSP API and read request from the user and navigate to another JSP page	**04**	**CO4**
8	Develop program using Statefull Session Bean API	**04**	**CO4**
9	Develop program using Stateless Session Bean API	**04**	**CO5**
10	Develop program using EntityBean API and insert new record to database	**04**	**CO5**

Web References

1	www.academia.edu/7567434/Advanced_Java_Academic_lab_manual
2	https://www.tutorialspoint.com/java
3	https://www.roseindia.net/java/Advanced-Java-Tutorials.shtml

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Establish Database connectivity and make modification with the help of Java interface
CO 2	Apply the concept of Message Passing through HTTPServlet
CO 3	Access the Data and storing the data through HTTPServlet
CO 4	Apply the Request Validation and Navigaion to other JSP
CO 5	Handle the Session Management and usage of Entity Bean API

18PCSMP102	**CORE PRACTICAL II : PHP & MYSQL LAB**	**SEMESTER - I**

Course Objectives

The Course aims

- To develop the skills of Form Designing and Exception handling in PHP
- To know about record creation and manipulation in MYSQL
- To know about the uses of AJAX in real time applications

Total Hours:40

PROGRAM	CONTENTS	Hrs.	CO
1	Program to demonstrate the concept of User Defined Functions using PHP	**04**	**CO1**
2	Program to Pass Value from One form to another form using PHP	**04**	**CO1**
3	Program to demonstrate Techniques of Exception Handling using PHP	**04**	**CO2**
4	Program to Display the records from MySQL using PHP	**04**	**CO2**
5	Program to Add, Edit and Delete the records from MySQL using PHP	**04**	**CO3**
6	Design a Web page to see the result for a candidate when the results are published on the web	**04**	**CO3**
7	Program to demonstrate PHP-XML Expat Parser	**04**	**CO4**
8	Program to process XML documents in PHP using built-in DOM parser	**04**	**CO4**
9	Design a web page using PHP to fetch information from a database with AJAX	**04**	**CO5**
10	Design a web page using PHP to fetch information from a XML file with AJAX	**04**	**CO5**

Web References

1	https://www.w3schools.com/php/php_mysql_intro.asp
2	zetcode.com/databases/mysqlphptutorial/
3	https://www.guru99.com/php-practical-example.html

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Apply User defined functions and passing values to Multiple forms
CO 2	Practice Mechanism of Exception Handling and ODBC through PHP
CO 3	Apply Data Manipulation and server interaction
CO 4	Apply parser and DOM parser to process XML documents in PHP
CO 5	Establish the Interactive communication from a database and an XML file with AJAX

18PLS101	CAREER COMPETENCY SKILLS – I	SEMESTER – I

Course Objectives

The course aims

- To impart knowledge on the Aptitude.
- To enhance employability skills and to develop career competency.

Total Hours: 15

UNIT	CONTENTS	Hrs	CO
I	Solving Simultaneous Equations Faster – Number System : HCF, LCM – Square roots and Cube roots - Averages	**03**	CO1
II	Problems on Numbers –Problems on Ages	**03**	CO2
III	Calendar – Clocks – Pipes and Cisterns	**03**	CO3
IV	Time and Work – Time and Distance	**03**	CO4
V	Ratio and Proportion – Partnership – Chain Rule	**03**	CO5

Text Book

1	Aggarwal R.S. 2013. Quantitative Aptitude. [Seventh Revised Edition]. S.Chand & Co., New Delhi.

Reference Book

1	Abhijith Guha, Quantitative Aptitude for Competitive Examinations, 5th Edition, Tata McGraw Hill, 2015, New Delhi.

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO1	Carry out mathematical calculations using shortcuts.
CO2	Calculate Problems on Ages with shortcuts.
CO3	Understand the core concepts of Pipes & Cisterns, Calendar & Clocks.
CO4	Obtain knowledge on shortcuts to Time & Work and Time & Distance.
CO5	Calculate Ratio & Proportion, Partnership with shortcuts.

18PCSM201	CORE V: C# AND ASP .NET FRAMEWORK	SEMESTER - II

Course Objectives

The course aims

- To become skilled at Fundamental and Advanced concept of .NET Frame work
- To impart Knowledge in C# programming skills in .NET
- To gain Knowledge of Web Application Architecture

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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	10	CO4
V	**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.	10	CO5

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.* *Christian Nagel, Bill Evjen, Jay Glymn, Karli Watson and Morgan Skinner.2008.* **Professional C# 2008**. *[First Edition]. Wiley Publishing . New York.*

Web References	
1	https://www.guru99.com/net-framework.html
2	https://www.tutorialspoint.com/asp.net/asp.net_tutorial.pdf
3	asp.net-tutorials.com/basics/introduction/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define the fundamentals of .NET framework
CO2	Familiar with the basics of C# working environment
CO3	Deal with Exception Handling and ADO.NET
CO4	Apply Lifecycle activities of ASP.NET
CO5	Handle the ASP.NET session Management

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	H	L
CO2	H	M	M	M	L
CO3	H	H	H	M	M
CO4	H	H	H	M	H
CO5	H	H	M	M	L

H-High; M-Medium; L-Low

18PCSM202	CORE VI: DATA MINING AND WAREHOUSING	SEMESTER - II

Course Objectives

The course aims

- To gain Knowledge in Data Warehousing and implementation
- To study the Data Mining techniques utilized in various types of Algorithms
- To gather knowledge on classification, clustering and association rules

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**Data Warehouse and OLAP Technology:** An Overview - Data Warehouse – A Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation.	10	CO1
II	**Introduction:** Data mining - Data Mining Functionalities. Data Preprocessing: Preprocess the Data - Data Cleaning - Data Integration and Transformation - Data Reduction.	10	CO2
III	**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 Back propagation - Prediction.	10	CO3
IV	**Cluster Analysis:** A Categorization of Major Clustering Methods - Partitioning Methods- Hierarchical Methods – Grid-Based Methods –Model-Based Clustering Methods – Density-Based Methods.	10	CO4
V	**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.	10	CO5

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.*

Web References

1 https://www.tutorialspoint.com/data_mining/index.html
2 https://www.guru99.com/data-warehousing-tutorial.html
3 https://www.cse.iitb.ac.in/infolab/Data/Talks/krithi-talk-impact.pp

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define the Data warehouse architecture and implementation
CO2	Comprehend the Data Mining Functionalities and Preprocessing techniques
CO3	Analyze Frequent patterns, Classification and Prediction algorithms
CO4	Analyze Various types of Clustering and its impact
CO5	Expertize in Research prototypes and Web Mining

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	L
CO2	M	H	H	M	L
CO3	M	H	H	M	M
CO4	M	H	H	M	L
CO5	M	H	H	H	M

H-High; M-Medium; L-Low

18PCSEL201	ELECTIVE I: OBJECT ORIENTED SOFTWARE ENGINEERING	SEMESTER - II

Course Objectives

The course aims

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

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	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.	10	CO2
III	**System Design:** An Overview of System Design – System Design Concepts – System Design Activities: From Objects to Subsystems – Addressing Design Goals - Managing System Design.	8	CO3
IV	**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.	10	CO4
V	**Testing:** Testing Concepts - Testing Activities - Managing Testing - Configuration Management: An Overview of Configuration Management - Configuration Management Concepts - Configuration Management Activities - Managing Configuration Management.	12	CO5

