MASTER OF COMPUTER APPLICATIONS

SYLLABUS

(Under Choice Based Credit System)
Applicable for the students admitted
from 2018 – 2019 onwards

PG DEPARTMENT OF COMPUTER APPLICATIONS

Bishop Heber College (Autonomous)
(Nationally Reaccredited at the A+ Level by NAAC)
(Recognized by UGC as "College with Potential for Excellence")
Tiruchirappalli-620 017

BISHOP HEBER COLLEGE
MCA OUTCOME BASED EDUCATION
2018 -2019 ONWARDS

VISION

Develop next generation software professionals of high calibre to cater to the various needs of the IT Industry through effective teaching and learning process and to involve in advanced research by imbibing ethical values in order to provide solutions to the problems of our society.

MISSION

1. Enrich the students with a deep insight on the latest technologies by providing globally competant curriculum.

2. Develop, evaluate, synthesize and apply the acquired computing knowledge to cater to the needs of the society by collobarating with industries and corporate sectors.

3. Enable the students to become experts, researchers, academicians, entrepreneurs in the field of computer applications with a commitment to lifelong learning.

MCA COURSE STRUCTURE 2018 - 2019

(For the candidates admitted from the academic year 2018-2019 onwards)

Eligibility :

A candidate who is a graduate in Mathematics or Physics or Chemistry or Statistics or Computer Science or Information Technology or Industrial Electronics or Applied Science (with Mathematics as an allied subject or Major Subject) or B.Com. or B.B.A. or B.E. / B.Tech except Computer Science in Engineering Branch) / AMIE of this University or from a recognized University or an examination accepted by the Syndicate as equivalent thereto.

Lateral Entry : PGDCA / B.Sc. Computer Science / B.Sc. Information Technology / B.C.A. / B.Sc. Software Development

Sem	Subject Code	Course	Subject Title	Hrs/Week	Credit	Int. Mark	Ext. Mark	Mark
I	P18CA101	Core I	Programming in Java	6	5	25	75	100
	P18CA102	Core II	Mathematical Foundations of Computer Science	5	5	25	75	100
	P18CA103	Core III	Internet Programming	5	5	25	75	100
	P18CA104	Core IV	Data Structures and Algorithms	6	5	25	75	100
	P18CA1P1	Core Prac.I	Programming inJava Lab	4	2	40	60	100
	P18CA1P2	Core Prac.II	Internet Programming Lab	4	2	40	60	100
			Total	**30**	**24**	**180**	**420**	**600**
II	P18CA205	Core V	Programming in .NETTechnology	4	4	25	75	100
	P18CA206	Core VI	Probability and Statistics	4	3	25	75	100
	P18CA207	Core VII	Linux Programming	4	4	25	75	100
	P18CA208	Core VIII	Computer Graphics	4	3	25	75	100
	P18CA2P3	Core Prac.III	Programming in .NET Lab	4	2	40	60	100
	P18CA2P4	Core Prac.IV	Programming in Linux Lab	4	2	40	60	100
	P18CA2E1 P18CA2E2 P18CA2E3	NMEC	Web Design Cyber Crime Principles of Information Technology	4	2	25	75	100
	P17VL2:1/ P17VL2:2	VLO	RI / MI	2	2	25	75	100
			Total	**30**	**22**	**230**	**570**	**800**
III	P18CA309	Core IX	Software Engineering	4	4	25	75	100
	P18CA310	Core X	Resource Management Techniques	4	4	25	75	100
	P18CA311	Core XI	Database Systems	4	4	25	75	100
	P18CA312	Core XII	Operating Systems	4	4	25	75	100
	P18CA3P5	Core Prac.V	Multimedia Lab	4	2	40	60	100
	P18CA3P6	Core Prac.VI	Database Systems Lab	4	2	40	60	100
	P18CA3:1 P18CA3:2 P18CA3:3	Elective I	Accounting and Financial Management Business Intelligence Management Information Systems	4	4	25	75	100
	P18CAPS1	SBC I*	Communication and Life skills	2	-	-	-	-
			Total	**30**	**24**	**205**	**495**	**700**
IV	P18CA413	Core XIII	Programming in PHP with MySql	4	3	25	75	100
	P18CA414	Core XIV	Computer Communication Networks	4	4	25	75	100
	P18CA415	Core XV	Smart Devices Programming	4	4	25	75	100
	P18CA416	Core XVI	Data Warehousing and Data Mining	4	4	25	75	100
	P18CA4P7	Core Prac. VII	Programming in PHP with MySql Lab	4	2	40	60	100
	P18CA4P8	Core Prac. VIII	Smart Devices Programming Lab	4	2	40	60	100
	P18CA4:1 P18CA4:2 P18CA4:3	Elective II	Artificial Intelligence Soft Computing Genetic Algorithms	4	4	25	75	100
	P18CA4S1	SBC I*	Communication Life skills	2	2	40	60	100
			Total	**30**	**25**	**245**	**555**	**800**

Sem	Subject Code	Course	Subject Title	Hrs/ Week	Credit	Int. Mark	Ext. Mark	Mark
V	P18CA517	Core XVII	Programming in Python	4	4	25	75	100
	P18CA518	Core XVIII	Compiler Design	4	4	25	75	100
	P18CA519	Core XIX	Big Data Analytics and Management	4	4	25	75	100
	P18CA5P9	Core Prac. IX	Programming in Python Lab	4	3	40	60	100
	P18CA5PJ	Core Prac. X	Mini Project	4	3	40	60	100
	P18CA5:1	Elective III	Cloud Computing	4	4	25	75	100
	P18CA5:2		Mobile Computing					
	P18CA5:3		Parallel Computing					
	P18CA5:4	Elective IV	Organizational Behaviour	4	4	25	75	100
	P18CA5:5		Business Intelligence					
	P18CA5:6		Human Resource Management					
			Total	30	26	305	495	800
VI	P18CA620	Core XX	Internet of Things	5	5	25	75	100
	P18CA621	Core XXI	Data Analytical Tools	5	4	25	75	100
	P18CA6PJ	Core Project-I	Project	20	10	50	150	200
				30	19	100	300	300
		Total		180	140	1265	2835	4000

S.No.	Courses	No. of Courses
1	Core Courses	21
2	Core Practicals	9
3	Elective	4
4	NMEC Course	1
5	Skill Based Courses	1
6	Value Education	1
7	Mini Project	1
8	Core Project	1
	Total	**39**

Extra Disciplinary Courses offered by the Department:

(a) Web Design – P18CA2E1
(b) Cyber Crime – P18CA2E2
(c) Principles of Information Technology– P18CA2E3

Core I: PROGRAMMING IN JAVA

Objectives:

1. To impart knowledge in the basic concepts of Java programming.
2. To develop programs in GUI using AWT and swing.
3. To introduce the Remote Method Invocation and JDBC.

UNIT – I   **12 Hours**
   The History and Evolution of Java:
   1.1 The Creation of Java
   1.2 The Byte Code
   1.3 The Java Buzzwords.
   1.4 An Overview of Java
   1.5 Introducing Classes
   1.6 Methods and Classes
   1.7 Inheritance.

UNIT – II   **11 Hours**
   2.1 Packages and Interfaces
   2.2 Exception Handling
   2.3 Multi-Threaded Programming
   2.4 String Handling.

UNIT – III   **10 Hours**
   The Collections Framework:
   3.1 Collections Overview
   3.2 The Collection Interfaces
   3.3 The Collection Classes (ArrayList, LinkedList, HasSet, TreeSet)
   3.4 Accessing a Collection via an Iterator
   3.5 utility classes: StringTokenizer, Date, Scanner.
   3.6 Input/Output: File- the Stream classes- Byte Streams- the Character Streams

UNIT – IV   **11 Hours**
   4.1 The Applet class
   4.2 Event Handling
   4.3 AWT: Working with windows, Graphics and Text – using AWT controls, Layout
   Managers and Menus.

UNIT – V   **11 Hours**
   5.1 Introducing Swing
   5.2 Exploring Swing
   5.3 Java Database Connectivity
   5.4 Java Remote Method Invocation (RMI)
   5.5 Servlets

Text Books
   1. Herbert Schildt, *JAVA^TM* : *Complete Reference,* McGraw Hill, Ninth Edition,2014.
   2. Ivan Bayross, *JAVA 2.0 Web Enabled Commercial Application Development*, BPB
      Publications, 2000. (Unit-V : **Java Database Connectivity**)

Reference Books
   1. Ken Arnold, James Gosling, David Holmes, *Java™ Programming Language*,
      Addison Wesley Profession, Fourth Edition, 2005.
   2. Paul J. Deitel, Harvey M. Deitel, *Java™ for Programmers, 2/E,* PHI Publications,
      2011.

SEMESTER : I	HOURS/WEEK : 5
CODE : P18CA102	CREDITS : 5

Core II : MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Objectives:

1. To impart basic knowledge onformal languages and grammars.
2. To study boolean algebra and graphs.

UNIT – I   **9 Hours**

Boolean Algebra:
1.1 Lattices and Algebraic Systems
1. 2Principle of Duality
1.3 Basic Properties of Algebraic Systems Defined by Lattices
1.4 Distributive and Complemented Lattices
1.5 Boolean Lattices and Boolean Algebras
1.6 Uniqueness of Finite Algebras
1.7 Boolean Functions and Boolean Expressions
1.8 Propositional Calculus – Design and Implementation of Digital Networks
1.9 Switching Circuits.

UNIT – II   **9 Hours**

Graphs and Planar Graphs:
2.1 Introduction
2.2 Basic Terminology
2.3Multigraphs and Weighted Graphs
2.4 Paths and Circuits
2.5 Shortest Paths in Weighted Graphs
2.6 Eulerian Paths and Circuits
2.7 Hamiltonian Paths and Circuits.
2.8 **Trees and Cut-Sets**:
2.8.1Trees
2.8.2Rooted Trees
2.8.3 Prefix Codes
2.8.4 Binary Search Trees – Spanning Trees and Cut-Sets
2.8.5 Minimum Spanning Trees.

UNIT – III   **10 Hours**

Computability and Formal Languages:
3.1 Introduction – Russell's Paradox and Noncomputability
3.2 Ordered Sets
3.3 Languages
3.4 Phrase Structure Grammars
3.5Types of Grammars and Languages.

UNIT – IV   **10 Hours**

Finite State Machines:
4.1 Introduction
4.2 Finite State Machines
4.3 Finite State Machines as Models as Physical System
4.4 Equivalent Machines
4.5 Finite State Machines as Language Recognizers.

UNIT – V   **9 Hours**

Recurrence Relations and Recursive Algorithms:
5.1Introduction
5.2 Recurrence Relations
5.3 Linear Recurrence Relations with Constant Coefficients
5.4 Homogeneous Solutions
5.5 Particular Solutions
5.6 Total Solutions
5.7 Solutions by the Method of Generating Functions
5.8 Sorting Algorithms.

Text Book

1. C.L.Liu, *Elements of Discrete Mathematics,* McGraw Hill, Second Edition, 1985.

Reference Books

1. J.P.Tremblay, R.Manohar, *Discrete Mathematical Structures with Application to Computer Science,* McGraw Hill, 2001.
2. Narasingh Deo, *Graph Theory,* PrenticeHall of India, 2004.

Core III : INTERNET PROGRAMMING

Objectives:
1. To develop the knowledge for designing web sites using HTML 5.
2. To imbibe the knowledge in scripting languages and AngularJS.

UNIT – I   **10 Hours**

     1.1 Getting Started with HTML –
     1.2 Formatting Text by using Tags –
     1.3 using Lists and Backgrounds –
     1.4 Creating Hyperlinks and Anchors –
     1.5 Introduction to Style Sheets – 1.5.1Formatting Text by using Style Sheets – 1.5.2Formatting Paragraphs by using Style Sheets.

UNIT – II   **10 Hours**

     2.1 Displaying Graphics –
     2.2 Creating Division Based Layouts –
     2.3 Creating Tables –
     2.4 Formatting Tables –
     2.5 Creating User Forms –
     2.6 Incorporating Sound and Video –
     2.7 Canvas.
     2.8 **The Basics of Java Script:** 2.8.1Overview of Java Script – 2.8.2Object Oriented and Java Script – 2.8.3General Syntactic Characteristics – 2.8.4Primitives, Operations, and Expressions – 2.8.5Screen Output and Keyboard Input – 2.8.6 Control Statements –2.8.7 Object Creation and Modification.

UNIT – III   **10 Hours**

     3.1 Arrays –
     3.2 Functions –
     3.3 An Example –
     3.4 Constructors –
     3.5 Pattern Matching Using Regular Expressions –
     3.6 Another Example –
     3.7 Errors in Scripts.
     3.8 **Java Script and XHTML Documents:**
     3.8.1The Java Script Execution Environment
     3.8.2 The Document Object Model
     3.8.3 Element Access in Java Script.
     3.9 **Events and Event Handling**:
     3.9.1 Handling Events from Body Elements
     3.9.2Handling Events from Button Elements
     3.9.3Handling Events from Text Box and Password Elements
     3.9.4 The DOM 2 Event Model
     3.9,5 The Navigator Object
     3.9.6 DOM Tree Traversal and Modification.

UNIT – IV   **10 Hours**

     Dynamic Documents with Java Script:
     4.1Introduction
     4.2Positioning Elements
     4.3Moving Elements
     4.4 Element Visibility
     4.5 Changing Colors and Fonts
     4.6 Dynamic Content
     4.7 Stacking Elements
     4.8 Locating the Mouse Cursor
     4.9 Reacting to a Mouse Click
     4.10 Slow Movement of Elements
     4.11Dragging and Dropping Elements.

UNIT – V   **10 Hours**

     Introduction To AngularJS:

5.1 Introduction

5.2 Understanding Directives

5.3Creating Controllers

5.4 Working With AngularJS Expression

5.5 Making Use of AngularJS Filters

5.6 Understanding AngularJS Modules

5.7 Exploring AngularJS Services

5.8 Learning AngularJS Views .

Text Books

1. Faithe Wempen, *HTML5 Step by Step*, Microsoft Press, 2011.
2. Robert W. Sebesta, *Programming the World Wide Web*, Pearson Education, Fourth Edition, 2009.
3. Felix Alvaro, *ANGULARJS: Easy AngularJS for Beginners*, Kindle Edition.

Reference Book

1.Joel Sklar, *Principles of Web Design: The Web Technologies Series*, Fifth Edition, 2011.