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..*

Web References	
1	pl.cs.jhu.edu/oose/
2	https://www.tutorialride.com/software-engineering/
3	www.cse.lehigh.edu/~glennb/oose/oose.htm

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Apply the Development activities and Modeling concepts
CO2	Evaluate the Requirement Elicitation and Analysis
CO3	Define Detailed information of System Design and Goals
CO4	Familiar with Object Design and Specification interface
CO5	Evaluate the Testing Activities and Configuration managemet

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	M	L
CO2	M	M	M	L	H
CO3	M	H	M	M	H
CO4	M	H	H	M	H
CO5	M	H	M	M	H

H-High; M-Medium; L-Low

18PCSEL202	ELECTIVE I: SOFTWARE TESTING	SEMESTER - II

Course Objectives

The course aims

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

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	**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	10	CO5

	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.*

Web References	
1	https://www.guru99.com/software-testing.html
2	https://www.tutorialspoint.com/software_testing/index.htm
3	www.softwaretestinghelp.com/manual-testing-tutorial-1

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define world class testing organization
CO2	Analyze the testing process,testing tools and trainers.
CO3	Apply the testing verification process
CO4	Analyze the software development methodologies
CO5	Evaluate different types of testing process

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	H	H
CO2	L	M	M	M	H
CO3	L	M	M	M	H
CO4	L	M	H	M	H
CO5	L	M	M	M	H

H-High; M-Medium; L-Low

18PCSEL203	ELECTIVE I: SOFTWARE PROJECT MANAGEMENT	SEMESTER - II

Course Objectives

The course aims

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

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	**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.	10	CO5

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.*

Web References	
1	https://www.tutorialspoint.com › Software Engineering › Software Project Management
2	https://www.mavenlink.com/resources/what-is-project-management-software
3	https://www.techopedia.com/definition/13132/project-management-software

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Familiar with the Project management Methodologies and Categories of Software Project
CO2	Apply the Various types of Software Development Models
CO3	Define the Activity planning and Risk Management
CO4	Analyze the Resource Allocation and Cost Control Management
CO5	Evaluate the Quality planning and Product

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	M	H
CO2	M	H	M	M	H
CO3	M	H	H	M	H
CO4	L	M	M	M	H
CO5	L	M	M	H	H

H-High; M-Medium; L-Low

18PCSEL204	ELECTIVE I: SOFTWARE ARCHITECTURE	SEMESTER - II

Course Objectives

The course aims

- To work from stakeholder requirements to create system interfaces that support partitioning
- To use different view points to organize partitioning to support deployment, maintenance and functional extension
- To document system commonalities and variability

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**The Architecture Business Cycle:** Where Do Architectures Come From – Software Processes and the Architecture Business Cycle - What Makes a Good Architecture.	10	CO1
II	**Software Architecture:** Software Architecture Is and What it Isn't – Other Points of View – Software Architecture Importance.	10	CO2
III	**Understanding Quality Attributes:** Functionality and Architecture – Architecture and Quality Attributes – System Quality Attributes – Quality Attribute Scenarios in Practice	10	CO3
IV	**Achieving Qualities:** Introducing Tactics – Availability Tactics – Modifiability Tactics – Performance Tactics – Security Tactics – Testability Tactics.	10	CO4
V	**Documenting Software Architectures:** Uses of Architectural Documentation - Views– Choosing the Relevant Views – Documenting a View – Unified Modeling Language.	10	CO5

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.*
   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..*

Web References

1. tutorials.jenkov.com/software-architecture/index.html
2. https://www.tutorialride.com/software-architecture.../software-architecture-and-design
3. www.developerfusion.com › Architecture › Tutorials

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Expertise in Software Architecture Business Cycle
CO2	Define the Importance of Software Architecture
CO3	Apply the Software quality Attributes
CO4	Evaluate the Tactics for Achieving quality
CO5	Familiar with the Complete documentation of Architecture Implementation

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	H	H
CO2	M	H	M	M	H
CO3	M	M	L	M	H
CO4	M	M	L	M	H
CO5	M	H	M	M	H

H-High; M-Medium; L-Low

18PCSMP201	CORE PRACTICAL III: C# AND ASP .NET FRAMEWORK	SEMESTER - II

Course objectives

The course aims

- To make good clarity in IDE for Form Designing and DB Connectivity on C# and ASP framework
- To make strong on understanding session management in .NET frame work

Total Hours:40

PROGRAM	CONTENTS	Hrs.	CO
	C#.NET		
1	Create a simple application in C# .Net using Console Application	**04**	**CO1**
2	Create an application that should use this and static keywords	**04**	**CO1**
3	Create and manage application that should use Try….Catch….Finally Blocks	**04**	**CO2**
4	Create an application that uses System. Collections namespace	**04**	**CO2**
5	Create and open a connection for a database and add, read and update records in a database	**04**	**CO3**
	ASP.NET		
6	Create a simple application in ASP.NET	**04**	**CO3**
7	Create an application that uses multiple forms	**04**	**CO4**
8	Create an application to interact with Application–level variables that should use HttpApplicationState	**04**	**CO4**
9	Create an application to interact with Session–level variables that should use HttpSessionState	**04**	**CO5**
10	Create and open a connection to a database and add, read and update records in a database	**04**	**CO5**

Web References

1	https://www.guru99.com/net-framework.html
2	https://www.tutorialspoint.com/asp.net/asp.net_tutorial.pdf
3	asp.net-tutorials.com/basics/introduction/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Practice the Console Environment and Exception Handling
CO 2	Identify the Data representation and Memory Management
CO 3	Practice ODBC Establishment and record manipulation
CO 4	Design MDI Form in ASP.NET Environment
CO 5	Practice on Session Management Techniques

18PCSMP202	**CORE PRACTICAL IV : DATA MINING LAB**	**SEMESTER - II**

Course objectives

The course aims

- To make clear understanding on preprocessing techniques in Data Mining
- To learn the different types of classification and clustering Algorithms in Weka
- To practice the different techniques used for data mining in Rapidminer.

Total Hours:40

PROGRAM	CONTENTS	Hrs.	CO
1	Implementing Data preprocessing on dataset student .arff	**04**	**CO1**
2	Implementing Data preprocessing on dataset labor.arff	**04**	**CO1**
3	Implementation of K-Means algorithm	**04**	**CO2**
4	Implementing Apriori algorithm	**04**	**CO2**
5	Implementation of FP-growth algorithm	**04**	**CO3**
6	Implementation of DB-SCAN algorithm	**04**	**CO3**
7	Implementation of Bayesian classification algorithm	**04**	**CO4**
8	Implementation Decision Tree using Rapidminer.	**04**	**CO4**
9	Implementation of Use case(Data import, Preporcessing, Model training and Testing) in RapidMiner.	**04**	**CO5**
10	Implementation of Classificaion by Regression in Rapidminer.	**04**	**CO5**

Web References

1	www.cs.ubbcluj.ro/~gabis/ml/MLSoftware/WekaTutorial.ppt
2	www.cs.utexas.edu/users/ml/tutorials/Weka-tut/
3	https://www.slideshare.net/butest/weka-tutorial

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Define Data preprocessing and Association Rules.
CO 2	Practice the Clustering and classification algorithms.
CO 3	Analyze different Mining Frequent Patterns.
CO 4	Work on Decision Tree and Search Method
CO 5	Practice about Data Analytics techniques

18PMACSI201	INTER DICIPLINARY COURSE I: DISCRETE MATHEMATICS	SEMESTER – II

Course objectives

The course aims

- To introduce mathematical logics and theory of automata
- To introduce basic concepts of graph theory

Total Hours: 50

UNIT	CONTENTS	Hrs.	CO
I	Logic – Introduction – TF-statements – Connectives – Atomic and Compound statements – Well formed formulae – Truth table of a formula – Tautology. **(Chapter – 9 Sections: 1 – 7)**	**10**	**CO1**
II	Tautological implications and equivalence of formulae – Replacement process – Functionally complete sets of connectives and duality law – Normal forms – Principal normal forms. **(Chapter – 9 Sections: 8 - 12)**	**10**	**CO2**
III	Theory of inference – Open statements – Quantifiers. **(Chapter – 9 Sections: 13 – 15)**	**10**	**CO3**
IV	Boolean algebra – Boolean polynomials – Karnaugh map (K-map for 5 variables and 6 variables are not included) – Switching circuits (Simple circuits). **(Chapter: 10 Sections: 5 – 8)**	**10**	**CO4**
V	Graph Theory – Basic concepts – Matrix representation of graphs – Trees – Spanning trees. **(Chapter: 11 Sections: 1 – 4)**	**10**	**CO5**

Text Books

1	*Venkataraman, M.K. Sridharan, N. and Chandrasekaran, N.,* 2000. **Discrete Mathematics.** The National Publish Company, New Delhi.
2	*Mishra, K.L.P., and Chandrasekaran, N.,* 2001. **Theory of Computer Sciences.** [Second Edition]. Prentice Hall of India Private Limited, New Delhi.

Reference Book

1	*Trembley, J.P. and Manohar, R.,* 1975. **Discrete Mathematical Structures with applications to computer Science.** International Edition, McGraw Hill Publication.

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Learn the concepts of logic
CO 2	Discuss various normal forms
CO 3	Understand the concepts of inference theory
CO 4	Construct Karnaugh map and switch circuits
CO 5	Know the concepts of graphs and trees

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	H	M	H	M	L
CO 2	H	M	H	M	L
CO 3	M	H	M	L	M
CO 4	M	H	H	L	M
CO 5	M	H	H	M	M

H-High; M-Medium; L-Low

18PVE201	VALUE EDUCATION: HUMAN RIGHTS	SEMESTER - II

Course Objectives

The course aims

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

Credits: 2 **Total Hours: 25**

UNIT	CONTENTS	Hrs	CO
I	**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.	05	CO1
II	**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.	05	CO2
III	**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.	05	CO3
IV	**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.	05	CO4
V	**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.	05	CO5

Reference Book

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

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO1	Understand the core principles of human rights philosophy
CO2	Know the importance and functions of human rights commission
CO3	Apply their rights for democracy, human rights and gender equality
CO4	Know the rights from the Governance, economic and social development through various Acts
CO5	Understand the right to information Act, rights for women, children, Nomads, refugees and various sector of people in our country

18PLS201	CAREER COMPETENCY SKILLS – II	SEMESTER – II

Course Objectives

The course aims

- To enhance employability skills and to develop career competency.

Total Hours: 15

UNIT	CONTENTS	Hrs	CO
I	Interview Skills – Types of Interview – Groundwork before Interview – Abide by the dress code – Importance of Body language in Interviews – Tell Us about yourself – Do's and Don'ts of an interview – Concluding an Interview – A Mock Interview.	**03**	**CO1**
II	Resume Preparation – Difference between a Resume and CV – The main body of Resume – The Career objective in Resume – A Fresher's Resume – Antiquity of Soft Skills – Classification of Soft Skills – Personality Analysis – Interpersonal Skills.	**03**	**CO2**
III	Body Language – Emotion displayed by Body Language – Group Discussion – Group Discussion types – Guidelines Do's and Don'ts during a Group Discussion – Concluding the Discussion – The technique of Summing Up.	**03**	**CO3**
IV	Speaking Skills – Effective Speaking Guidelines – Reading Skills – Types of Reading Skills – Barriers to Speed Reading – Listening Skills – Stages of Listening – Types of Listening – Barriers to Listening – Beware of Pitfalls – Avoid Errors : Indianisms in English – Most common errors in the world – Similar but not Quite the same – Words that are Singular or Couple.	**03**	**CO4**
V	Avoid Pitfalls: of Beware Self-improvement - Facilitating Laboratory: Language Techniques and Concepts E-learning	**03**	**CO5**

Text Book

1	*Barun K. Mitra. 2011.* **Personality Development and Soft skills**. [Second Edition]. Oxford University Press, New Delhi.

Reference Book

1	*S.P. Dhanavel. 2015,* **English and Soft Skills**. [Second Edition]. Orient Black Swan Publishers, New Delhi.

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO1	Understand the types of Interviews, Dress Code and Styles
CO2	Develop Resume content and structures.
CO3	Improve body language skills.
CO4	Know how to represent self through communication.
CO5	Attain the different level of Learning Skills.

18PCSM301	CORE VII: BIG DATA ANALYTICS	SEMESTER- III

Course Objectives

The course aims

- To familiarize with the basics of Big data technology and Hadoop environment.
- To implement Big data analytics in today's real-world business.

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	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.	**10**	**CO1**
II	**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.	**10**	**CO2**
III	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.	**10**	**CO3**
IV	**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.	**10**	**CO4**
V	**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.	**10**	**CO5**

Text Book

1 *Judith Hurwitz, Alan Nugent, Dr. Fern Halper and Marcia Kaufman. 2016.* ***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**.**

Web References	
1	https://www.oracle.com/in/big-data/guide
2	https://cloud.google.com/solutions/big-data
3	https://en.wikipedia.org/wiki/Big_data

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Familiar with the Big Data Technology intensification and Big Data stack Architecture.
CO2	Apply the concepts of virtualization in Map Reduce functions and Hadoop Tecnnologies.
CO3	Comprehend the structure of Big Data Ware house and the different types Analtics approaches.
CO4	Apply the Big Data Implementation in different real time environments.
CO5	Evaluate the Big Data solutions for improving Business with analytical process.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	H	H	H	M
CO2	M	M	H	L	L
CO3	L	M	H	H	M
CO4	M	M	H	H	H
CO5	L	M	H	H	H

H-High; M-Medium; L-Low

18PCSM302	CORE VIII: INTERNET OF THINGS	SEMESTER- III

Course Objectives

The course aims

- To know about Smart Objects, Architectures of IoT and its protocols.
- To build simple IoT Systems using Arduino and Raspberry Pi.
- To understand data analytics and develop IoT infrastructure for effective applications.