Core IV : DATA STRUCTURES AND ALGORITHMS

Objectives:

1. To understand the linear and non linear data structures available in problem solving.
2. To know about the sorting and searching techniques and its efficiencies.
3. To get a clear idea about the various algorithm design techniques.
4. To apply the data structures and algorithms in real time applications.

UNIT – I   **9 Hours**

Introduction and Overview:
1.1 Definitions
1.2 Concept of Data Structures
1.3 Overview of Data Structures
1.4 Implementation of Data Structures.
1.5 **Linked Lists:**
1.5.1 Definition
1.5.2 Single Linked List
1.5.3 Circular Linked List
1.5.4 1Double Linked List
1.5.5 Circular Double Linked List
1.5.6 Application of Linked Lists.
1.6 **Stacks:** Introduction
1.6.1 Definition
1.6.2 Representation of Stack
1.6.3 Operations on Stacks
1.6.4 Application of Stacks.
1.7 **Queues:** Introduction
1.7.1 Definition
1.7.2 Representation of Queues – Various Queue Structures
1.7.3 Application of Queues.

UNIT – II   **10 Hours**

Trees :
2.1 Basic Terminologies
2.2 Definition and Concepts
2.3 Representation of Binary Tree
2.4 Operations on Binary Tree
2.5 Types of Binary Trees
2.6 Trees and Forests
2.7 B Trees .

UNIT – III   **10 Hours**

Graphs:
3.1 Introduction
3.2 Graph Terminologies
3.3 Representation of Graphs
3.4 Operations on Graphs
3.5 Applications of Graph Structures
3.6 BDD and its Applications.
3.7 Introduction:
3.8 What is an Algorithm?
3.9 Algorithm Specification
3.10 Performance Analysis**.**

UNIT – IV   **11 Hours**

Divide–and–Conquer:
4.1 General Method
4.2 Binary Search
4.3 Finding the Maximum and Minimum
4.4 Merge Sort
4.5 Quick Sort – Selection.
4.6 **The Greedy Method:**

4.6.1 The General Method
4.6.2 Minimum Cost Spanning Trees
4.6.3 Single–Source Shortest Paths.

UNIT – V   **10 Hours**

Dynamic Programming:
5.1 The General Method
5.2 Multistage Graphs
5.3 All Pairs Shortest Paths
5.4 Single Source Shortest Paths.
5.5 Backtracking:
5.5.1 The General Method
5.5.2 The 8-Queens Problem
5.5.3 Sum of Subsets
5.5.4 Graph Coloring.

Text Books
1. Samanta D**, *Classic Data Structures,* ** Prentice Hall of India, 2006.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, ***Fundamentals of Computer Algorithms***, Galgotia Publications, Second Edition, 1998.

Reference Books
1. V. Aho, J. E. Hopcroft, and J. D. Ullman, ***Data Structures and Algorithms***, Pearson Education, 2008.
2. Anany Levitin, ***Introduction to the Design and Analysis of Algorithms,*** Pearson Education 2003.

Core Practical I: PROGRAMMING IN JAVA LAB

Objectives:

1. To get experience with java programming concepts.
2. To develop GUI application using awt and swing.
3. To develop JDBC programs.

List of Exercises:

1. Classes and Objects.
2. Inheritance.
3. Interfaces.
4. Packages.
5. Exceptions handling.
6. Multithreading.
7. Collection Interfaces.
8. I/O Streams.
9. Applet programming.
10. Applying AWT concepts.
11. Applying swing concepts.
12. JDBC.

Core Practical II : INTERNET PROGRAMMING LAB

Objectives:

1. To provide working experience with tags, command and hyper links.
2. To develop web pages using HTML5, AngularJS, Java and Visual Basic scripts.

List of Exercises

1. Text and Hyperlinks.
2. Image Mapping.
3. Style Sheets.
4. List with Hyperlinks.
5. Table Handling.
6. Canvas.
7. Video, Audio.
8. Input Types.
9. Semantic Elements.
10. Forms and Validation using Java Script.
11. Calculator using Java script.
12. Event Handling using Vbscript.
13. Application Form using Vbscript.
14. AngularJS Expression.
15. AngularJS Forms & Validation.

SEMESTER : II   HOURS/WEEK : 4
CODE   : P18CA205   CREDITS   : 4

Core V : PROGRAMMING IN .NET TECHNOLOGY

Objective:
1. To build web applications using MVC Design Pattern
2. To expose the students to work with C# Sharp.

UNIT – I   10 Hours

    1.1 The Anatomy of an ASP.NET Application
    1.2 Introducing Server Controls
    1.3Improving the Currency Converter
    1.4 A Deeper Look at HTML Control Classes
    1.5The Page Class
    1.6Application Events
    1.7 Stepping Up to Web Controls
    1.8 Web Control Classes
    1.9 List Controls– Table Controls
    1.10 Web Control Events and AutoPostBack
    1.11 A Simple Web Page.

UNIT – II   10 Hours
    2.1 Introduction of different Web Technology
    2.2 Quick introduction to ASP.NET MVC
    2.3 Role of Model, View, and Controller
    2.4 How ASP.NET MVC Works
    2.5Benefits of using ASP.NET MVC
    2.6 Installing MVC 5 and Creating Applications.

UNIT – III   9 Hours
    Controllers
    3.1The Controller's Role
    3.2A sample Application:
    3.2.1The MVC Music Store
    3.2.2Controller Basics.
    3.3**Views**
    3.3.1 The purpose of Views
    3.3.2View Basics
    3.3.3The Razor View Engine
    3.3.4Specifying a partial view.

UNIT – IV   9 Hours
    Models
    4.1Modeling the Music store
    4.2Scaffolding a store manager
    4.3Editing an Album
    4.4Model Binding
    4.5**Data annotations and Validation**
    4.6 Annotating orders for validation
    4.7Custom validation logic
    4.8Display and edit annotations.

UNIT – V   10 Hours
    AJAX:
    5.1 JQuery
    5.2Ajax helpers
    5.3Client validation
    5.4 Beyond helpers-Improving Ajax performance.
    5.5**Nuget**
    5.5.1 Introduction to Nuget
    5.5.2Adding a library as a package. **Asp.Net Web API**
    5.6 Defining Asp.net web API
    5.6.1Writing an API controller
    5.6.2Configuring web API.

Text Book
1. Mathew MacDonald, **Beginning ASP.NET 4 in C# 2010: From Novice to Professional**, Apress Publications, Second Edition, 2012.
2. Jon Galloway, Brad Wilson, K.Scott Allen, David Matson, **Professional ASP.NET MVC 5**, John Wiley & sons Inc.

Reference Book
1. *Mathew MacDonald, Beginning ASP.NET 3.5 in C# 2008: From Novice to Professional, Apress Publications, Second Edition, 2008.*
2. *Mahesh Chand, Programming C# 5.0, C# Corner Publications, 2014.*
3. *Pro**ASP.NET MVC 5**, Apress.*

Core VI : PROBABILITY AND STATISTICS

Objectives:

1. To impart knowledge on probability and distribution functions.
2. To learn discrete distributions and basics of statistics.

UNIT – I   10 Hours
      1.1 Probability
      1.2 Random Events
      1.3 Sample Spaces
      1.4 Axiomatic Approach to Probability
      1.5 Conditional Probability
      1.6 Addition and Multiplication
      1.7 Baye's Theorem.

UNIT – II   10 Hours
      2.1 Random Variables
      2.2 Discrete and Continuous Random Variables
      2.3 Probability Density Functions
      2.4 Distribution Functions
      2.5 Marginal and Conditional probability Distribution Functions.

UNIT – III   10 Hours
      3.1 Mathematical Expectations
      3.2 Variance
      3.3 Moment Generating Functions
      3.4 Correlation Coefficients
      3.5 Regression.

UNIT – IV   10 Hours
      4.1 Discrete Distributions
      4.2 Binomial, Poisson Distributions
      4.3 Continuous Distribution
      4.4 Normal and Properties of Normal Distribution.

UNIT – V   10 Hours
      5.1 Concept of Sampling
      5.2 Types of Sampling
      5.3 Sampling Distribution and Standard Error
      5.4 Testing of Hypothesis
      5.5 Tests for Means and Variances for Large and Small Samples
      5.6 Chi–Square Test and its Applications
      5.7 Tests of Goodness of Fit
      5.8 Test of Independence of Attributes.

Text Book

1. Irwin Miller., Marylees Miller., *John E. Freund'sMathematical Statistics with Applications*, Seventh Edition, Pearson Education,2004.

Reference Books

1. MadinA,*Statistical Methods - An Introductory Text*, Wiley Basterr Ltd., New Delhi,2010.
2. Guptha S.V, Kapoor V.K, *Fundamental of Mathematical Statistics,* Sultan Chand andSons, 2011.

Core VII : LINUX PROGRAMMING

Objectives:

1. To provide a comprehensive overview of the Linux operating system
2. To understand Shell commands and shell scripting Implementation of Linux System using GUI concepts.
3. To understand the concept of Sockets.

UNIT –I

Getting Started:

1.1 An Introduction to UNIX,Linux and GNU -Programming Linux:.

1.2 **Shell Programming:**

1.2.1why program with a shell?a bit of philosophy-what is a shell?-pipes and redirection

1.2.2the shell as a programming language

1.2.3shell syntax-going graphical the dialog utility-putting it all together

1.3 **Working with Files:**

1.3.1 linux file structure

1.3.2 system calls and device drivers

1.3.3-library functions

1.3.4low-level file access

1.3.5the standard I/O library

1.3.6 Formatted input and output-file and directory maintenance

1.3.7scanning directories

1.3.8-errors

1.3.9the/proc file system

1.3.10advanced topics.

UNIT -II

The Linux Environment:

2.1 program arguments

2.2environment variables

2.3time and date-temporary files

2.4user information

2.5host information

2.6logging-resources and limits

2.7**Terminals:**

2.7.1 Reading from and Writing to the terminal

2.7.2talking to the terminal-the terminal driver and the general terminal interface-

2.7.3the termios structure

2.7.4terminal output-detecting keystrokes.

2.8**Managing Text-Based Screens with curses:**

2.8.1compiling with curses

2.8.2curses terminology and concepts

2.8.3the screen

2.8.4the keyboard

2.8.5windows

2.8.6 subwindows

2.8.7the keypad

2.8.8using color

2.8.9pads

2.8.10the CD collection application,

UNIT -III

Data Management:

3.1managing memory

3.2file locking

3.3databases

3.4the CD application.

3.5**Development Tools:**

3.5.1problems of multiple source files

3.5.2the make command and make files
3.5.3source code control
3.5.4writing a manual page
3.5.5 distributing software
3.5.6RPM packages
3.5.7other package formats
3.5.8development environments.
3.6 **Debugging:**
3.6.1types of errors
3.6.2general debugging techniques
3.6.3debugging with gdb
3.6.4 more debugging tools
3.6.5assertions
3.6.6memory debugging.
UNIT –IV
Processes and Signals:
4.1what is a process
4.1.1process structure
4.1.2starting new processes
4.1.3signals,
4.2**POSIX Threads:**
4.2.1what is a thread?-advantages and drawbacks of threads
4.2.2 a first threads program
4.2.3simultaneous execution
4.2.4synchronization-thread attributes
4.2.5cancelling a thread-threads in abundance.
4.3**Inter-Process Communication: Pipes**
4.3.1:what is a pipe?
4.3.2-process pipes
4.3.3sending output to popen-the pipe call
4.3.4parent and child processes
4.3.5named pipes:
FIFOs-the CD database application.
4.4**Semaphores,Shared memory and Message Queues:**
4.4.1semaphores
4.4.2shared memory
4.4.3message queues
4.4.4the CD database application
4.4.5IPC status commands.
UNIT –V
Sockets:
5.1what is a socket?
5.2socket connections-
5.3network information
5.4multiple clients-datagrams.
5.5**Programming GNOME using GTK+:**
5.5.1introducing X-
5.5.2introducing GTK+
5.5.3Events, signals and widgets
5.5.4GTK+ widgets
5.5.5GNOME widgets
5.5.6GNOME menus
5.5.7dialogs
5.5.8CD database application
5.9**Programming KDE Using Qt:**
5.9.1introducing KDE and Qt-installing Qt-signals and slots-Qt widgets
5.9.2dialogs
5.9.3menus and toolbars with KDE-CD database application using KDE/Qt.
Text Book

Neil Matthew,Richard Stones,"Beginning Linux Programming", Fourth
Edition,Wiley Publishing Inc,2008.

Reference Books

1. Paul Cobbaut,"Linux Fundamentals"version 1.3,published by Free Software Foundation on 24 may2015.
2. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, "Linux in a Nutshell", O'Reilly Media, 6thEd., 2009.
3. Neil Matthew, Richard Stones, Alan Cox, "Beginning Linux Programming", 3rdEd., 2004.
4. Robert Love, "Linux System Programming" ,O'Reilly Media, 2ndEd., 2007.
5. William Shotts,"The Linux Command Line"version 16.07,third internet edition, published by No Starch press on july 28,2016.

SEMESTER : II	HOURS/WEEK : 4
CODE : P18CA208	CREDITS : 3

Core VIII: COMPUTER GRAPHICS

Objectives:

1. To understand the computational development of graphics with mathematics.
2. To introduce the fundamental concepts about display devices, input devices and graphics system.
3. To provide in–depth knowledge of display systems, image synthesis, shape modeling of 2D and 3D applications.

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UNIT – I   **10 Hours**

Overview of Graphics Systems:
1.1 Video Display Devices
1.2 Input Devices
1.3 Hard Copy Devices
1.4 Graphics Software
1.5 Introduction to OpenGL.
1.6 **Graphics Output Primitives:**
1.6.1 Line
1.6.2 Drawing Algorithms
1.6.3 Line Equations
1.6.4 DDA Algorithm
1.6.5 Bresenham's Algorithm
1.6.6 Circle
1.6.7 Generating Algorithms.

UNIT – II   **10 Hours**

Attributes of Graphics Primitives:
2.1 Color and Gray Scale
2.2 Line Attributes
2.3 Fill
2.4 Area Attributes
2.5 Character Attributes
2.6 Antialiasing.
2.7 OpenGL Color Functions.
2.8 Geometric Transformations:
2.8.1 Basic Two Dimensional Geometric Transformations
2.8.2 Matrix Representations and Homogeneous Coordinates.

UNIT – III   **10 Hours**

Two–Dimensional Viewing:
3.1 The Clipping Window
3.2 Clipping Algorithms
3.3 Two Dimensional Line Clipping
3.4 Polygon Fill
3.5 Area Clipping
3.6 Curve Clipping
3.7 Text Clipping.
3.8 **Interactive Input Methods and Graphical User Interfaces:**
3.8.1 Logical Classification of Input Devices
3.8.2 Interactive Picture Construction Techniques.

UNIT – IV   **10 Hours**

Three Dimensional Viewing:
4.1 The Three–Dimensional Viewing Pipeline
4.2 Three–Dimensional Viewing
4.3 Coordinate Parameters Transformation from World to Viewing Coordinates
4.4 Projection Transformations
4.5 Perspective Projections
4.6 OpenGL Three Dimensional Viewing Functions.

UNIT – V   **10 Hours**

Visible–Surface Detection Methods:

5.1Classification of Visible
5.2Surface Detection Algorithms
5.3 Comparison of visibility
5.4Detection Methods
5.5Curved Surfaces
5.6Wire–Frame Visibility Methods.
5.7 **Computer Animation:**
5.7.1 Design of Animation Sequences
5.7.2 Traditional Animation Techniques
5.7.3 General Computer–Animation Functions
5.7.4 Computer Animation Languages
5.7.5 Key-Frame Systems
5.7.8Motion Specifications.

Text Book

Donald Hearn, M. Pauline Baker, *Computer Graphics with Open GL,* Pearson Education, Third Edition, 2009.

Reference Book

 Newman William M., Sproull Robert F., *Principles of Interactive Computer Graphics*, McGraw Hill, 2010.

Core Practical III : PROGRAMMING IN .NET LAB

Objectives:

1. To develop practical knowledge in .Net technologies.
2. To get hands–on experience on web services.

List of Exercises

1. Design an ASP.NET web form using HTML Server Controls. Use at least 5 different controls.
2. Design a website using web controls to create an interactive website.
3. Create a Movie database application with ASP.NET MVC.
4. Design a MVCand Razor with database connection for CRUD
5. Create an ASP.NET MVC with Bootstrap
6. Design a Web based application for Event management system
7. Write an application for Restaurant table booking application.
8. Create an Online quiz application with Dashboard.

Core Practical III : PROGRAMMING IN LINUX LAB

1. To Introduce Linux Shell programming techniques.

2. To describe and understand the LINUX file system with the security aspects.

List of programs:

1. Basic Commands of Linux cal, pwd, cd, ls, mv, cd, cp, rm, mkdir, rmdir, more, less, touch.
2. Creating and viewing files using cat, file comparisons, disk related commands, checking disk free spaces.
3. Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands- wc, cut, paste etc –
4. mathematical commands - expr, factor etc.
5. Filter commands- pr, head, tail, cut, sort, uniq. tr - Filter using regular expression grep, egrep, sed, awk .
6. Accessing help options, File names and Wild Card, Types of Files, Directory Hierarchy, Operations.
7. Commands using vi and Emacs Editor, File Permissions.
8. Shell Programming: Basics of Shell Programming, Meta Characters, Predefined Variables, Shell Variables, Storing and Accessing value of variables, Reading files, Expression, Strings Handling.
9. Conditional Statements: if, if-else, nested conditions, Case Statements.
10. Positional Parameters, argument Validations, Looping Statements: while loop, until, for, Nested Loops, User Defined Functions.
11. Process Management with Linux, File System management, User Administration, Linux Start up and Shutdown.

NMEC (a) : WEB DESIGN

Objectives:

1. To learn the basics of internet, email and search engines.
2. To develop the knowledge for creating web pages using HTML and scripting.

UNIT – I   **10 Hours**
      1.1 Internet
      1.2 Definition of Internet
      1.3 Basics of Internet
      1.4 Internet and WWW
      1.5 Internet Application
      1.6 Web Browsers
      1.7 Web Pages
      1.8 Internet Chat
      1.9 Web Sites
      1.10 E–Mail
      1.11 Search Engines
      1.12 URLs
      1.13 Domain Names
      1.14 Portals.

UNIT – II   **10 Hours**
      2.1 HTML
      2.2 Basics of HTML
      2.3 Document Body Text
      2.4 Hyperlink
      2.5 Adding more Formatting
      2.62 Lists .
      7– Using Color & images.

UNIT – III   **9 Hours**
      3.1 Tables
      3.2 Multimedia Objects
      3.3 Frames
      3.4 Forms
      3.5 Marquee.

UNIT – IV   **9 Hours**
      4.1 DHTML
      4.2 Cascading Style Sheets
      4.3 Introduction using Styles
      4.4 Working Simple Examples
      4.5 Defining Your Own Styles
      4.6 Properties & Values in Styles
      4.7 Style Sheets
      4.8 A Worked Example
      4.9 Formatting Blocks of Information.

UNIT – V   **9 Hours**
      5.1 Java Script – Introduction to Java script
      5.2 Basics
      5.3 Variables
      5.4 String Manipulation
      5.5 Mathematical Functions
      5.6 Operations
      5.7 Built– in Objects
      5.8 Data Validation
      5.9 Messages & Confirmation
      5.10 Status Bar
      5.11 Writing to a Different Frame.

Text Books
1. Raj Kamal, *Internet & Web Technologies*, McGraw Hill, 2009.
2. Chris Bates, *Web Programming*, John Wiley & Sons, Third Edition, 2010.

Reference Book
Steven Holzner, *HTML Black Book*, Dreamtech Publishers, 2008.

NMEC (b) : CYBER CRIME

Objectives:

1. To give a clear picture on the nature and effects of cyber crimes.
2. To help the students to face such challenges with technical skills.

UNIT – I   **9 Hours**
      1.1 Sale of Illegal Articles
      1.2 Online gambling
      1.3 Intellectual Property Crimes – Email Spoofing
      1.4 Forgery
      1.5 Cyber Stalking
      1.6 Web Defacement.

UNIT – II   **9 Hours**
      2.1 Email Bombing
      2.2 Data Diddling
      2.3 Virus / Worm Attacks
      2.4 Trojans and Keyloggers
      2.5 Email Frauds
      2.6 Computer Crime Technology
      2.7 White Collar Computer Crime
      2.8 Crime Victim.

UNIT – III   **9Hours**
      3.1 Fake Websites
      3.2 Bank Fraud
      3.3 Advance Fee Fraud
      3.4 Identity Theft – Digital Privacy Cyber Security
      3.5 Protecting Information Resources.

UNIT – IV   **9 Hours**
      Corporate Reputation:
      4.1 Determinants and Effects
      4.2 Rebuilding Corporate Reputation
      4.3 Social Responsibility.

UNIT – V   **9 Hours**
      5.1 Knowledge Resources
      5.2 Entrepreneurship Capabilities
      5.3 Information Sources
      5.4 knowledge Categories
      5.5 Crime Investigations

Text Books
1. Rohas Nagpal, *Evolution of Cyber Crimes*, Asian School of Cyber Laws,2008.
2. Petter Gottschalk, *Policing Cyber Crime*, Petter Gottschalk and Ventus Publishing Aps, 2010.

Reference Book
Farooq Ahmad,*Cyber Law in India Law on Internet*, Fourth Edition,2011.

SEMESTER : II	HOURS/WEEK : 4
CODE : P18CA2E3	CREDITS : 2

NMEC (c): PRINCIPLES OF INFORMATION TECHNOLOGY

Objectives:

1. To impart basic knowledge about computer systems.
2. To enable the students to know the importance of internet and applications of internet technologies.

UNIT – I 10Hours
Introduction to Computer Systems :
1.1 Introduction to Computer
1.2 Classification of Digital Computer System
1.3 Anatomy of Digital Computer
1.4 Architecture
1.5 Number System
1.6 Memory Units
1.7 Auxiliary Storage Devices.

UNIT – II 10Hours
2.1 Input Devices
2.2 Output Devices
2.3 **Computer software and software Development**:
2.3.1 Introduction to Computer Software
2.3.2 Operating systems
2.3.3 Programming Languages
2.3.4 Software Features and Trends.

UNIT – III 9 Hours
Tele Communications:
3.1 Introduction to Tele communication
3.2 Computer Networks
3.3 Communication System
3.4 – Distributed system.

UNIT – IV 9 Hours
Internet and Intranet:
4.1 Internet and World Wide Web
4.2 email
4.3 Intranets.

UNIT – V 9 Hours
Applications of IT:
5.1 Computer in Business and Industry
5.2 Computers in Home
5.3 Computer in Education and Training
5.4 Computer in Entertainment, Science, Medicine and Engineering.

Text Book
1. Alexis Leon and Mathews Leon, *Fundamentals of Information Technology*, VIKAS Publishing House Pvt. Ltd., 2009.

Reference Books
1. Stacey C. Sawyer, Brain K. Williams Sarah E. Hutchinson, *Using Information Technology – A practical introduction to computers and communications*, Third Edition, McGraw Hill, 2005.
2. A. Kumar, *Internet and IT*, Anmol Publications Pvt. Ltd., First Edition, 2002.

Core IX: SOFTWARE ENGINEERING

Objectives:

1. To enable the students to learn the various software development models.
2. To understand the concepts of data flow in software development.

UNIT – I   **10 Hours**

Software and Software Engineering:
1.1The Nature of Software
1.2The Unique Nature of WebApps
1.3Software Engineering
1.4 The Software Process
1.5 Software Engineering Practice
1.6Software Myths.
1.7**The Software Process:**
1.7.1Process Models:
1.7.2A Generic Process Model
1.7.3 Process Assessment and Improvement
1.7.4 Prescriptive Process Models
1.7.5 Specialized Process Models
1.7.6The Unified Process.

UNIT – II   **10 Hours**

Modeling: Principles that Guide Practice:
2.1Software Engineering Knowledge
2.2Core Principles
2.3Principles That Guide Each Framework Activity.
2.4**Understanding Requirements:**
2.4.1Requirements Engineering
2.4.2Establishing the Groundwork
2.4.3Eliciting Requirements – Developing UseCases
2.4.4Building the Requirements Model
2.4.5 Negotiating Requirements – Validating Requirements.
2.5**Requirements Modeling: Scenarios,**
2.5.1Information and Analysis Classes:
2.5.2 Requirements Analysis
2.5.3Scenario
2.5.4Based Modeling
2.5.5 UML Models That Supplement the Use Case
2.5.6 Data Modeling Concepts
2.5.7Class
2.5.8Based Modeling.

UNIT – III   **10 Hours**

Design Concepts:
3.1 Design within the Context of Software Engineering
3.2The Design Process
3.3Design Concepts
3.4 The Design Model.
3.5**Architectural Design:**
3.5.1 Software Architecture
3.5.2Architectural Genres
3.5.3Architectural Styles
3.5.4Architectural Design.
3.6**User Interface Design:**
3.6.1 The Golden Rules
3.6.2Interface Design Steps.
3.7**Quality Management: Quality Concepts:**
3.7.1`Software Quality
3.7.2The Software Quality Dilemma
3.7.3Achieving Software Quality.

UNIT – IV   **10 Hours**

Software Quality Assurance:
4.1Background Issues
4.2Elements of Software Quality Assurance
4.3SQA Tasks, Goals and Metrics
4.4Formal Approaches to SQA
4.5Statistical Software Quality Assurance

4.6 Software Reliability

4.7 The ISO 9000 Quality Standards

4.8 The SQA Plan. 4.9**Software Testing Strategies:**

4.9.1 AStrategic Approach to Software Testing

4.9.2Strategic Issues

4.9.3Test Strategies for Conventional Software

4.9.4 Validation Testing

4.9.5System Testing

4.9.6 The Art of Debugging.

4.10**Testing Conventional Applications:**

4.10.1 Software Testing Fundamentals

4.10.2Internal and External Views of Testing

4.10.3 White Box Testing

4.10.4 Basis Path Testing

4.10.5Control Structure Testing

4.10.6 Black Box Testing.

UNIT – V   **10 Hours**

Managing Software Projects: Project Management Concepts:

5.1 The Management Spectrum

5.2 People

5.3The Product

5.4The Process

5.5The Project.

5.6 **Process and Project Metrics:**

5.6.1 Metrics in the Process and Project Domains

5.6.2 Software Measurement

5.6.3 Metrics for Software Quality

5.6.4Integrating Metrics within the Software Process

5.6.5 Metrics for Small Organizations

5.6.6 Establishing a Software Metrics Program.

5.7 **Estimation For Software Projects:**

5.7.1 Software Project Estimation

5.7.2 Decomposition Techniques

5.7.3Empirical Estimation Models.

5.8 **Project Scheduling:**

5.8.1 Basic Concepts

5.8.2Project Scheduling – Scheduling**.**

5.9Risk Management:

5.9.1 Software Risks

5.9.2Risk Identification

5.9.3Risk Projection

5.9.4 Risk Refinement

5.9.5Risk Mitigation, Monitoring and Management.

Text Book

1. Roger S. Pressman, *Software Engineering - A Practitioner's Approach*, McGraw Hill, seventh Edition, 2010.

Reference Books

1. Ian Sommerville, *Software Engineering*, Pearson Education Asia, Sixth edition, 2000.
2. James F Peters and Witold Pedryez, *Software Engineering – An Engineering Approach*, John Wiley and Sons, New Delhi, 2000.

Core X : RESOURCE MANAGEMENT TECHNIQUES

Objectives:

1. To impart basic knowledge in resource management techniques.
2. To enable the students to learn problem solving techniques.

UNIT – I   **10 Hours**
1.1 The Linear Programming Problem
1.2 Mathematical Formulation of the Problem
1.3 Graphical Solution Method
1.4 The Simplex Method
1.5 Artificial Variable Techniques
1.6 Dual Simplex method.

UNIT – II   **10 Hours**
2.1 The Transportation Problem
2.2 Matrix Form
2.3 The Transportation Table
2.4 The Initial Basic Feasible Solution
2.5 Degeneracy in Transportation Problems
2.6 Optimum Solution
2.7 The Assignment and Routing Problems.

UNIT – III   **10 Hours**
3.1 Queueing Theory
3.2 Queueing System
3.3 Characteristics of Queueing System
3.4 Poisson Process and Exponential Distribution
3.5 Classification of Queues
3.6 Transient and Steady States
3.7 Poisson Queues
3.8 Non – Poisson Queueing Systems
3,9 Non – Markovian Queues
3,10 Probabilistic models.

UNIT– IV   **10 Hours**
4.1 Inventory Control
4.2 ABC Analysis
4.3 Economic Lot Size Problems
4.4 EOQ with Shortage
4.5 Multi
4.6 Item Deterministic Problem
4.7 Uncertain Demand
4.8 Inventory Control with Price Breaks.
4.9 Replacement Problem
4.10 Replacement of Items that Deteriorate with time
4.11 Replacement of Items that Fail Completely
4.12 other Replacement Problems.