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	Evolution of Internet of Things – Enabling Technologies – **IoT Architectures:** oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack - Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects.	10	CO1
II	**IoT Access Technologies:** Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – **Network Layer:** IP versions, Constrained Nodes and Constrained Networks – **Optimizing IP for IoT:** From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – **Application Transport Methods:** Supervisory Control and Data Acquisition – **Application Layer Protocols:** CoAP and MQTT.	10	CO2
III	Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfa ces and Raspberry Pi with Python Programming.	10	CO3
IV	Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management with NETCONF-YANG.	10	CO4
V	Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control	10	CO5

Text Book

1 *David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry,2017.* **IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things**, Cisco Press.

Reference Books	
1	*Arshdeep Bahga, Vijay Madisetti,2015.* **Internet of Things – A hands-on approach, Universities Press.**
2	*Olivier Hersent, David Boswarthick, Omar Elloumi. 2012.* **The Internet of Things – Key applications and Protocols, Wiley,** (for Unit 2).
3	Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle. 2014 **From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence**, Elsevier.
4	*Michael Margolis, Arduino Cookbook. 2011* ***Recipes to Begin, Expand, and Enhance Your Projects****, 2nd Edition, O'Reilly Media.*

Web References	
1	https://nevonprojects.com/iot-projects
2	https://circuitdigest.com/internet-of-things-iot-projects
3	https://www.skyfilabs.com/blog/raspberry-pi-based-iot-projects

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Explain the detailed architecture, stack of IoT and functional blocks of IoT Eco System.
CO2	Define the network, security and transport methods of IoT.
CO3	Analyse the streaming analytics and network analytics with Machine learning techniques.
CO4	Apply the Machine leraning techniques over cloud environment.
CO5	Define the IoT reference models and smart architecture.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	H	H	M
CO2	L	H	H	M	M
CO3	M	M	H	H	H
CO4	M	L	H	H	M
CO5	L	H	H	H	M

H-High; M-Medium; L-Low

18PCSEL301	ELECTIVE II : DIGITAL IMAGE PROCESSING AND PATTERN RECOGNITION	SEMESTER- III

Course Objectives

The course aims

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

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**Image Enhancement:** Grayscale Transformation - Piecewise Linear Transformation - Bit Plane Slicing - Histogram Equalization – Smoothing Filter - Sharpening Filter - Image Blur Types and Quality Measures.	10	CO2
III	**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.	10	CO3
IV	**Feature Extraction:** Fourier Descriptor and Moment Invariants - Shape Number and Hierarchical Features - Corner Detection - Hough Transform - Principal Component Analysis - Linear Discriminate Analysis.	10	CO4
V	**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.	10	CO5

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.

Web References	
1	https://www.geeksforgeeks.org/digital-image-processing-basics
2	https://www.tutorialspoint.com/dip/image_processing_introduction.htm
3	https://en.wikipedia.org/wiki/Digital_image_processing

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Describe the basic concepts of signals and digital properties of image.
CO2	Interpret the various image enhancement techniques.
CO3	Analyze the image representation in more meaning full and easy by applying process of partitioning methods.
CO4	Realise dimensionality reduction that efficiently represents the image and apply the image data in computer vision.
CO5	Apply the machine learning in discovery of knowledge in image processing.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	H	H	M
CO2	L	H	H	M	L
CO3	M	H	H	H	H
CO4	L	L	H	H	M
CO5	L	H	H	H	M

H-High; M-Medium; L-Low

18PCSEL302	ELECTIVE III: SOFT COMPUTING	SEMESTER- III

Course Objectives

The course aims

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization associated with neural network learning.

Total Hours: 50

Unit	Contents	Hours	CO
I	**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.	**10**	**CO1**
II	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.	**10**	**CO2**
III	**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.	**10**	**CO3**
IV	**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	**10**	**CO4**
V	**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.	**10**	**CO5**

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.

Web References	
1	https://whatis.techtarget.com/definition/soft-computing
2	https://www.quora.com/What-is-soft-computing-What-are-the-some-real-life-applications-of-soft-computing
3	https://www.igi-global.com/dictionary/soft-methods

COURSE OUTCOMES(CO)

After completion of the course , the students will be able to

CO1	Define the overview of Intelligent systems that leads expert systems and scope of their applications in real world problems wich has significant complexity.
CO2	Explain the algorithms that can be used to model complex patterns and prediction problems.
CO3	Concive knowledge in CPU based automatic controls in feed forward networks wich is used expert and AI doains.
CO4	Gain the experience in multiobjective optimization of power systems is derivied form fuzzy logic.
CO5	Concieve knowledge how genetic programming used in fuzzy systems.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	H	H	L	M
CO2	L	H	M	H	M
CO3	L	H	M	H	L
CO4	M	H	M	H	M
CO5	L	H	H	H	M

H-High; M-Medium; L-Low

18PCSEL303	ELECTIVE III: CLOUD COMPUTING	SEMESTER - III

Course Objectives

The course aims

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

Total Hours: 50

Unit	Contents	Hrs	CO
I	**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.	11	CO1
II	**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	10	CO2
III	**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	10	CO3
IV	**Microsoft Cloud Services:** Exploring Microsoft Cloud services – Windows Azure Platform - Cloud Security : Securing the Cloud – Securing Data –Establishing Identity and Presence.	9	CO4
V	**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.	10	CO5

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.

Web References	
1	https://geekflare.com/cloud-computing-basics/
2	https://www.tutorialspoint.com/cloud_computing/cloud_computing_architecture.htm
3	https://www.tutorialride.com/cloud-computing/cloud-computing-architecture.htm

COURSE OUTCOMES(CO)

After completion of the course , the students will be able to

CO1	Define the different types of Cloud models and its Architecture.
CO2	Apply the suitable virtualization models in different service types.
CO3	Access the web services , Storage systems and Data Services.
CO4	Educate the working style of cloud services and security.
CO5	Evalaute SOA architecture and storage of cloud systems.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	M	H	M
CO2	M	M	H	H	M
CO3	L	H	H	H	M
CO4	L	H	H	H	H
CO5	M	H	H	H	M

H-High; M-Medium; L-Low

18PCSEL304	ELECTIVE III: PARALLEL PROCESSING	SEMESTER - III

Course objectives

The course aims

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

Total Hours: 50

Unit	Contents	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**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.	10	CO3
IV	**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.	10	CO4
V	**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.	10	CO5

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.