UNIT – V   **10 Hours**
5.1 Network Scheduling by PERT/CPM
5.2 Basic Concepts
5.3 Constraints in Network
5.4 Construction of the Network
5.5 Time Calculations in Networks
5.6 Critical Path Method (CPM)
5.7 PERT – 5.8PERT Calculations.

Note: Derivations of results are not expected.

Text Book

Kanti Swarup, P.K. Gupta and Man Mohan,*Operations Research*, Sultan Chand and Sons, 1992.

Reference Books

1. Hamdy A Taha,*Operations Research – An Introduction,* Macmillan Publishing Company, 1982.
2. Don.T. Phillips, A.Ravindran, James.J.Solberg, *Operations Research – Principles and Practice*,John Wiley & Sons, 1976.

Core XI: DATABASE SYSTEMS

Objectives:

1. To understand the database applications, structure, languages and models.
2. To have a clear idea about the relational model, integrity, security, transaction management, storage and file structure.
3. To learn about SQL & PL /SQL statements.

UNIT – I   **12 Hours**

 Introduction:
 1.1Database System Applications
 1.2– Database Systems vs File Systems
 1.3 View of data
 1.4 – Data Models
 1.5 Database Languages
 1.6 Database Users and Administrators
 1.7Transaction Management
 1.8– Database System Structure
 1.9Application Architectures.
 1.10**Entity – Relationship model**:
 1.10.1Basic Concept
 1.10.2
 1.10.3Constraints
 1.10.4 Keys
 1.10.5Entity
 1.10.6Relationship Diagram
 1.10.7Weak entity Sets
 1.10.8Extended E–R Features.
 1.11**Relational Model**:
 1.11.1 Structure of Relational Database
 1.11.2Relational Algebra
 1.11.3Extended Relational Algebra Operations.

UNIT – II   **10 Hours**

 Integrity and security:
 2.1 Domain Constraints Referential Integrity
 2.2Assertions
 2.3Security and Authorization
 2.4Authorization in SQL
 2,5Encryption and Authentication.
 2.6**Relational Database Design:**
 2.6.1First Normal Form
 2.6.2 Pitfalls in Relational Database Design
 2.6.3Functional Dependencies
 2.6.4Decomposition
 2.6.5Desirable Properties of Decomposition
 2.6.6Boyce Codd Normal Form
 2.6.7Third Normal Form
 2.6.8Fourth Normal Form
 2.6.9 More normal Forms .

UNIT – III   **9 Hours**

 Storage and File Structure:
 3.1RAID
 3.2File Organization
 3.3 Organization of Records in Files
 3.4Dictionary Storage.
 3.5**Indexing and Hashing**:
 3.5.1Basic Concepts
 3.5.2 Ordered Indices – B+
 3.5.3 Tree Index Files
 3.5.4Static Hashing
 3.5.5– Dynamic Hashing.

UNIT–IV   **9 Hours**

 Transaction Management:
 Transactions Concept
 Transaction state
 Implementation of Atomicity and Durability

Concurrent Executions
Serializability
Concurrency control:
Lock Based Protocols
Timestamp Based Protocols
Validation Based Protocols
Recovery system:
Failure classification
Storage Structure
Recovery and Atomicity
Log Based Recovery
Shadow Paging.

UNIT – V   **10 Hours**
Introduction to Oracle:
4.1 Classification of SQL Commands
4.2 Data Types
4.3Operators
4.4 Built in functions
4.5Sorting
4.6Joins
4.7Special Operators:
4.8 Set Operators
4.9.**Indexing:**
4.9.1Removing Index
4.9.2Creating Index on Multiple Columns.
4.10**Views:**
4.10.1Creating and Accessing
4.10.2Classification of Views.
4.11**PL/SQL:** Introduction
4.11.1Advantages of PL/SQL
4.11.2Structure of PL/SQL Block
4.11.3 Conditional Statement
4.11.4 Functions: Structure of Function – Compiling a Function – Calling a Function.
4.12 **Stored Procedures:**
4.12.1Advantages of Procedures
4.12.2Why Called "Stored Procedures"?
4.12.3Differences between Procedures and Functions
4.12.4 Compiling a Procedure
4.12.5 Executing a Procedure .
4.13 **Cursors:** What is Cursor? – Purpose of Cursors – Classification of Cursors.**Database Triggers:** Components of Trigger–Types of Triggers.

Text Books
1. Abraham Silberchatz, Henry F. Korth and S. Sudharshan,*Data Base System concepts* Mc Graw Hill, Fourth Edition, 2006.
2. Satish Asnani,*Oracle Database 11g –Hands–on SQL and PL/SQL,*PHI Learning, 2010.

Reference Books
1. C.J. Date, A. Kannan, S.Swamynathan, *Introduction to Database Systems*, Pearson Education, Eighth Edition 2006.
2. Ramez Elmasri, *Fundamentals of Database Systems*, Pearson Education, 2008.

Core XII: OPERATING SYSTEMS

Objectives:

1. To enable the students to learn the basic concepts of operating systems.
2. To impart knowledge about operating system functionalities like memory, processor, and scheduler.

UNIT – I   **10 Hours**

  Operating System Overview:
  1.1 Operating System Objectives and Functions
  1.2 The Evolution of Operating Systems
  1.3 Major Achievements
  1.4 Developments Leading to Modern Operating Systems
  1.5 Virtual Machines
  1.6 OS Design Considerations for Multiprocessor and Multicore
  1.7 Microsoft Windows Overview
  1.8 Traditional UNIX Systems
  1.9 Modern UNIX Systems.

UNIT – II   **10 Hours**

  Process: Process Descriptions & Control:
  2.1 What is a Process?
  2.2 Process States – Process Description
  2.3 – Process Control
  2.4 Execution of the Operating System.
  2.5 **Threads:**
  2.5.1 Processes and Threads
  2.5.2 Types of Threads
  2.5.3 Multicore and Multithreading.
  2.6 **Concurrency:**
  2.6.1 Mutual Exclusion and Synchronization
  2.6.2 Concurrency: Deadlock and Starvation.

UNIT – III   **9 Hours**

  Memory: Memory Management:
  3.1 Memory Management Requirements
  3.2 Memory Partitioning
  3.3 Paging
  3.4 Segmentation
  3.5 Security Issues
  3.6 **Virtual Memory:**
  3.6.1 Hardware and Control Structures
  3.6.2 Operating System Software.

UNIT – IV   **9 Hours**

  Scheduling:
  4.1 Uniprocessor Scheduling: Types of Scheduling
  4.2 Scheduling Algorithms.
  4.3 **Multiprocessor and Real Time Scheduling:**
  4.3.1 Multiprocessor Scheduling
  4.3.2 Real time scheduling
  4.3.3 Linux Scheduling
  4.3.4 UNIX FreeBSD Scheduling Windows 7 Scheduling.

UNIT – V   **10 Hours**

  Input/ Output and Files: I/O Management and Disk Scheduling:
  5.1 I/O Devices
  5.2 Organization of the I/O Function
  5.3 Operating System Design Issues
  5.4 I/O Buffering
  5.5 Disk Scheduling
  5.6 RAID

5.7Disk Cache
5.8 UNIX FreeBSD I/O
5.9Windows 7 I/O.
5.10**File Management**:
5.10.1Overview
5.10.2File Organization and Access
5.10.3 File Directories
5.10.4File Sharing
5.10.5 Record Blocking
5.10.6 Secondary Storage Management
5.10.7File System Security
5.10.8UNIX File Management
5.10.9 Linux File Management
5.10.10Windows 7 File System.

Text Book
Willam Stallings, *Operating Systems*, Pearson Education, Seventh Edition, 2003.

Reference Books
1.Deital H.M, *An Introduction to Operating Systems,* Addison Wesley Publishing Co., 1984.
2.Silberschartz A, PetersonJ.L., Galvin P, *Operating System Concepts*, Addison Wesley publishing co., 1998.

Core Practical V : MULTIMEDIA LAB

Objectives:

1. To develop practical knowledge in multimedia tools.
2. To get hands–on experience in designing multimedia.

List of Exercises

1. Draw an image using various basic tools (paintbrush tool, eye dropper & color picker, crop tool, lasso tool, paint bucket tool etc).
2. Use the following options to edit the image:
   i. Scale.
   ii. Rotate.
   iii. Distort.
   iv. Transformation.
   v. Fill & stroke.
   vi. Sharpen.
3. Re–touch the photo with the following options:
   i. Black & white photo re–touching.
   ii. Converting color to black & white.
   iii. Picture Restoration.
   iv. Dodging.
   v. Burning with photo.
4. Select different portions from two (or) three images and merge them into a single image.
5. Apply the following color manipulation techniques :
   i. Invert.
   ii. Equalize.
   iii. Threshold.
   iv. Replace color options.
6. Implement the image masking concepts.
7. Apply special visual effects to an image using filters.
8. Make a poster for an advertisement of a product using Adobe Photoshop.
9. Create an animation with special effects.
10. Create a new RGB Color file that is 5 inches wide, 7 ½ inches high with 200 pixels per inch and change the background through the File/New pull–down menu.
11. Create an e–Invitation for sport's day.
12. Create a 30 second multi–media profile about Bishop Heber College.

Core Practical VI :DATABASE SYSTEMS LAB

Objectives:

    1. To get hands–on experience with SQL.
    2. To work with PL/SQL commands, functions, procedures, cursors and triggers.
    3. To get experience on exception handling.

List of Exercises:

1. DDL statements and simple queries.
2. DML statements and simple queries.
3. Queries using
    1. WHERE clause, HAVING clause, LIKE operator, BETWEEN clause.
    2. logical operators.
    3. Set operators.
    4. Sorting and grouping.
4. Nested queries using SOL
    i. Sub queries.
    ii. Join operators .
5. Built – in functions (string functions, character functions, date functions, conversion functions, and aggregate functions).
6. Use of indexes, creating views and querying in views.
7. Functions.
8. Procedures.
9. Cursors.
10. Triggers.
11. Exceptions.
12. Case studies in PL/SQL:
    i. Splitting of tables.
    ii. Joining of tables.
    iii. Pay bill preparation

Elective I (A) : ACCOUNTING AND FINANCIAL MANAGEMENT

Objectives:

1. To learn book keeping and accountancy for financial management.
2. To learn cost analysis, decision making and operational planning.

Unit – I   **10 Hours**
Financial Statements:
1.1 Accounting Concepts and Conventions
1.2 System of Book Keeping
1.3 Journal
1.4 Ledger
1.5 Trail Balance
1.6 Preparation of Trading A/c, Profit and Loss A/c and Balance Sheet without Adjustments.

Unit – II   **10 Hours**
Ratio analysis ratios Introduction
2.1 Significance
2.2 Limitations
2.3 Classification According to Statement
2.4 Short-Term Solvency
2.5 Current Ratio
2.6 Liquidity Ratio
2.7 Classification According to Function:
2.7.1 Long-Term Solvency
2.7.2 Debt-Equity Ratio
2.7.3 Proprietary Ratio
2.7.4 Profitability Ratio
2.7.5 Gross-Profit Ratio
2.7.6 Net-Profit Ratio
2.7.7 - Operating Ratio.

Unit – III   **10 Hours**
Cost Concepts and cost classifications:
3.1 Cost concepts and various types of cost classifications
3.2 Determination of costs
3.3 Marginal costing
3.4 Break Even Analysis
3.5 Contribution approach
3.6 Direct costing

Unit – IV   **10 Hours**
Company Accounts - Introduction to company accounts
4.1 Types of shares
4.2 Issue of shares at par, at premium, at discount

Unit – V   **9 Hours**
Introduction to Marketing : Meaning
5.1 Objectives
5.2 Classification of markets
5.3 Recent trends in marketing
5.4 Customer relationship Marketing
5.5 E-Marketing
5 .6 Online Marketing
5.7 Tele Marketing

Text Book
T.S. Reddy and A. Murthy, Financial Accounting, Margam Publications, Chennai (2012)

Reference Books

1. R.L. Gupta and V.K. Gupta, "Principles and practice of Accountancy", Eleventh Edition, 2005,Sultan Chand Sons, New Delhi.

2. N. Vinayagam& B. Charumathi, "Financial Accounting", Second Revised Edition, 2008, S.Chand& Company Ltd, New Delhi

Elective I (B) : BUSINESS INTELLIGENCE

Objectives:

1. To be exposed with the basic rudiments of Business Intelligence System.

2. To understand the modeling aspects behind Business Intelligence, Business Intelligence Life Cycle and explore the techniques.

UNIT - I   **15 Hours**
BUSINESS INTELLIGENCE:
1.1 Effective and Timely Decisions
1.2 Data, Information and Knowledge
1.3 Role of Mathematical Models
1.4 **Business Intelligence Architectures:**
1.4.11 Cycle of a Business Intelligence Analysis
1.4.2 Enabling Factors in Business Intelligence Projects
1 .4.3 Development of a Business Intelligence System
1.4.4 Ethics and Business Intelligence.

UNIT II   **15 Hrs**
KNOWLEDGE DELIVERY:
2.1 The Business Intelligence User Types, Standard Reports, Interactive Analysis and Ad Hoc Querying, Parameterized Reports And Self-Service Reporting, Dimensional Analysis, Alerts/Notifications,
2,2 **Visualization:** Charts, Graphs, Widgets, Scorecards and Dashboards, Geographic Visualization, Integrated Analytics,
2.3 Considerations: Optimizing The Presentation for the Right Message.

UNIT III   **15 Hrs**
EFFICIENCY:
3.1 Efficiency Measures
3.2 The CCR Model: Definition Of Target Objectives
3.3 Peer Groups
3.4 **– Identification of Good Operating Practices:**
3.4.1 Cross Efficiency Analysis
3.4.2 Virtual Inputs And Outputs
3.4.3 Other Models.
3.4.4 Pattern Matching
3.4.5 Cluster Analysis
3.4.6 Outlier Analysis.

UNIT IV   **15 Hrs**
BUSINESS INTELLIGENCE APPLICATIONS:
4.1 Marketing Models
4.2 Logistic and Production Models
4.3 Case Studies.

UNIT V   **15 Hrs**
FUTURE OF BUSINESS INTELLIGENCE :
5.1 Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

Text Book
Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.

Reference Books
1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.

3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

Elective I (C) : MANAGEMENT INFORMATION SYSTEMS

Objectives:

1. To impart the business knowledge in terms of information management and decision making.
2. To develop the knowledge in business applications for managerial decision supports.

UNIT – I   **10 Hours**
Introduction to Information Systems:
1.1 Why study Information System?
1.2Why Business need Information Technology?
1.3Fundamentals of Information Systems
1.4Overview of Information Systems.

UNIT – II   **10 Hours**
Solving Business Problems with Information Systems:
2.1 System Approach to Problem Solving
2.2Developing Information System Solution.
2.3**Database Management:**
2.3.1Managing Data Resources
2.3.2Technical Foundation of Database Management.

UNIT – III   **10 Hours**
Information Systems for Strategic Advantage:
3.1 Fundamentals
3.2Strategic Advantage
3.3Strategic Applications and Issues in IT.
3.4**Managing:** Enterprise and Global Management.

UNIT – IV   **10 Hours**
Business Applications of Information Technology:
4.1 The Internet Electronic Commerce
4.2Fundamentals of Electronic Commerce
4.3 Information System for Business Operations
4.4 Business Information System
4.5– Transaction Processing Systems.

UNIT – V   **10 Hours**
Information Systems for Managerial Decision Support:
5.1 Decision Support Systems
5.2 Artificial Intelligence Technology in Business
5.3Management IT
5.4Planning for Business Change with IT
5.5Implementing Business Changes with IT
5.6Security and Control Issues in IS
5.7Ethical and Societal Challenge of Information Technology.

Text Book
James A. O'Brien,***Management Information Systems,***Galgotia Publications, Fourth Edition, 1999.

Reference Book
Gordon B. Davis,Margrethe H. Olson, ***Management Information Systems,***McGraw Hill, 2000.

SBC I* - COMMUNICATION AND LIFE SKILLS

Objectives:

1. To inculcate the significance of soft–skills both for personal and professional success.
2. To enable the students to muster effective verbal and non verbal communication.

UNIT – I   **10 Hours**
   Basic Grammar – Reading Comprehension:
   1.1 Purpose and Strategies of Reading
   1.2 Skimming for Details
   1.3 Identifying Main Ideas.

UNIT – II   **10 Hours**
   Reading Comprehension:
   2.1 Scanning for Information
   2.2 Drawing Inferences – Vocabulary.
   2.3 **Writing Paragraphs:**
   2.4 Features of Good Writing
   2.5 Gathering Ideas – Purposes of Writing
   2.6 Writing for a Specific Audience
   2.7 Organizing Ideas.

UNIT – III   **10 Hours**
   Writing Essays:
   3.1 Writing an Introduction
   3.23 Developing Supporting Ideas
   3.3 Writing a Conclusion
   3.4 using Linkers
   3.5 Choosing the Right Words
   3.6 Common Errors in Writing
   3.7 Editing and Proof Reading.

UNIT – IV   **10 Hours**
   Group Discussion:
   4.1 Group Discussion as a Tool for Selection
   4.2 Skills for Group Discussion
   4.3 Leadership and Problem
   4.4 Solving Skills
   4.5 Types of Group Discussions
   4.6 Group Dynamics
   4.7 Roles and Functions.

UNIT – V   **10 Hours**
   Interview Skills:
   5.1 Purpose of Interviews
   5.2 Preparing a Resume
   5.3 Writing Cover Letter
   5.4 Before and at the Interview
   5.5 Etiquette, Body Language and Time Management.

Text Book1
   Lina, B Sai Lakshmi et.al*Polyskills*, Cambridge University Press India Pvt. Ltd., 2012.

Reference Books
   1. John Seely, *The Oxford Guide to Writing and Speaking*, Oxford University Press, New Delhi, 2004.
   2. Thorpe E, and Thorpe S, *Objective English*, Pearson Education, Second Edition, New Delhi, 2007.
   3. Turton N.D and Heaton J.B, *Dictionary of Common Errors*, Addison Wesley Longman Ltd., Indian reprint 1998.

Core XIII : PROGRAMMING IN PHP WITH MYSQL

Course Objectives:
　　O1: To acquire knowledge how server-side programming works on the web.
　　O2: To demonstrate the PHP Basic syntax for variable types and calculations.
　　O3. To define the different types of arrays.
　　O4. To use PHP built-in functions and creating custom functions.
　　O5. To Understanding POST and GET in form submission.
　　O6. To receive and process form submission data.
　　O7. To manage the session
　　O8. To Build Dynamic web site using server side PHP Programming and Database connectivity.

UNIT – I　　　　　　　　　　　　　　　　　　　　　　　　　**12 Hours**
　　PHP BASICS :
　　1.1 Introduction
　　1.2 PHP Getting Started
　　1.3 Syntax
　　1.4 PHP Variables,
　　1.5 Predefined Variables: superglobals,
　　1.5.1 server variables
　　1.5.2 Constants
　　1.5.3 Echo and Print
　　1.5.4 Data Types
　　1.5.5 String Functions
　　1.5.6 Operators
　　1.5.7 Control Structures:
　　1.5.8 Arrays
　　1.5.9 Sorting Arrays
　　1.5.10 Loops

UNIT – II　　　　　　　　　　　　　　　　　　　　　　　　**12 Hours**
　　2.1 PHP Functions
　　2.2 Math Operations
　　2.3 Date and Time
　　2.4 Classes and Objects
　　2.5 Forms :
　　2.6 GET and POST I
　　2.7 nclude Files
　　2.8 File system- Parsing Directories
　　2.9 File Upload
　　2.10 File Download

UNIT – III　　　　　　　　　　　　　　　　　　　　　　　**12 Hours**
　　State Management :
　　3.1 Cookies
　　3.2 Sessions
　　3.3 Form Handling
　　3.4 Form Validation
　　3.5 Filters
　　3.6 Error Handling
　　3.7 Send Email
　　3.8 PHP Magic Constants
　　3.9 JSON Parsing
　　3.10 Regular Expressions
　　3.11 Exception Handling

UNIT – IV　　　　　　　　　　　　　　　　　　　　　　　**12 Hours**
　　PHP & MySQL DATABASE :
　　4.1 MySQL Introduction:MySQLi (object-oriented, MySQLi procedural,PDO)
　　4.2 MySQL Connect
　　4.3 MySQL Create Database
　　4.4 MySQL Create Table

4.5 MySQL Insert
4.6 MySQL Prepared
4.7 MySQL Last Inserted ID
4.8 MySQL Select
4.9 MySQL Where
4.10 MySQL Limit
4.11 MySQL Order By
4.12 MySQL Update
4.13 MySQL Delete.

UNIT – V 12 Hours

MySQL CRUD Application
5.1 MySQL Ajax Search
5.2 MySQL Login System
5.3 MVC
5.4 Simple PHP MVC Example

Books for Study
1. Antonio Lopez, "Learning PHP 7", PACKT Open Source Publication, 2016
2. Dennis Popel, "Learning PHP Data Objects: A Beginner's Guide to PHP Data Objects, Database Connection Abstraction Library for PHP 5", Packt Publishing, 2009. (UNIT V)

Books for Reference
1. Adrian W. West, "Practical PHP and MySQL Website Databases", Apress, 2016
2. Leon Atkinson, "Core PHP Programming", Pearson Education, 2004.
3. www.jkmaterials.yolasite.com/resources/labmanuals/BTech/WT-PHP-Record.pdf
4. MySQL® Notes for Professionals, GoalKicker.com
5. PHP Notes for Professionals, GoalKicker.com

Core XIV : COMPUTER COMMUNICATION NETWORKS

Objectives:

1. To study the concepts on the uses of network, network hardware, software, protocols, and their performance.
2. To learn the different types of network layers and network security.

UNIT – I   **10 Hours**

Introduction – **Uses of Computer Networks:**
1.1 Business Application
1.2 Home Application
1.3 Mobiles users
1.4 Social Issues
1.5 Network Hardware
1.6 Network Software.
1.7 **Reference Models**
1.7.1: OSI Reference model
1.7.2 TCP\IP Reference model.
1.8 **The physical Layer:**
1.8.1 The Theoretical Basis for Data Communication
1.8.2 Guided Transmission Media
1.8.3 Wireless Transmission.

UNIT – II   **10 Hours**

The Data Link Layer:
2.1 Design Issues
2.2 Error Detection and Correction
2.3 Elementary Data Link Protocols
2.4 Sliding Window Protocols
2.5 The Medium Access Sublayer.
2.6 **Ethernet:**
2.6.1 Ethernet Cabling
2.6.2 Manchester Encoding
2.6.3 Ethernet MAC Sublayer Protocol.
2.7 **Bluetooth:**
2.7.1 Bluetooth Architecture
2.7.2 Bluetooth Applications
2.7.3 The Bluetooth Protocol Stack
2.7.4 Bluetooth Frame Structure.

UNIT – III   **10 Hours**

The Network Layer:
3.1 Design Issues
3.2 Routing Algorithms.
3.3 **Congestion Control:**
3.3.1 General Principles of Congestion Control
3.3.2 Congestion Control Prevention Policies
3.3.3 Congestion Control in Virtual Circuit Subnets
3.3.4 Congestion Control in Datagram Subnets.
3.3.5 Quality of Service
3.3.6 Internetworking
3.3.7 The Network Layer in the Internet: The IP Protocol – IP Address.

UNIT – IV   **10 Hours**

The Transport Layer:
4.1 The Transport Service
4.2 The Internet Transport Protocol (UDP)
4.3 **The Internet Transport Protocol (TCP):**
4.3.1 Introduction to TCP
4.3.2 TCP Service Model
4.3.3 The TCP Protocol
4.3.4 The TCP Segment Header

4.3.5 TCP Connection Establishment
4.3.6 TCP Connection Release .
4.4**The Application Layer:**
4.4.1Domain Name System
4.4.2 Electronic Mail.

UNIT – V   **10 Hours**
Network Security:Cryptography:
5.1 Introduction to Cryptography
5.2 Substitution Ciphers
5.3 Transposition Ciphers
5.4 One Time pads
5.5 Two Fundamental Cryptographic Principles.
5.6 **Symmetric Key Algorithms:** Data Encryption Standard. **Public**
5.7 Key algorithms: RSA – Other Public Key Cryptography.
5.8 Email Security
5.9 Web Security.

Text Book

Andrew S. Tannenbaum, *Computer Networks*, Prentice Hall of India, Fourth Edition, 2005.

Reference Books
1. Behrouz A Forouzan, *Data Communications and Networking*, McGraw Hill, Fourth Edition, 2006.
2. William Stallings, *Data and Computer Communications*, PrenticeHall of India, Sixth Edition, 2000.

Core XV: SMART DEVICES PROGRAMMING

Objectives:

1. To learn the assembly language programming.
2. To understand the concepts of microprocessors and microcontrollers.

UNIT – I   **10 Hours**
1.1 Introduction to Android and Development Environments Various mobile technologies
1.2 Apple IOS
1.3 Android operating system
1.4 install and configure Eclipse, Android Studio andn Android sdk
1.5 android virtual device
1.6 creation of android virtual device
1.7 sample programs
1.8 features of Eclipse and Android studio.

UNIT – II   **10 Hours**
2.1 Simple Android Application Development Sample programs
2.2 Operation of Android Virtual device
2.3 activity in android
2.4 Life cycle of an activity intent
2.5 linking activities using intent
2.6 data passing between activities using intent
2.7 android components: activities, services, broadcast receivers, content providers.

UNIT – III   **10 Hours**
UI Design and Data storage UI components:
3.1 Layout: Linear, Absolute, Table, Frame.
3.2 Views: Text, Edit, Button, ImageButton, CheckBox, ToggleButton, RadioButton, RadioGroup, List, Image, Grid
3.3 Menus – Options, Context- Action bar, Notifications.

UNIT – IV
4.1 Data storage in Android
4.2 various storage technologies
4.3 operations for data storage and retrieval to/from internal and external memory
4.4 SQLite database
4.5 content Providers and their relative advantages and disadvantages
4.6 SMS service in Android
4.7 publish application in Google Play Store.

UNIT – V   **10 Hours**
5.1 Mobile Application development using HTML 5.0 and JavaScript HTML components for mobile applications
5.2 HTML 5 tags and attributes for mobile development
5.3 Styling Mobile Pages with CSS3
5.4 Simple applications uing HTML5 and JavaScript
5.5 Building a mobile web application
5.6 Introduction to PhoneGap.

Text Books
1. Wei-Meng Lee, "Beginning Android Application Development", Wrox, First Edition.
2.Jennifer Kyrnin, "HTML 5 Mobile Application Development", SAMS publications, First Edition.

Reference Book
Thomas Myer, "Beginning PhoneGap", 2011.

Core XVI : DATA WAREHOUSING AND DATA MINING

Objectives:

1. To learn how to extract knowledge from information repositories.
2. To know the techniques of mining and warehousing.

UNIT – I   **10 Hours**

    Introduction:
    1.1 Why Data Mining?
    1.2 What is Data Mining?
    1.3 What Kinds of Patterns can be Mined?
    1.4 Which Technologies Are Used?
    1.5 Which Kinds of Applications Are Targeted?
    1.6 Major issues in Data Mining.
    1.7 **Data Preprocessing**: **Data Preprocessing:**
    1.7.1 An Overview
    1.7.2 Data Clearing
    1.7.3 Data Integration
    1.7.4 Data Reduction
    1.7.5 Data Transformation and Data Discretization.

UNIT – II   **10 Hours**

    Data Warehousing and Online Analytical Processing:
    2.1 Data Warehouse: Basic Concepts
    2.2 Data Warehouse Modeling: Data Cube and OLAP
    2.3 Data Warehouse Design and Usage
    2.4 Data Warehouse Implementation
    2.5 Data Generalization by Attribute
    2.6 Oriented Induction.

UNIT – III   **9 Hours**

    Mining Frequent Patterns, Associations, and Correlations: Basics Concepts and Methods:
    3.1 Basic Concepts
    3.2 Frequent Itemset Mining Methods.
    3.3 **Classification: Basic Concepts:**
    3.3.1 Basic Concepts
    3.3.2 Decision Tree Induction
    3.3.3 Rule Based Classification
    3.3.4 Lazy Learners.

UNIT – IV   **9 Hours**

    Cluster Analysis: Basic Concepts and Methods:
    4.1 Cluster Analysis
    4.2 Partitioning Methods
    4.3 Hierarchical Methods
    4.4 Density Based Methods
    4.5 Grid Based Methods.

UNIT – V   **10 Hours**

    Outlier Detection:
    5.1 Outliers and Outlier Analysis
    5.2 Outlier Detection Methods – Statistical Approaches
    5.3 Proximity based Approaches
    5.4 Clustering based Approaches
    5.5 Classification based Approaches.
    5.6 **Data Mining Trends and Research Frontiers:** Data Mining Applications.