Web References	
1	https://www.webopedia.com/TERM/P/parallel_processing.html
2	https://www.computerhope.com › Dictionary › P – Definitions
3	https://www.quora.com/What-is-parallel-processing

COURSE OUTCOMES(CO)

After completion of the course , the students will be able to

CO1	Evaluate the performance of PC with respect to the different generations.
CO2	Define the cache memory organization and performance characteristics.
CO3	Gain the knowledge in I/O operations and types of interfaces.
CO4	Familiar with various tasks of operating system and the architecture of processor.
CO5	Explain the parallel processing in different types of processors.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	H	M	M	L
CO2	M	H	H	H	M
CO3	L	H	H	H	M
CO4	L	H	H	H	H
CO5	M	H	H	H	M

H-High; M-Medium; L-Low

18PCSMP301	CORE PRACTICAL V: MOBILE APPLICATION DEVELOPMENT	SEMESTER – III

Course Objectives

The course aims

- To develop the ablity of designing and validating activity for a mobile application.
- To develop the applications with multimedia techniques and database connectivity.

Total Hours: 40

PROGRAM	CONTENTS	Hrs.	CO
1	Develop an Application it shows Hello World message using Toast.	**04**	**CO1**
2	Develop an Application that contains one Textview, it shows the activity lifecycle of each stages , use the XML-based approach.	**04**	**CO1**
3	Develop an Login form Application it validate username and password statically.	**04**	**CO2**
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.	**04**	**CO2**
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.	**04**	**CO3**
6	Create an app to play an audio and video files.	**04**	**CO3**
7	Develop a Login form App it validate the username and password using Sqlite database.	**04**	**CO4**
8	Develop an app for file read and write operation using internal and external storage.	**04**	**CO4**
9	Create an app to show scale, transition, alpha and rotation animation.	**04**	**CO5**
10	Develop app for JSON Parsing from URL.	**04**	**CO5**

Web References

https://www.tutorialspoint.com/android/android_eclipse.htm

https://www.developer.com/ws/android

https://code.tutsplus.com/tutorials/android-sdk-working-with-eclipse

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Apply the Basic controls to design an effective form filling mobile application in XML based approach.
CO 2	Apply the different types of views to validate login form with appropriate coding instructions.
CO 3	Know Sqlite for creation of database and apply the validation.
CO 4	Apply different tanformations for image or button for simple animation.
CO 5	Create a basic JSON Parsing main activity application.

18PCSMP302	CORE PRACTICAL VI: NETWORK AND IOT LAB	SEMESTER – III

Course objectives

The course aims

- To explore the networking concepts using CISCO PACKET TRACER simulator.
- To exemplify IoT concepts using ARDUINO and RASPBERRY PI.

Total Hours: 40

PROGRAM	CONTENTS	Hrs.	CO
1	Identification of various networks components – connections, BNC, RJ-45, I/O box- Cables- Co-axial, twisted pair, UTP- NIC(network interface card) – Switch, hub	**04**	**CO 1**
2	(a) Sketch wiring diagrams of network cabling considering a computer lab of 20 systems (b) Interfacing with the network card(Ethernet) and Preparing of network cables	**04**	**CO 1**
3	Establishment of LAN and Use of protocols in establishing LAN	**04**	**CO 2**
4	Installation of network device drivers, networks (Peer to Peer Networking client server interconnection) and proxy server	**04**	**CO 2**
5	IoT Exemplification using ARDUINO	**04**	**CO 3**
6	IoT Exemplification using RASPBERRY PI	**04**	**CO4**
7	Trouble shooting of networks	**04**	**CO4**
8	File Transfer Protocol.	**04**	**CO4**
9	HTTP Server.	**04**	**CO5**
10	Class, Network and Host ID.	**04**	**CO5**

Web Reference

1. https://data-flair.training/blogs/how-iot-works
2. https://www.tutorialspoint.com/internet_of_things

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Configure networking components for connection establishment .
CO 2	Design simple and complex network architecture.
CO 3	Install device drivers and servsers for effective network communications.
CO 4	Connect the ARDUIO with other interfacing devices.
CO 5	Design new internet based applications by remote accessing mode.

18PMACSI301	IDC II: RESOURCE MANAGEMENT TECHNIQUES	SEMESTER – III

Course objectives

The course aims

- To know the concepts of mathematical formulation and solving.
- To find solution of Transportation and Assignment models.
- To introduce inventory model, Replacement model.
- To learn the concepts in CPM and PERT.

Total Hours: 50

UNIT	CONTENTS	Hrs.	CO
I	**Linear Programming Problem:** Introduction – Linear Programming Problem – Mathematical Formulation of the problem - Illustration on Mathematical Formulation of LPPs - Graphical Solution method – Some Exceptional cases – General Linear Programming Problem – Canonical and Standard forms of LPP - The Simplex method: The Simplex Algorithm and Problems – The Big-M method. **(Chapter – 2) (Chapter 3 Sections: 3.2 – 3.5)** **(Chapter – 4 Sections: 4.3 – 4.4)**	**10**	**CO 1**
II	**Transportation Model:** Introduction - Formulation of the Transportation Problem –Finding an initial basic feasible solution – Degeneracy in Transportation Problem - Transportation algorithm (MODI method) – Unbalanced Transportation Problems – Maximization case in Transportation problems. **Assignment Problems:** Introduction – Mathematical formulation of the Problem - Assignment algorithm (Hungarian method) – Unbalanced Assignment Models – Maximization case in Assignment Problems. **(Chapter – 10 Sections: 10.1, 10.2, 10.9, 10.12, 10.13, 10.15)** **(Chapter – 11 Sections: 11.1 - 11.4)**	**10**	**CO 2**
III	**Replacement Problem and System Reliability:** Introduction – Replacement of Equipment that Deteriorates Gradually – Replacement of Equipment that fails suddenly – Reliability and system Failure Rates **(Chapter – 18 Sections: 18.1 – 18.3,18.6)**	**10**	**CO 3**
IV	**Inventory Control -I**: Introduction – Types of Inventories – Reasons for Carrying Inventories –The Inventory Decisions – Costs Associated with Inventories–Factors Affecting Inventory Control – The Concept of EOQ - Deterministic Inventory Problems With No Shortages - Deterministic Inventory Problems With Shortages. **(Chapter – 19 Sections: 19.1 – 19. 4, 19.6-19.7, 19.9-19.11)**	**10**	**CO 4**
V	**Network Scheduling by PERT /CPM:** Introduction – Basic Components – Logical Sequencing - Rules of Network	**10**	**CO 5**

	Construction – Concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM. **(Chapter – 25 Sections: 25.1 – 25.8)**		
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.* 2014. **Resource Management Techniques**. [Eighth Edition]. AR Publication, Chennai.		
2	*Sharma, J.K.* 2007. **Introduction to Operations Research Theory and Applications.** [Third Edition]. MacMillan India Ltd., New Delhi.		

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Formulate and solve real life problems through LPP
CO 2	Find the optimum transportation schedule and assignment model
CO 3	Know the concepts of replacement policies
CO 4	Gain knowledge of keeping optimum stockhold
CO 5	Use the techniques for planning and scheduling of projects

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	H	M	M	M	L
CO 2	M	H	M	M	M
CO 3	M	H	H	M	L
CO 4	M	H	H	H	M
CO 5	L	H	M	M	H
H-High; M-Medium; L-Low					

18PCSM401	CORE IX: PYTHON PROGRAMMING	SEMESTER- IV

Course Objectives

The course aims

- To acquire core concepts of Python.
- To collect knowledge on OOPs and System Programming.
- To explore awareness about socket programming and web surfing.