Text Book

    Jiawei Han and Micheline Kamber, *Data Mining Concepts and Techniques*, Morgan Kaufmann, Third Edition, 2012.

Reference Books

1. Margaret H.Dunham, *Data Mining: Introductory and Advanced Topics*, Pearson Education, 2003.
2. Arun K.Pujari, *Data Mining Techniques*, University Press, 2001.

Core Practical VII : PROGRAMMING IN PHP WITH MYSQL LAB

Course Objectives:

O1: To manipulate control structures in simple php programs

O2: To perform various functions on arrays,Math, String and Date and Time objects

O3: To define different types of Functions

O4: To create objects and classes

O5: To handle clients data

O6: To develop simple web application using server side PHP programing and Database Connectivity using MySQL

O7: To illustrate the concept of object–oriented, MySQLi procedural, PDO in Database Connectivity.

O8: To manage state using cookies, sessions and URL rewriting

List of Exercises:

1. Simple PHP programs using control structures
2. Arrays, Sorting
3. Functions
4. Math, String and Date and Time objects
5. Objects and classes
6. Form Handling (POST & GET)
7. File includes, File upload and downlod
8. Statemanagement using cookies, sessions and URL rewriting
9. Error Handling
10. Sending Mail, Filters
11. PHP Magic Constants
12. Data base Connectivity using
    - object-oriented,
    - MySQLi procedural,
    - PDO
13. CRUD Application
14. Using JSON

Core Practical VIII : SMART DEVICES PROGRAMMING LAB

Objectives:

3. To develop practical knowledge in smart device programming.

List of Exercises

1. Create Hello World application
2. Create activity bases applications
3. Create three pages using layout system - Liner layout, Relative layout and Table layout respectively.
4. Write android web applications
5. Create custom Android Virtual Device(AVD)
6. Emulate device with different screen size
7. Make SMS and phone call
8. Write applications utilising data base and SQLite commands
9. To Create a SQLite database and perform query operations.
10. To Insert data in database table and retrieve ,display details in screen
11. Transfer files between emulator and PC
12. Create an android application with login page and a home page
13. Compile and debug the application.
14. Install application in both emulator and device.
15. Design and Develop mobile application using HTML 5.0 and JavaScript.

SEMESTER : IV	HOURS/WEEK : 4
CODE : P18CA4:1	CREDITS : 4

Elective II (A) : ARTIFICIAL INTELLIGENCE

Objectives:
1. To study the concepts of Artificial Intelligence.
2. To learn the methods of solving problems using Artificial Intelligence.
3. To introduce the concepts of Expert Systems and machine learning.

UNIT – I   10 Hours
1.1 What is Artificial Intelligence?
1.2 The AI problems
1.3 What is an AI technique?
1.4 Criteria for success.
1.5 Problems, Problem Spaces and Search:
1.6 Defining the Problem as a State Space Search
1.7 Production Systems
1.8 Problem Characteristics.

UNIT – II   12 Hours
2.1 Heuristic Search Techniques: Generate and Test – Hill Climbing: Simple Hill Climbing, Steepest Ascent Hill Climbing
2.2 Best First Search: OR Graphs, The A* Algorithm
2.3 Problem Reduction: AND-OR Graphs, The AO* Algorithm
2.4 Constraint Satisfaction
2.5 Means Ends Analysis.

UNIT – III   11 Hours
Knowledge Representation Issues:
3.1 Representation and Mappings
3.2 Approaches to Knowledge Representation
3.3 Issues in Knowledge Representation: Important Attributes, Relationship among Attributes.
3.4 Using Predicate Logic:
3.4.1 Representing Simple Facts in Logic
3.4.2 Representing Instance and Isa Relationships
3.4.3 Computable Functions and Predicates
3.4.4 Resolution.

UNIT – IV   11 Hours
4.1 Representing Knowledge Using Rules: Procedural versus Declarative Knowledge
4.2 Logic Programming
4.3 Forward versus Backward Reasoning
4.4 Matching
4.5 Control Knowledge.

UNIT – V   11 Hours
5.1 Expert Systems: Representing and Using Domain Knowledge
5.2 Expert System Shells
5.3 Explanation
5.4 Knowledge Acquisition.
5.5 Perception and Action: Real-Time Search – Perception:
5.6 Speech Recognition
5.7 Action
5.8 Robot Architectures.

Text Book
        Elaine Rich, Kevin Knight, Artificial Intelligence, Tata McGraw Hill Publications, Second Edition, 2008.

References Books
1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India Publications, 2006.
2. Nils J. Nilsson, "Artificial Intelligence: A New Synthesis", Harcourt Asia Publications, 2000.
3. V.S. Janakiraman, K. Sarukesi, P. Gopalakrishnan, "Foundations of Artificial Intelligence and Expert Systems", McMillan India Publications, 2005.

Elective II (B) : SOFT COMPUTING

Objectives:

1. To learn Fuzzy set theory and properties of Fuzzy Sets.
2. To learn Neuro -Fuzzy modeling concepts, Neural networks and training algorithms

Unit -I   **10 Hours**
>   1.1 Introduction: Artificial Neural Network
>   1.2 Advantages of Neural Networks
>   1.3 Fuzzy Logic
>   1.4 Genetic Algorithms
>   1.5 Hybrid Systems
>   1.6 Neuro Fuzzy Hybrid Systems
>   1.7Neuro Genetic Hybrid Systems
>   1.8 Fuzzy Genetic Hybrid Systems.

Unit -II   **10 Hours**
>   2.1Artificial Neural Networks
>   2.2 Fundamental Concept
>   2.3 Evolution of Neural Networks
>   2.4 Basic Models of Artificial Neural Network
>   2.5 Terminologies of ANNs
>   2.6McCulloch-Pitts Neuron
>   2.7 Linear Separability
>   2.8 Hebb Network.

Unit-III   **10 Hours**
>   3.1Supervised Learning Network
>   3.2 Perceptron Networks
>   3.3Adaptive Linear Neuron (Adaline)
>   3.4 Mutiple Adaptive Linear Neurons
>   3.5 Back Propagation Network
>   3.6Radial Basis Function Network.

Unit-IV   **10 Hours**
>   4.1 Introduction to Fuzzy Logic
>   4.2 Classical Sets–Operations on Classical Sets
>   4.3 Fuzzy Sets,
>   4.4 Fuzzy Relations
>   4.5 Membership Functions
>   4.6 Defuzzification
>   4.7 Fuzzy Arithmetic and Fuzzy Measures
>   4.8 Fuzzy Rule base and Approximate Reasoning
>   4.9 Fuzzy Decision Making
>   4.10 Fuzzy Logic Control System.

Unit V   **10 Hours**
>   5.1 Genetic Algorithms
>   5.2 Introduction
>   5.3 Traditional Optimization and Search Techniques
>   5.4 Genetic Algorithm and Search Space
>   5.5Genetic Algorithms vs. Traditional Algorithms
>   5.6 Basic Terminologies in Genetic Algorithm
>   5.7 Simple GA
>   5.8 General Genetic Algorithm
>   5.9 The Schema Theorem
>   5.10 Classification of Genetic Algorithm
>   5.11Holland Classifier System
>   5.12 Genetic Programming
>   5.13 Applications of GA.

Text Book
1. Dr.S.N. Sivanandam, Dr.S.N. Deepa, *Principles of Soft Computing* Wiley India Edition, 2011.

Reference Books
1. F.O. Karray & C.D. Silva *Soft Computing and Intelligent Systems Design – theory, tools and applications,* Pearson Education, 2009

2. J.S.R. Jang, C.T. Sun & E. Mizutani Neuro-Fuzzy and **Soft Computing – A computational approach to learning and machine intelligence,** Pearson Education, 2004.

Elective II (C) : GENETIC ALGORITHMS

Objectives:

1. To understand the importance of genetic algorithms.
2. To enable the students to know the various applications of genetic algorithms.

UNIT – I   10 Hours

Introduction: A Brief History of Evolutionary Computation
Elements of Genetic Algorithms
A simple Genetic Algorithm
Applications of Genetic Algorithms.
Genetic Algorithms in Scientific Models:
Evolving Computer Programs
Data Analysis and Prediction
Evolving Neural Networks
Modeling Interaction between Learning and Evolution
Modeling Sexual Selection
Measuring Evolutionary Activity.

UNIT – II   10 Hours

Theoretical Foundation of Genetic Algorithm:
Schemas and Two_Armed and k_Armed Problem
Royal Roads
Exact Mathematical models of simple Genetic Algorithms
Statistical Mechanics Approaches.

UNIT – III   10 Hours

Computer Implementation of Genetic Algorithm:
Data structures
Reproduction
Crossover and Mutation
Mapping objective functions to fitness form
Fitness Scaling
Coding
A multi parameter
Mapped
Fixed Point Coding
Discretization and Constraints.

UNIT – IV   9 Hours

Some applications of Genetic Algorithms:
The Risk of Genetic Algorithms
De Jong and Function Optimization
Improvement in Basic Techniques
Current Applications of Genetic Algorithms.

UNIT – V   9 Hours

Advanced Operators and Techniques in Genetic Search:
Dominance
Duplicity and Abeyance
Inversion and other Reordering Operators. Micro operators
Niche and Speciation
Multi-Objective optimization
Knowledge based Techniques
Genetic Algorithms and Parallel Processors.

Text Book
1. David E. Goldberg, *Genetic Algorithms in Search, Optimization & Machine Learning*, Pearson Education, 2006.

Reference Book
1. Melane Mitchell, *An Introduction to Genetic Algorithms*, Prentice Hall of India, 2002.

SEMESTER : III & IV	HOURS/WEEK : 2
CODE : P18CAPS1	CREDITS : 2

SBC I* - COMMUNICATION AND LIFE SKILLS

Objectives:

1. To inculcate the significance of soft–skills both for personal and professional success.
2. To enable the students to muster effective verbal and non verbal communication.

UNIT – I   10 Hours
> **Basic Grammar – Reading Comprehension:**
> **1.1** Purpose and Strategies of Reading
> 1.2 Skimming for Details
> 1.3 Identifying Main Ideas.

UNIT – II   10 Hours
> **Reading Comprehension:**
> **2.1** Scanning for Information
> 2.2 Drawing Inferences – Vocabulary.
> 2.3 **Writing Paragraphs:**
> **2.4** Features of Good Writing
> 2.5 Gathering Ideas – Purposes of Writing
> 2.6 Writing for a Specific Audience
> 2.7 Organizing Ideas.

UNIT – III   10 Hours
> **Writing Essays:**
> 3.1 Writing an Introduction
> 3.23 Developing Supporting Ideas
> 3.3 Writing a Conclusion
> 3.4 using Linkers
> 3.5 Choosing the Right Words
> 3.6 Common Errors in Writing
> 3.7 Editing and Proof Reading.

UNIT – IV   10 Hours
> **Group Discussion:**
> **4.1** Group Discussion as a Tool for Selection
> 4.2 Skills for Group Discussion
> 4.3 Leadership and Problem
> 4.4 Solving Skills
> 4.5 Types of Group Discussions
> 4.6 Group Dynamics
> 4.7 Roles and Functions.

UNIT – V   10 Hours
> **Interview Skills:**
> **5.1** Purpose of Interviews
> 5.2 Preparing a Resume
> 5.3 Writing Cover Letter
> 5.4 Before and at the Interview
> 5.5 Etiquette, Body Language and Time Management.

Text Book1
> Lina, B Sai Lakshmi et.al*Polyskills*, Cambridge University Press India Pvt. Ltd., 2012.

Reference Books
> 1. John Seely, *The Oxford Guide to Writing and Speaking*, Oxford University Press, New Delhi, 2004.
> 2. Thorpe E, and Thorpe S, *Objective English*, Pearson Education, Second Edition, New Delhi, 2007.
> 3. Turton N.D and Heaton J.B, *Dictionary of Common Errors*, Addison Wesley
> Longman Ltd., Indian reprint 1998.

Core XVII : PROGRAMMING IN PYTHON

Objectives:

1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, dictionaries.

UNIT - I
INTRODUCTION TO PYTHON :
1.1 Overview
1.2 History of Python
1.3 Python features
1.4 Environment: Environment setup
1.5 Getting Python
1.6 Install Python
1.7 Setting up Path
1.8 Running Python
1.9 Basic Syntax
1.10 Hello World – Interactive mode programming
1.11 Script mode Programming
1.12 A simple Python example.

UNIT - II
DATA, EXPRESSIONS, STATEMENTS, CONTROL FLOW:
2.1 Python interpreter and interactive mode
2.2 Values and types: int, float, boolean, string, and list
2.3 variables
2.4 expressions
2.5 statements
2.6 tuple assignment
2.7 precedence of operators
2.8 comments
2.9 modules and functions
2.10 function definition and use
2.11 flow of execution
2.12 parameters and arguments
2.13 Conditionals: Boolean values and operators
2.13.1 conditional (if) - alternative (if-else) - chained conditional (if-elif-else)
2.14 Iteration: state – while – for – break – continue –pass.
2.15 Fruitful functions:
2.15.1 return values – parameters
2.15.2 local and global scope.

UNIT - III
FUNCTIONS:
3.1 Function composition
3.2 recursion.
3.3 Strings: string slices
3.3.1Immutability
3.3.2 string functions and methods
3.3.3 string module
3.3.4 Lists as arrays.
3.4 Object Oriented Programming: Classes and Objects:
3.4.1 Creating a Class
3.4.2 Using a Class
3.4.3 A simple Inheritance
3.4.4 Multiple Inheritance.

UNIT - IV
LISTS, TUPLES, DICTIONARIES :
4.1 Lists: list operations
4.2 list slices, list methods

4.3 list loop, mutability
4.4 aliasing
4.5 cloning lists
4.6 list parameters.
4.7 Tuples: tuple assignment - tuple as return value.
4.8 Dictionaries: operations and methods
4.9 advanced list processing
4.10 list comprehension.
4.11 Illustrative programs: selection sort, insertion sort, merge sort.

UNIT V

FILES, MODULES, PACKAGES, DATABASE:
5.1 Files and exception: text files
5.1.1 reading and writing files
5.1.2 format operator
5.1.3 command line arguments.
5.2 Errors and exceptions :
5.2.1 handling exceptions
5.2.2 modules
5.2.3 packages.
5.3Illustrative programs:
5.3.1word count, copy file.Database and SQL: Database – Transactions
5.3.2 What is SQLDB?
5.3.3 Database connection Parameters
5.3.4Insert, Update, Delete
5.4Sending Mail:
5.4.1 SMTP protocol
5.4.2 Syntax
5.4.3 Sending Email using Python.