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**Core Python**: Introduction- History of Python- Features of Python- Installing Python- Running Python-Input and output statements- Operators- Variables and Assignment- Numbers- Dictionaries-Control statements-Exceptions-Functions-Classes-Modules. **Syntax and Style:** Statements and Syntax- Variable Assignment- Identifiers.	**10**	**CO1**
II	**Python Objects:** Standard Types- Built-in Types- Standard Type Operators- Standard Type Built-in Functions. **Sequences:** Strings- Lists- Tuples. **Dictionaries:** Introduction to Dictionaries- Operators- Built-in Functions and methods- Dictionary Keys. **Conditionals and Loops:** if statement- else Statement- while Statement- for Statement- break Statement- continue Statement- pass Statement.	**10**	**CO2**
III	**Files and Input/Output:** File Objects- File Built-in Function,Methods and Attributes-Standard Files- Command-line Arguments- File System- File Execution. **Errors and Exceptions:** Detecting and Handling Exceptions- Standard Exceptions.	**10**	**CO3**
IV	**Functions:** Introduction- Calling Functions- Creating Functions- Passing Functions- Formal Arguments- Positional Arguments- Default Arguments- Variable-length Arguments- Functional Programming. **Modules:** Introduction- Modules and Files- Namespaces- Importing Modules- Importing Module Attributes- Module Built-in Functions.	**10**	**CO4**
V	**Network Programming:** Introduction- **Sockets:** Communication Endpoints- Network Programming in Python. **Web Programming:** Introduction- **Web Surfing with Python**: Creating Simple Web Clients- Advanced Web Clients- CGI: Helping Web Servers Process Client Data- Building CGI Application- Advanced CGI- Web (HTTP) Servers.	**10**	**CO5**

Text Book

1 *Wesley J. Chun* .2010. **Core Python Programming.** [First Edition]. Prentice Hall PTR. ISBN: 0-13-026036-3

Reference Books	
1	*Mark Lutz*.2009. **Learning Python**.[Fourth Edition]. O Reily.ISBN: 978 - 0-596-15806-4
2	*Mark Lutz*.2010.**Programming Python**. [Fourth Edition].O Reily.ISBN:9780596158118
3	*Tim Hall and J-P Stacey*.2009. **Python 3 for Absolute Beginners**. ISBN:9781430216322
4	*Magnus Lie Hetland*.2009. **Beginning Python: From Novice to Professional**.[Second Edition]. ISBN:9781590599822.

Web References	
1	https://pythonprogramming.net/introduction-to-python-programming/
2	https://www.geeksforgeeks.org/python-programming-example/
3	https://www.python.org/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Realize the basic concepts of Python.
CO2	Know the OOPs and string handling techniques.
CO3	Analyze the file objects and automatic trigerring of programs.
CO4	Analyze the function handling and module description mechanisms.
CO5	Recognize the multiple end-users interaction in scripting and socket programming.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	L	M	M	L
CO2	H	H	M	M	L
CO3	M	H	M	H	M
CO4	M	M	M	H	H
CO5	L	M	H	H	H

H-High; M-Medium; L-Low

18PCSM402	CORE X: PROFESSIONAL ETHICS AND CYBER LAW	SEMESTER- IV

Course Objectives

The course aims

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

Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**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.	10	CO1
II	**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.	10	CO2
III	**Professional Ethics for IT Professionals :** Professional vs Expert – Professional responsibility – Striving for technical excellence- Maintaining professional honesty and integrity - Privacy and confidentiality. Whistle blowing.	10	CO3
IV	**Interpersonal Relationship-** Meaning and importance of Interpersonal Relationship - Collegiality and Loyalty – Authority and responsibility- Respect for authority- Conflicts, collaboration and cooperation.	10	CO4
V	**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.	10	CO5

Text Book

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

Web References	
1	https://www.tutorialspoint.com/information_security_cyber_law/
2	https://cyber.laws.com/ethical-hacking-tutorials
3	https://www.tutorialspoint.com/professional_ethics/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO1	Define and explain the basic human values and standard life.
CO2	Interpret the need and importance of professional ethics.
CO3	Analyze the responsibility and techniques to strive for technical excellence.
CO4	Realise the authority and responsibility in Interpersonnel relationship.
CO5	Analyze the pros and cons of cyber crime and IT act.

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	L	M	M	H
CO2	L	M	M	M	H
CO3	M	M	M	L	H
CO4	L	L	H	M	H
CO5	L	M	H	M	H

H-High; M-Medium; L-Low

18PCSMP401	CORE PRACTICAL VII: PYTHON PROGRAMMING LAB	SEMESTER-IV

Course Objectives

The course aims

- To implement OOPs concept in Python.
- To create webpages and explore database connectivity in Python.

Total Hours: 40

PROGRAM	CONTENTS	Hrs	CO
1	Programs using elementary data items, lists, dictionaries and conditional branches, loops.	04	CO1
2	Programs using functions	04	CO1
3	Programs using exception handling	04	CO2
4	Programs using classes and objects	04	CO2
5	Programs using inheritance	04	CO3
6	Programs using polymorphism	04	CO3
7	Programs to implement file operations.	04	CO4
8	Programs using modules.	04	CO4
9	Programs for creating dynamic and interactive web pages using forms.	04	CO5
10	Program using database connection and web services.	04	CO5

Web References

1	https://www.programiz.com/python-programming/examples
2	https://www.practicepython.org/
3	https://www.w3resource.com/python-exercises/

COURSE OUTCOMES (CO)

After completion of the course , the students will be able to

CO 1	Apply the elementary building blocks in Python program structure.
CO 2	Apply the OOPs concepts in Python programming.
CO 3	Realize and apply file handling operations in Python.
CO 4	Create customized web pages using forms in Python.
CO 5	Apply different types of database and web connectivity using Python.

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	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	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.
- All 3 reviews will be reviewed 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

Viva-Voce : 150 Marks

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.

CAREER COMPETENCY SKILLS

- **On Line Objective Examination (Multiple Choice questions) – Semester I**

- 100 questions-100 minutes
- Twenty questions from each UNIT.
- On line examination will be conducted at the end of I Semester.