Text Books

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
2. Guido van Rossum and Fred L. Drake Jr, "An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

Reference Books

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press , 2013
3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.
4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers,LLC,2013.
5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd.,, 2015.

Core XVIII : COMPILER DESIGN

Objectives:

1. To impart the basic knowledge of compilers.
2. To understand and develop compilers with analyzer and code generators.

UNIT – I   **10 Hours**

    1.1 Introduction to Compiler
    1.2 Compilers
    1.3 Analysis of the Source Program
    1.4 The Phases of a Compiler
    1.5 Cousins of the Compiler
    1.6 Grouping of Phases – Compiler Constructions Tools
    1.7 **Lexical Analysis :**
    1.7.1 Role of the Lexical Analyzer
    1.7.2 Input Buffering
    1.7.3 Specifications of Tokens
    1.7.4 Recognitions of Tokens
    1.7.5 Language for Specifying Lexical Analyzers
    1.7.6 Finite Automata
    1.7.7 Regular Expression to NFA
    1.7.8 Design of a Lexical Analyzer Generator.

UNIT – II   **9 Hours**

    2.1 Syntax Analyzer
    2.2 Role of The Parser
    2.3 Context
    2.4 Free Grammars
    2.5 Top Down Parsing
    2.6 Bottom Up Parsing
    2.7 Operator
    2.8 Precedence Parsing
    2.9 LR Parsers
    2.10 Using Ambiguous Grammars
    2.11 Parser Generators

UNIT – III   **9 Hours**

    3.1 Runtime Environments
    3.2 Source Language Issues
    3.3 Storage Organization – Storage Allocations
    3.4 Strategies
    3.5 Access to Non Local Names
    3.6 Parameter Parsing
    3.7 Symbol Tables
    3.8 Language Facilities for Dynamic Storage Allocation
    3.9 Dynamic Storage Allocation Techniques.

UNIT – IV   **9 Hours**

    4.1 Intermediate Code Generation
    4.2 Intermediate Languages
    4.3 Declarations Assignment Statements
    4.4 Boolean Expressions
    4.5 Case Statements
    4.6 Back Patching
    4.7 Procedure Calls.

UNIT – V   **9 Hours**

    5.1 Code Generation
    5.2 Issues in the Design of a Code Generator
    5.3 The Target
    5.4 Machine
    5.5 Runtime Storage Management
    5.6 Basic Blocks and Flow Graphs

Text Book

Alfred V. Aho, Ravi Sethi and Jeffrey D.Ullman, *Compilers, Principles, Techniques and Tools*, Pearson Education, Second Edition, 2007.

Reference Book

Reinhard Wilhelm, Helmut Seidl, *Compiler Design Virtual Machines*, Springer Verlag Berlin Heidelberg, 2010.

Core XIX : BIG DATA ANALYTICS AND MANAGEMENT

Objectives:

- To give an insight to the trends in Big Data Analytics
- To help the scholars to implement innovative ideas using Hadoop

UNIT – 1   10 Hours

Introduction to Big Data: Definition –Characteristics- Importance of Big Data – Understanding the waves of managing data – Architecture of Big Data – Examining Big Data types – Integrating data types into a big data environment. Distributed Computing: Understanding Distributed Technologies foundation of computing- Need of Distributed Computing in Big Data.

UNIT – II   10 Hours

Technologies Foundation of Big Data: Big Data Technology Components: - Exploring the Big Data Stack – Big Data Analytics – Big Data Applications. Big Data Virtualization and Distributed Computing: Basics and importance of virtualization - Network virtualization - Data and Storage virtualization - Management and Security challenges with virtualization – Abstraction and Virtualization. Examining the Cloud and Big Data: Defining the cloud in the context of Big Data – Understanding cloud deployment and delivery models – Making use of the cloud for Big Data.

UNIT – III   10 Hours

Big Data Management: Operational Databases: RDBMS – Non Relational Databases – Key-value pair Databases – Riak-key Value Database – Document Databases – MongoDB - CouchDB – Columnar Databases – Graph Databases – Spatial Databases. Map Reduce Fundamentals – Exploring the world of Hadoop.

UNIT – IV   10 Hours

Analytics and Big Data: Using Big Data to get results – Basic Analytics – Advance Analytics – Operationalized Analytics – Modifying Business Intelligence products to handle Big Data. Analytical Algorithms – Big Data Analytics Solutions: Understand Text Analytics and Big Data – Text Analytics tools for Big Data – Building new models and approaches to support Big Data – Big Data Analytics Framework.

UNIT – V   10 Hours

Big Data Implementation: Integrating Data Sources: Identifying the Data, Fundamentals of Big Data Integration – Defining Traditional ETL – Using Hadoop as ETL – Best Practices for Data Integration in a Big Data World.

Text Book
1. Judith Hurwitz, Alan Nugent, Dr.Fern Halper, Marcia Kaufman, "Big Data for Dummies", Wiley Publications, 2013.

Reference Books
1. "Big Data Now" Current Perspectives from O'Reilly Media, 2012.
2. Dr. Arvind Sathi , "Big Data Analytics : Disruptive Technologies for Changing the game", ISBN 978-1-58347-380-1.

Core Practical IX : PROGRAMMING IN PYTHON LAB

Objectives:

To develop programs using Python

List of Exercises:

Simple programs

1. Write a Python program to find the average of numbers in a given list.

2. Write a python program to count the number of digits in a number.

3. Python Program to Read Height in Centimeters and then Convert the Height to Feet and Inches

4. Python Program to Compute Prime Factors of an Integer

5. Python Program to generate all the Divisors of an Integer

6. Python Program to Find the LCM and GCD of Two Numbers

Control Statements

7. Python Program to Check if a Number is an Armstrong Number

8. Python Program to Check if a Number is a Perfect Number

9. Python Program to Check if a Number is a Prime Number

Using Functions

10. Recursion: Factorial, Fibonacci

List

11. Python Program to Find the Largest Number in a List

12. Python Program to Put Even and Odd elements in a List into Two Different Lists

13. Python Program to Merge Two Lists and Sort it

14. Python Program to Find the Union of two Lists

15. Python Program to Find the Intersection of Two Lists

16. Python Program to Create a List of Tuples with the First Element as the Number and Second Element as the Square of the Number

Strings

17. Python Program to Replace all Occurrences of 'a' with $ in a String

18. Python Program to Detect if Two Strings are Anagrams

19. Python Program to Count the Number of Vowels in a String

20. Python Program to Take in a String and Replace Every Blank Space with Hyphen

21. Python Program to Calculate the Length of a String Without Using a Library Function

22. Python Program to Calculate the Number of Words and the Number of Characters Present in a String

Files

23. Python Program to Read the Contents of a File

24. Python Program to Count the Number of Words in a Text File

25. Python Program to Copy the Contents of One File into Another

Core Project – I: MINI PROJECT

Objectives:

1. To gain knowledge in a particular technical domain and application domain by doing a detailed analysis of the given problem by understanding different aspects of the problem.
2. To arrive at the status report in the area, carry out developmental and/or experimental Work, analyze and interpret the results to arrive at the conclusions.
3. To develop a software project.

Outcomes:
1. Expected to do an in depth study in his/her specialized technical domain and application domain.Submit the Report.

Elective III (A) : CLOUD COMPUTING

Objectives:
1. To understand the basic concepts of cloud computing, cloud components, cloud architecture,services and model.
2. To understand the concept of Virtualization.
3. To Appreciate the role of Cloud Computing, Fog and Edge Computing in a typical IoT system.

UNIT - I
Getting Started:Cloud Computing Basics
Cloud Computing Overview
Applications
Intranets and the Cloud
First Movers in the Cloud
Your Organization and Cloud Computing:
When You Can Use Cloud Computing:
Benefits – Limitations
Security Concerns
Regulatory Issues
Cloud Computing Titans:
Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM.

UNIT II
The Business Case for Going to the Cloud:
Cloud Computing Services
How Those Applications Help Your Business
Cloud Computing Technology:
Hardwareand Infrastructure:
Clients – Network – Security – Services
Accessing the Cloud :
Platforms – Web Applications
Web APIs - Web Browsers.

UNIT III
Cloud Storage:
Overview-Cloud Storage providers
Standards: Application-Client-Infrastructure-Service
Cloud Computing at Work:Software as a Service:
overview-Driving
Forces-Company Offerings-Industries
Software plus Services:
Overview-Mobile Device Integration-Providers
Microsoft Online.

UNIT IV
Developing Applications:
Google – Microsoft
Local Clouds and Thin Clients:
Virtualization in your Organization-Server Solutions
Thin Clients
Migrating to the Cloud :
Cloud Services for individuals
Cloud Services aimed at the Mid
Market- Enterprise-Class Cloud Offerings – Migration.

UNIT V
Expounding the Edge/Fog Computing Paradigm:
Introduction
The Introduction of Fog/Edge Computing
Illustrating the Game
Changing IoT Journey
Describing the Fog Computing
Like Concepts
The Use Cases of Fog/Edge Computing

Why Is Fog Computing Crucial for the Envisaged IoT Success?
Delving into Fog/Edge Analytics.
Edge Analytics:
The Prominent Use Cases
Carving Out Edge Clouds for Edge Analytics
Deep Diving and Digging into the Aspect of Edge Analytics
Introducing Integrated Fog Computing Platforms
The Eclipse Kura
An IoT Device Management and Analytics Platform -Everyware Software Framework
The Solair Platform
IoT Devices: The Integration Options
Altiux Innovations
ParStream Edge Analytics Appliance
Dell Edge Gateway 5000 Series.

Text Books
1. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, *"Cloud Computing : A Practical Approach"*, The McGraw Hill, 2010.
2. Pethuru Raj and Anupama C. Raman. **"The Internet of Things: Enabling Technologies, Platforms and Use Cases"**,CRC Press,Taylor &Francis Group,2017.

References
1. Barrie Sosinsky, *"Cloud Computing Bible"*,Wiley Publishing, 2011.
2. Rajkumar Buyya, James Broberg, and Andrzej Goscinski, **"Cloud Computing Principles and Paradigms"**Published by Wiley India Pvt Ltd, 2014.
3. OvidiuVermesan and Peter Friess, **"Internet of Things - From Research Innovation to Market Deployment "** River Publishers, 2014.

Elective IV (B) : MOBILE COMPUTING

Course Objectives:

O1: Recall the applications, architecture of mobile networks.

O2: Compare signals, multiplexing and modulation techniques.

O3: Categorize the telecommunication systems and satellite systems.

O4: Explain the wireless LAN and Bluetooth technologies.

O5: Utilize the terminologies and functions of mobile network layers

O6: Identify the routing algorithms in ad-hoc networks

O7: Elaborate the Wireless Application Protocol.

O8: Interpret the architecture, components and tools of android**.**

UNIT – I   **10 Hours**

Introduction:
Applications
A Simplified reference model.
Wireless transmission:
Frequencies for radio transmission
Signals
Antennas
Signal propagation
Multiplexing
Modulation
Spread spectrum
Cellular systems.

UNIT – II   **10 Hours**

Telecommunications Systems: GSM:
Mobile services
System architecture
Radio interface
Protocols
Security.
UMTS:
UMTS system architecture
UMTS radio interface.
Satellite Systems:
Applications
Basic Types of Satellite Orbits - GEO - LEO - MEO
Routing - Localization – Handover.

UNIT – III   **10 Hours**

Wireless LAN:
IEEE
System architecture
Protocol architecture.
Bluetooth:
User scenarios
Architecture
Radio layer
Baseband layer
Link manager protocol
L2CAP
Security
SDP
Profiles.

UNIT – IV   **10 Hours**

Mobile Network Layer:
Mobile IP
Goals, assumptions and requirements
Entities and terminology

IP packet delivery
Agent discovery
Registration
Tunneling and encapsulation
Optimizations
Reverse tunneling
IPv6.
Mobile ad-hoc networks:
Routing
Destination sequence distance vector
Dynamic source routing
Overview ad-hoc routing protocols
Wireless Application Protocol: Architecture.

UNIT – V   **10 Hours**
    High level overview of android development:
    The android operating system
    Android versions
    Android application
    Android Developer tools
    Device support
    Android studio overview and installation
    Installing android SDK
    Getting started with Android studio:
    Create a new Android project
    Review the generated project
    Create a virtual device(AVD
    Start your virtual device
    Start the application on your virtual device

Books for Studys:
1. Jochen Schiller, "Mobile communications", Pearson Education, Second Edition, 2009
2. Lars Vogel, "Android Development Tutorial Based on Android 4.0, 2019" (http://www.vogella.com/tutorials/android.html)

Books for Reference
1. Asoke K. Talukder , Hasan Ahmed and Roopa R Yavagal, Mobile Computing,Second Edition, McGraw Hill, 2011.
2. Wei–Meng Lee, Beginning Android Application Development, John Wiley and Sons, Inc, 2012.

Elective IV (C) : PARALLEL COMPUTING

Course Objectives:
O1:To Explain how large-scale parallel systems are architecture and how massive parallelism is implemented in accelerator architectures;
O2: ToWrite parallel programs for large-scale parallel systems, shared address space platforms, and heterogeneous platforms;
O3:To Design efficient parallel algorithms and applications;
O4: To Measure with performance analyze and modeling of parallel programs.
O5: To Provide in-depth coverage of fundamentals, design complexity, power, reliability and performance coupled with treatment of parallelism at all levels.
O6:ToAnalyzehow parallel computers work and how to analyze the correct designs of parallel architectures.
O7: ToEvaluate how each component of an algorithm affects the time complexity and why each component of an algorithm is important for its correctness.
O8:ToDescribe different parallel architectures; inter-connect networks, programming models, and algorithms for common operations such as matric-vector multiplication.

UNIT – I   **10 Hours**
Introduction to Parallel Computing
Motivating Parallelism
Scope of Parallel Computing
Parallel Programming Platforms
Implicit Parallelism
Limitations of Memory System Performance
Dichotomy of Parallel Computing Platforms
Physical Organisation of Parallel Platforms
Communication Costs in Parallel Machines
Routing Mechanisms for Inter Connection Networks
Impact of Process Mapping and Mapping Techniques.

UNIT – II   **10 Hours**
Principles of Parallel Algorithm Design
Preliminaries
Decomposition Techniques
Characteristics of Tasks and Interactions
Mapping Techniques for Load Balancing
Methods for Containing Interaction Over Heads
Parallel Algorithm Models.

UNIT – III   **10 Hours**
Dense Matrix Algorithms
Matrix Vector Multiplication
Matrix _ Matrix Multiplication
Solving a system of Linear Equations.

UNIT – IV   **10 Hours**
Sorting:
Issues in Sorting on Parallel Computers
Sorting Networks
Bubble Sort and its Variants
Quick Sort
Bucket and Sample Sort
Other sorting Algorithms.

UNIT – V   **10 Hours**
Graph Algorithms
Definitions and Representation Prim's Algorithm
Dijisktrars Algorithm
All Pairs Shortest Paths
Transitive Closure

Connected Components
Algorithm for Space Graphs.

Books for Study
   1. *Ananth Grama, Anshul Guptha, George Karypis and Vipin Kumar, "Introduction to Parallel Computing", Pearson Education, 1994.*
Books for Reference
   1. Harry F. Jordan, Gita Alaghband, "*Fundamentals of Parallel Processing*", Prentice Hall, 2003.

Elective IV (A): ORGANIZATIONAL BEHAVIOUR

Course Objectives:

O1: To analyze the behavior of individuals and groups in organizations in terms of the key factors that influence organizational behavior.

O2: To examine the management issues and ethical issues in attitudes, values and job satisfaction of people working in organizations.

O3: To identify different motivational theories and evaluate motivational strategies used in a variety of organizational settings.

O4: To compare the theories of learning.

O5: To explain how organizational change and culture affect the working relationships within organizations.

O6: To analyze the aspects of conflicts and the influence of job frustration in an organization.

O7: To assess the basic design elements of organizational structure and evaluate their impact on employees.

O8: To develop good communication skills and formulate leadership styles within organizations.

UNIT – I   **10 Hours**

Introduction:
Elements of OB
Nature and Scope of OB
Contributing Disciplines to OB.
Organisational Behaviour in Historical Perspective
Foundations of IndividualBehaviour:
Introduction
The Individual and Individual Differences
Human Behaviour and its Causation.

UNIT – II   **9 Hours**

Personality –Perception –Attitudes:
Concept of Attitudes
Formation of Attitudes
Types of Attitudes
Measurement of Attitude
Change of Attitude.
Values:
Concept of Value
Types of Values
Formation of Values
Values and Behaviour. **Job Satisfaction.**

UNIT – III   **10 Hours**

Learning:
Meaning and Definition
Determinants of Learning
Learning Theories
Learning Principles
Reinforcement
Punishment
Learning and Behaviour.**Motivation:**
Concepts
Meaning of Motivation
Nature of Motivation
Motivation Cycle or Process
Need for Motivation
Theories of Motivation
Motivation and morale.

UNIT – IV   **10 Hours**
> **Organisational Conflicts:**
> Definition of Conflict
> Sources of Conflict
> Types of Conflicts Aspects of Conflicts
> Functional Conflict
> Dysfunctional Conflict
> Conflict Process
> Conflict Management.
> **Job Frustration –Stress Management.**

UNIT – V   **10 Hours**
> **Communication:**
> Nature and Need for Communication
> Communication Process
> Communication Channel
> Communication Networks
> Communication Barriers
> Effective Communication.
> **Leadership – Organisational Structure – Organisational Culture**.

Books for Study
1. S.S Khanka, "Organizational Behaviour", S.Chand and Company Ltd, 2002.

Books for Reference
1. John W Newstorm and Keith Davis, "Organizational Behaviour", TMH, 2001.

Elective IV (B): BUSINESS INTELLIGENCE

Course Objectives:

O1. To summarize the basic rudiments of Business Intelligence System.
O2. To demonstrate the modeling aspects behind Business Intelligence.
O3. To analyze the models to identify good operating practices.
O4. To assess cross efficiency in business models.
O5. To develop marketing models.
O6. To compare the logistics models.
O7. To use visualization techniques in the prediction business intelligence.
O8. To predict the future of Business Intelligence

UNIT - I   **15 Hrs**

Management Support Systems:
An Overview:
Managers and Decision-Making
Managerial Decision-Making and Information Systems
Managers and Computer Support
Computerized Decision Support and the Supporting Technologies
A Framework for Decision Support
The Concept of Decision Support Systems
Group Support Systems
Enterprise Information Systems
Knowledge Management Systems
Expert Systems
Artificial Neural Networks
Advanced Intelligent Decision Support Systems
Hybrid Support Systems.

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UNIT II   **15 Hrs**

Decision-Making Systems, Modeling, and Support:
Decision-Making:
Introduction and Definitions
Systems-Models
Phases of the Decision
Making Process
Decision-Making:
The Intelligence Phase –
The Design Phase- The Choice Phase
The Implementation Phase
How Decisions Are Supported
ersonality Types, Gender, Human Cognition, and Decision Styles-The Decision-Makers.

UNIT III   **15 Hrs**

Decision Support Systems:
An Overview
DSS Configurations
What Is a DSS?
Characteristics and Capabilities of DSS
Components of DSS
The Data Management Subsystem
The Model Management Subsystem
The User Interface (Dialog) Subsystem
The Knowledge-Based Management Subsystem-The User-DSS Hardware
DSS Classifications.

UNIT IV   **15 Hrs**

Modeling and Analysis:
MSS Modeling-Static and Dynamic Models
Certainty, Uncertainty, and Risk
Influence Diagrams
MSS Modeling with Spreadsheets-Decision Analysis of a Few Alternatives (Decision Tables and Decision Trees)
The Structure of MSS Mathematical Models
Mathematical Programming Optimization-Multiple Goals, Sensitivity Analysis, What If, and Goal Seeking-Problem-Solving Search Methods

Heuristic Programming-Simulation.

UNIT V   **15 Hrs**

Business Intelligence: Data Warehousing, Data Acquisition, Data Mining, Business Analytics, and Visualization:
The Nature and Sources of Data
Data Collection, Problems, and Quality
The Web/Internet and Commercial Database Services-Database Management Systems in Decision Support Systems/
Business Intelligence
Database Organization and Structures
Data Warehousing
Data Marts-Business Intelligence/Business Analytics-Online Analytical Processing (OLAP)
Data Mining
Data Visualization, Multidimensionality, and Real-Time Analytics.

Text Book
1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", th Edition, Pearson 2013.

Books for Reference

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, 2003.
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, 2009.
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager"s Guide", Second Edition, 2012.
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, 2007.
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,2007.

Elective IV (C): HUMAN RESOURCE MANAGEMENT

Course Objectives:

O1. To interpret the need for Human Resource Planning.
O2. To categorize the various job characteristics.
O3. To assess the design of a job.
O4. To demonstrate the various techniques in Training and Development.
O5. To evaluate the selection process
O6. To explain the characteristics of Harmonious Industrial Relations.
O7. To analyze the factors affecting Industrial Relations.
O8. To summarize the Strategic Human Resource Management.

UNIT- I   **10 Hours**

Human Resource Planning:
How HRP Relates to Organizational Planning or Strategic Planning,
The need for Human Resource Planning,
The Steps in Human Resource Planning Process, Situation Analysis, Environmental
Scanning and Strategic Planning, Forecasting Human Resource Demands.

UNIT- II   **10 Hours**

Job Analysis and Job Design: Purpose and uses of Job Analysis, Job Analysis
Technique, Job Analysis
Methods of Data Collection, Job Design Approaches, Job Characteristic Approach to
Job Design.
The Recruitment Process:
Environmental Factors Affecting Recruitment Process, Recruitment Methods,
Evaluating the Recruitment Process.

UNIT- III   **10 Hours**

The Selection Process: Step in Selection Process (Techniques of Selection Process),
Ethical Standards of Testing, Types of Interviews, Evaluation of the Selection Program.
Training and Development: The Functions of Training, Assessing Training Needs,
Types of Training, Evaluation of Training and Development.

UNIT- IV   **10 Hours**

Career Planning and Development:
Career Development, Career Management. Industrial Relations:
Characteristics of Industrial Relations, Significance of Harmonious Industrial
Relations, Approaches to Industrial Relations, Factors Affecting Industrial Relations
Strategy, Causes of Poor Industrial Relations, Effects of Poor Industrial Relations.

UNIT- V   **10 Hours**

Strategic Human Resource Management:
Strategic Human Resource Management, Strategic Planning, Need for Strategic
Management, Benefits of Strategic Management, Dysfunctions of Strategic
Management.

Books for Study:

1. B. Pattanayak, "Human Resource Management", 3rd Edition, Prentice-Hall of India, 2006.

Books for Reference:

1. David A. Dedecenezo, Stephen P. Robbins, "Personnel/ Human Resource Management ", 3rd
Edition, Prentice-Hall of India, 1990.
2. Adwin B. Flippo, Personnel Management, (Mcgraw Hill Series in Management).
3. F. R. David, Concept of Strategic Management. New York:Macmillan., 1993.
4. Narender. K. Chadha, Human Resource Management: Issues, Challenges and Case Studies
(2nd revised ed.), Shri Sai Printographers, New Delhi, 2002.
5. Nirmal Singh. Human Resource Management, Galgotia Publications Pvt. Ltd., New Delhi,
2004.

Core XX: INTERNET OF THINGS

Course Objectives:

     O1: To illustrate the history and beginning of Internet of Things
O2: To identify the challenges in the architecture of IoT
O3: To elaborate the details of optimized IP in IoT
O4: To compare Traditional protocol with application protocols of IoT
O5: To choose the appropriate security practices for IoT
O6: To construct the Internet of Things for real world scenario
     O7: To deduct the data transfer between device and human interface.
 O8: To test the Internet of Things projects using Clayster platform

UNIT- I   **12 Hours**
     INTRODUCTION TO IoT-Requirements of IoT:
     The definition of the Internet of Things, main assumptions and perspectives
     Platform for IoT devices. Economics and Technology of the IoT
     Issues in IoT and solutions
     Architecture of IoT.**Anatomy of IoT:**
     Traditional Internet Protocol Vs Chirps
     Applying network intelligence at propagator nodes-Transport and functional architectures.

UNIT- II   **10 Hours**
     IoT Devices
     Temporary and Ad-hoc devices
     Addressing issues
     End devices in dedicated networks
     Converting states to chirps
     RFID integration in the IoT
     End devices with higher demands
     Small data-Building a web of things
     Autonomy and co-ordination-Structuring a tree
     Housekeeping message
     Role of integrator function
     Degrees of functionality
     Aggregating end points-Packaging options.

UNIT- III   **12 Hours**
     Data and Human Interaction:
     Functions of IoT
     Analysis and control
     Neighborhood and affinities
     Public private and other kinds of data
     Publishing agent
     Searching for and managing agents
     High and low level loops
     Human interface and control points
     Collaborative scheduling tools
     Packaging and provisioning- Distributed integrator functions
     Filtering the streams
     IP Alternative
     Protocol based on category classification
     Skeletal architecture of chirp packets
     Pattern driven
     Propagator node networks and operation-Power of local agents and integrator functions
     High level interchange.

UNIT- IV   **10 Hours**
     IoT APPLICATIONS:
     Moore's Law
     Intelligence near the edge

Incorporating legacy devices
Staying in the loop
Social machines
Applications of IoT
Agriculture
Home healthcare
Efficient process control
Factory application
Home automation
Natural sciences
Living applications
Origin of IoT
Open source networking solutions
Shared software and business process vocabularies.

UNIT- V   **10 Hours**

Creating the IoT projects:
Sensor project
Actuator project
Controller
Camera.Using an IoT service platform
Selecting an IoT.**Platform**
The claysterplatform
Interfacing ourdevices using XMPP
Creating control application.

Books for Study

1.Francis DaCosta, "Rethinking the Internet of Things-A scalable approach to connecting everything", First edition,Apress open publication, 2013.
2. Peter Waher, "Learning Internet of Things", PACKT Publishing-First Edition, 2015.

Books for Reference

1. Arhdeep Bahga and Vijay Madisetti , "Internet of Things: A Hands on Approach", First Edition, 2014
2. Cuno Pfister, "Getting started with the internet of things", O'Rielly Publication, First Edition, 2014,Kindle Edition Publication.

Core XXI: DATA ANALYTICAL TOOLS

Objectives:

1. To outlinethe basic concepts of R programming.
2. To demonstrate the usage of R Packages and its applications.
3. To write R programs using control structures and looping statements.
4. To analyze statistical methods using analytical tools.
5. To introduce MongoDB
6. To query with MongoDB
7. To compose web applications using Firebase Database
8. To maximize the security in web application

UNIT I   (10 Hours)

History and Overview of R
Getting started with R – R Nuts and Bolts
Getting Data In and Out of R :
Reading and Writing Data
Reading Data Files with read.table()
Reading in Larger Datasets with read.table
Calculating Memory Requirements for R Objects. Using the readr Package
Using Textual and Binary Formats for Storing Data
Interfaces to the Outside World
Subsetting R Objects
Vectorized Operations
Dates and Times
Managing Data Frames with the dplyr package.

UNIT II   (10 Hours)

Control Structures :
if-else - for Loops
Nested for loops
while Loops
repeat Loops
next, break. Functions :
Functions in R - Your First Function
Argument Matching
Lazy Evaluation
The ... Argument
Arguments Coming After the ... Argument
Scoping Rules of R – Loop Functions
Debugging
Simulation.

UNIT III   (10 Hours)

Data Analysis and Statistical methods:
Exploratory Data Analysis(EDA)
Naïve Bayes
K-nearest neighbors
Classification & Regression trees
Time Series – Regression.

UNIT IV   (10 Hours)

Databases
Getting and Starting MongoDB
Introduction to the MongoDB Shell
Datatypes-Using the MongoDB Shell
Inserting and Saving Documents-removing Documents
Updating Documents-Querying-Introduction to Find- Query Criteria

Type-Specific Queries-$where queries-Cursors -

UNIT V (10 Hours)

Getting Started with Firebase
Firebase User Authentication
Email/Password authentication using FirebaseUI Auth
Google Sign-In Authentication using Firebase
UI Auth-Firebase Real-time database
Writing Firebase Real-Time database data
Reading Firebase Real-Time database data

Books for Study

1. Roger D.Peng, "R Programming for Data Science", Leabpub, 2015.
2. Kristina Chodorow, Shannon Bradshaw, "MongoDB: The Definitive Guide", 3rd Edition, by O'Reilly Publications, June 2019.
3. Neil Smith , "Firebase Essentials-Android Edition",First Edition-,Payload Media, ebookFrenzy-2017

Books for Reference

1. Nina Zumel, John Mount "Practical Data Science with R", Manning, 2014.
2. F. Provost, T Fawcett, "Data Science for business", 2013

Core Project-I : PROJECT

Objectives:

1. To explore the knowledge of students in technical domain and application domain.
2. To get an experience to develop software in the corporate domain.