- **Viva Voce – Semester II**

  - The student has to come in proper dress code and he/she should bring 2 copies of resume for the Viva Voce
  - The 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)

Duration: 3 Hours

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

Practical Question Paper Pattern and mark Distribution (60 Marks)

Duration: 3 Hours

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	18PCSENI201	INTER DISCIPLINARY COURSE I : Computers for Communication and E-Learning	II	English
2	18PCSENIP201	INTER DISCIPLINARY COURSE PRACTICAL - I: Computers for Communication and E-Learning	II	
4	18PCSMAI301	INTER DISCIPLINARY COURSE I : Programming in C++	III	Mathematics
5	18PCSMAIP301	INTER DISCIPLINARY COURSE PRACTICAL - I : Programming in C++	III	
6	18PCSPHI201	INTER DISCIPLINARY COURSE I : Computer Graphics and Multimedia	II	Physics
7	18PCSPHIP201	INTER DISCIPLINARY COURSE-I PRACTICAL : Multimedia Tools	II	

18PCSENI201	INTER DISCIPLINARY COURSE I : COMPUTERS FOR COMMUNICATION AND E-LEARNING	SEMESTER - II

Course objectives

The course aims

- To learn the basic concepts of computers
- To acquaint students with the proper procedures to create HTML files
- To learn how to formulate E-learning principles

Total Hours: 45

Unit	Contents	Hours	CO
I	**Introduction to Computers :** Anatomy of a digital Computer – Memory units – Auxiliary Storage Devices - Input Devices – Output Devices – Introduction to computer software – Systems – Computer Networks – Communication systems.	09	CO1
II	**HyperText Markup Language:** History of HTML and W3C-HTML and its Flavors- HTML Basics- Elements, Attributes and Tags- Basic Tags. Advanced Tags: Table-Frames-Images-Meta Tag-Planning of Web Page-Model and Structure for Website-Designing Web Pages- Multimedia Content (Audio & Video) Frames.	09	CO2
III	**Cascading Style Sheet (CSS):** Introduction- Advantages-Adding CSS- Browser Compatibility –CSS and Page Layout-Selectors. eXtensible Markup Language(XML): Role of XML-Prolog- Body- Elements- Attributes- Validation- Displaying XML- Namespace.	09	CO3
IV	**E-Learning:** Definition – Benefits – Challenges & opportunities – ROI metrics & valuation – E-Learning cycle – E-learning strategy. Design and Implementation: Role of tutor – Instructional design – Design issues – Types of learning engagements – Blended learning - Team Infra structure – Vendor relationships – Learning management systems – Testing.	09	CO4
V	**Learning Methodology:** Organizing learning sequences – Common lesson structures – Creating building blocks – Designing learning sequences – Learning activities – Test and exercise learning – Planning tests – Selecting questions – Sequencing test questions – Feedback – Improve testing – Prevent cheating.	09	CO5

Text Book	
1.	*Alexis Leon and Mathews Leon. 2010.* **Introduction to Computers.** *[Fourth Edition]. LeonTechWorld, Chennai. (Unit I)*
2	*Uttam K.Roy. 2016.* **Web Technologies.** *[Fourth Edition]. Oxford University Press.(Unit II,III)*
3	*John R Gardner and Bryn Holmes. 2006.* **E-Learning: Concepts and Practice.***[First Edition]. SAGE Publications Ltd, New Delhi. (Unit IV)*
4	*William K Horton. 2007.* **Designing web-Based Training: How to Teach Anyone Anything Anywhere Anytime**. *[First Edition]. John Wiley & Sons Inc, New York. (Unit V)*
Reference Books	
1.	*French, C.S. 1998.* **Data Processing and Information Technology**, *BPB Publications, New Delhi.*
2.	*Sinha, P.K. 1992.* **Computer Fundamentals.** *BPB Publications, New Delhi, 1992.*
3.	*Guy Hart Davis.1998.* **The ABCs of Microsoft Office 97 Professional edition**, *BPB Publications, New Delhi.*
4.	*Allen, M. W. 2003.* **Michael Allen's Guide to E-learning: Building Interactive, Fun and Effective Learning Program for Any Company**. *[First Edition]. John Wiley & Sons Inc, New York.*
5.	*Marc J Rosenberg*. 2000. **E-Learning: Strategies for Delivering Knowledge in the Digital Age**. [First Edition]. McGraw-Hill Education, New Delhi

COURSE OUTCOME (CO)

After completion of the course , the students will be able to

CO1	Know about Fundamentals of computers
CO2	Learn about Formatting and Documentation in HTML
CO3	Know about the Advanced concepts in HTML and CCS
CO4	Gain Knowledge on E-learning methodologies
CO5	Know about Designing and learning sequences

MAPPING

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	L	M
CO2	L	M	L	M	M
CO3	H	H	M	M	L
CO4	M	H	M	H	M
CO5	M	M	M	H	M

H-High; M-Medium; L-Low

18PCSENIP201	INTER DISCIPLINARY COURSE PRACTICAL- I: COMPUTERS FOR COMMUNICATION AND E-LEARNING	SEMESTER - II

Course Objectives

The course aims

- To offer an introduction to Microsoft Windows 7, Microsoft Word 2010, Microsoft Excel 2010 and Microsoft PowerPoint 2010
- To acquaint students with the proper procedures to create documents, worksheets, databases and presentations suitable for coursework, professional purposes and personal use
- To offers a big advantage over its kin by allowing instructors to design with multiple media in an online environment
- To understand, how to integrate all of the media into an effective learning environment

Total Hours: 30

PROGRAM	CONTENTS	Hrs.	CO
1	Create Newspaper which includes Main Heading-Sub Heading, Pictures, Graph and news in double column format in MS-Word 2010.	**03**	**CO1**
2	Send a resume to different companies using Mail merge concept in MS-Word 2010.	**03**	**CO1**
3	Create a excel sheet with student mark list and display result analysis using MS-Excel 2010.	**03**	**CO2**
4	Create a chart using Chart Wizard, changing the chart type, color, printing documents in MS-Excel 2010.	**03**	**CO2**
5	Set an audio and video with animation effect in PowerPoint, grouping and ungrouping clip art and cropping.	**03**	**CO3**
6	Design a website that incorporates all types of hyper links, image and paragraph tags, table tags and text formatting tags.	**03**	**CO4**
7	Design a website to display the details about galaxy using image map in HTML.	**03**	**CO4**
8	Develop a Program that should use tool to convert power point presentation to E-learning publishable format (SWF).	**03**	**CO4**
9	Develop a Program that should use tool to convert power point presentation to E-learning publishable format and it should include external link.	**03**	**CO5**
10	Identify any E-learning web site and publish the E-content to the other users.	**03**	**CO5**

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Practice the Formatting and mail merge option in MS_Word
CO 2	Work on Types Chart and Data Analysis in MS_Excel
CO 3	Know about Animation and Presentation effects in MS_Powerpoint
CO 4	Practice on Image and Formatting tags in HTML
CO 5	Work on E-Content and Publishable Format

18PCSMAI301	INTER DISCIPLINARY COURSE : PROGRAMMING IN C++	SEMESTER – III

Course objectives

The course aims

1. To write robust, maintainable, elegant and efficient C++ code.
2. To deploy good C++ programming practices.
3. To implement advanced Object-Oriented techniques in C++ to realize efficient and flexible applications

Total Hours: 45

UNIT	CONTENTS	Hrs.	CO
I	**Principles of Object Oriented Programming:** Object Oriented Paradigm – Basic concepts of OOP – Benefits of OOP – Applications of OOP – Beginning with C++: Structure of C++ program – Simple C++ program – Compiling and Linking.	**08**	**CO 1**
II	**Tokens, Expressions and Control Structures:** Keywords – Identifiers and Constants – Variables – Data Types – Operators – Control Structures – Functions in C++.	**09**	**CO 2**
III	**Classes and Objects:** Introduction – Defining Member Function – Arrays within a class – Arrays of Objects – Friendly Functions - Constructors and Destructors: Introduction – Parameterized Constructors – Copy Constructors – Destructors.	**09**	**CO 3**
IV	**Operator Overloading:** Introduction - Rules – Overloading Unary and Binary Operators – Inheritance: Single – Multilevel – Multiple – Hybrid – Virtual Base Class – s – Virtual Functions.	**10**	**CO 4**
V	**Working with Files:** Introduction – Opening and Closing a File – File Modes – Sequential Input and Output Operations – Random Access File.	**09**	**CO 5**

Text Book

1.	*Balagurusamy, E*. 2007. **Object Oriented Programming with C++**. [Third Edition]. Tata McGraw Hill Publishing Company Limited, New Delhi.

Reference Books

1.	*Ravichandran, D*. 2002. **Programming with C++**. [Second Edition]. Tata McGraw Hill publishing company limited, New Delhi.
2.	*Ira Pohl*. 2003. **Object oriented Programming using C++**. [Second Edition]. Pearson Education Asia, New Delhi.
3.	*Bjarne Stroustrup*. 2000. **The C++ Programming Language**. [Third Edition]. Addison Wesley, Boston.
4.	*John R. Hubbard*. 2003. **Programming with C++**. Schaums outline series, TMH, New Delhi.

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Define the concepts of object oriented programming and its benefits.
CO 2	Apply the class and objects concepts in real time environments.
CO 3	Analyze the complexity of the real world problems and suitable methods to solve it.
CO 4	Apply the effective oops methodology in reducing runtime and coding lines.
CO 5	Manage file operations in different modes according to the requirement.

MAPPING					
PSO / CO	PSO 1	PSO 1	PSO 1	PSO 1	PSO 1
CO 1	M	M	M	L	L
CO 2	M	M	M	L	L
CO 3	M	M	M	L	L
CO 4	M	M	M	L	L
CO 5	M	M	M	L	L

H-High; M-Medium; L-Low

18PCSMAIP301	INTER DISCIPLINARY COURSE PRACTICAL: PROGRAMMING IN C++	SEMESTER – III

Course Objectives

The course aims

- To understand all the object oriented concepts practically.
- To develop the programmatical skill in C++ in real time Applications.

Total Hours: 30

PROGRAM	CONTENTS	Hrs.	CO
1	Program for Classes and Objects.	03	CO1
2	Program for Classes and Objects using Scope Resolution Operator.	03	CO1
3	Program for Inline functions.	03	CO2
4	Program for Friend functions.	03	CO2
5	Program for Function Overloading.	03	CO3
6	Program using Constructor and Destructor.	03	CO4
7	Program using Operator Overloading.	03	CO4
8	Program using Pure Virtual Function.	03	CO4
9	Program for Single and Multiple Inheritances.	03	CO5
10	Program for Hierarchical and Hybrid Inheritances.	03	CO5

Web References

https://www.programiz.com/cpp-programming/examples

https://www.javatpoint.com/cpp-program

https://www.geeksforgeeks.org/cc-programs

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Expertise in the Concepts of Class and Object.
CO 2	Work with Inline and Friend functions.
CO 3	Apply the Overloading concepts in real time applications.
CO 4	Handle Memory management using Constructor and Destructor.
CO 5	Pertain different Types of Inheritance in Applications

18PCSPHI201	INTER DISCIPLINARY COURSE I: COMPUTER GRAPHICS AND MULTIMEDIA	SEMESTER – II

Course objectives

The course aims

- To provide better knowledge of display systems, image synthesis and shape modeling of 3D applications
- To understand the basic concepts related to multimedia including data standards, algorithms and design.

Total Hours: 40

UNIT	CONTENTS	Hrs	CO
I	2D transformations – Clipping – Point clipping – Line clipping – Polygon clipping – Text clipping – Exterior clipping – Window to view port mapping – Interactive input methods – Picture construction techniques.	**8**	**CO1**
II	3D concepts – 3D transformations – 3D viewing – Visible surface detection methods – Back face detection method – Depth buffer method – Scan line method – Virtual reality environment.	**8**	**CO2**
III	Introduction to multimedia – Applications – Hypermedia – Authoring – File formats – Color models – Digital audio – Digital music making – MIDI – Digital video – Video compression techniques – Video performance measurements –Multimedia databases – Animation.	**8**	**CO3**
IV	Multimedia network services – Network protocols – Requirements for multimedia communications – Multimedia conferencing architectures – Quick time movie file format – MHEG – Multimedia file sharing – Multimedia & Internet – Real time interchange.	**8**	**CO4**
V	Design of a multimedia system – Content based information retrieval – HDTV, ATV, EDTV, IDTV standards – Development of user interface design – Multimedia broadcasting – Social media sharing – Multimedia development issues – Sample multimedia project.	**8**	**CO5**

Text Books

1. *Donald Hearn and M. Pauline Baker,* 2012. **Computer Graphics C Version.** [Second Edition]. Pearson Education, India.
2. *David Hillman,* 2008. **Multimedia: Technology and applications.** Delmar Cengage Learning, USA.

Reference Books
1. *John F. Koegel Buford.* 2009. **Multimedia Systems.** [Sixth Edition]. Pearson Education, India.
2. *Tom Mcreynolds and David Blythe*. 2005. **Advanced Graphics Programming Using OpenGL.** Amsterdam, Netherlands.

COURSE OUTCOMES(CO)

After completion of the course, the students will be able to

CO 1	Know the concept of 2D transformations, image clipping methods and picture construction techniques.
CO 2	Describe the 3D concepts and 3D modeling.
CO 3	Know the fundamentals of multimedia and its various applications.
CO 4	Describe the various multimedia network services and real time interchange.
CO 5	Explain the design of various multimedia systems.

MAPPING:

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	L	H	H	H
CO 2	M	M	H	H	H
CO 3	M	L	H	H	H
CO 4	M	M	H	H	H
CO 5	M	L	H	H	H

H-High; M-Medium; L-Low;

18PCSPHIP201	INTER DISCIPLINARY COURSE PRACTICAL I: MULTIMEDIA TOOLS	SEMESTER – II

Course Objectives

The course aims

- To give practice in multimedia tools for making combination such as text, audio, images, animations, video and interactive element.

Total Hours: 20

Ex.No.	LIST OF EXPERIMENTS	Hrs	CO
1	Retouching of images	**02**	**CO1**
2	Gray scale to color conversion of an image	**02**	**CO2**
3	Image optimization	**02**	**CO1**
4	Image manipulation using filters	**02**	**CO1**
5	Image compression	**02**	**CO1**
6	Guide layer effects in an image.	**02**	**CO3**
7	Frame by Frame animation	**02**	**CO3**
8	Interactive animation	**02**	**CO3**
9	Object and motion tweening	**02**	**CO3**
10	Video and audio effects	**02**	**CO3**

COURSE OUTCOMES(CO)

After completion of the course, the students will be able to

CO 1	Work with retouch, manipulate and compress the given images using multimedia tools.
CO 2	Practice on converting gray image to color image.
CO 3	Practice on various kinds animation as well as video and audio effects.