

B.Voc

Software Development

Annexure II

Parvatibai Chowgule College of Arts and Science

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE

THREE YEAR B.Voc.(Software Development)

COURSE STRUCTURE

Semester-I	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G1: Language Paper-I	4		4
G2: Elements of Basic Statistics	4		4
G3: Cyber Security	4		4
Skill Component			
SK1: Office Automation Tools	3	3	6
SK2: Web Designing	3	3	6
SK3: Introduction to programming	3	3	6
Semester-II			
	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G4: Language Paper-II	4		4
G5: Mathematical Foundations in Computer Science	4		4
G6: Academic Writing	4		4
Skill Component			
SK4: Computer Organization & Operating System	3	3	6
SK5: Data Structure	3	3	6
SK6: Multimedia	3	3	6
Outcome:			
<ul style="list-style-type: none"> • Office Assistant • Programming Assistant • Technical Assistant • Hardware Technician • Desktop Publishers 			

Semester-III	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G7: Environment Studies-1	2		2
G8: Business Communication	4		4
G9: Accounting & Financial Management	4		4
Internship	2		2
Skill Component			
SK7: Object Oriented Technologies	3	3	6
SK8: Computer Network	3	3	6
SK9: Database Management System	3	3	6
Semester-IV			
	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G10: Organizational Behavior	4		4
G11: Personality Enhancement	4		4
G12: Environmental Studies-2	2		2
Internship	2		2
Skill Component			
SK10: Server Side programming	3	3	6
SK11: Agile Software Engineering	3	3	6
SK12: Mobile Application Development	3	3	6
Outcome:			
<ul style="list-style-type: none"> • Assistant Programmer • Android Application Developer • Web Designer • Network Administrator • Database Administrator 			

Semester-V	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G13: Entrepreneurship	4		4
G14: Business Economics	4		4
G15: Human Values & Professional Ethics	4		4
Skill Component			
SK13: Internet of Things	3	3	6
SK14: Software Testing	3	3	6
Project Work			6
Semester-VI			
	Lecture Credits	Tutorial/Practical Credits	Credits
General Education Component			
G16: E-Governance	4		4
G17: Business Ethics	4		4
G18: Innovation in Science	4		4
Skill Component			
SK15: Network Security	3	3	6
SK16: Digital Marketing and E-Commerce	3	3	6
Project Work			6
Outcome:			
<ul style="list-style-type: none"> • Software Programmer • Software Developer • Server Administrator • Software Project Analyst • Software Tester • Lab Instructor 			

Annexure III

Parvatibai Chowgule College of Arts and Science (Autonomous)
Margao, Goa

Semester I & Semester II Syllabi for Skill Component

B.Voc.(Software Development)

(2017-2018)

Semester I Syllabus

Paper Title: Office Automation Tools

Paper Code: SK1

Marks: 75

Credits : 03

Course Prerequisites : Nil

Course Objectives:

- The main objectives of this course to provides basic training of computer and its most common software use in office work..

Learning Outcome:

- To become proficient in using:
 - Spreadsheet Applications
 - Desktop Publishing Applications

Syllabus:

PART-I

MS Excel and Open Office-Calc:

[6L]

Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data- Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks, Setting Formula - finding total in a column or row.

Mathematical operations:**[5L]**

(Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Formatting Spreadsheets- Labeling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Color etc, Borders & Shading – Shortcut keys. Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal. Creating Charts - Drawing. Printing. Using Tools – Error checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

OpenOffice-Calc :**[4L]**

Introduction – Introduction to Spreadsheets, Overview of a Worksheet, Creating Worksheet & Workbooks, Organizing files, Managing files & workbooks, Functions & Formulas, Working with Multiple sheets, Creating Charts & Printing Charts – Operating with MS Excel documents, which are already created and saved in MS Excel.

PART-II

Adobe Page Maker

[5L]

Basic concept: Creating and opening publication, using the tool box, working with palettes, text and graphics, starting a publication from the template, saving and closing a publication. Tutorial - positioning ruler guides, typing text, formatting graphics. Creating columns, creating styles, changing type style and alignment. Rotating and moving of text block and graphics, placing text file, setting tab, indents, and leaders copying graphics between publication, positioning and resizing the logo.

Constructing a publication :**[6L]**

setting up pages, changing document setup, using masterpages, choosing a measurement system and setting up rulers, adjusting layout, numbering pages, rearranging pages creating running header and footers importing text, threading text blocks, balancing columns, edit story. Customizing the dictionary, hyphenation, leading frames layers, locking, objects wrapping text around graphics cropping a graphic using libraries assembling publication into a book, indexing a publication , creating table of contents ,applying color, edit color creating custom color, color libraries table editor, importing, linking and exporting a graphic. OLE (object linking and embedding).TIFF image. PDF HTML formats printing of publication proof corrections with appropriate proof reading marks. Typography - Types(Fonts), Type sizes, Different families , Point system and other system of measuring , Casting off, typography, proof reading, familiarization with

symbols/proofreading marks used in marking copy, typescript for press, Determining line measure and depth and margins, House of style, Page composition through Page Maker.

Corel Draw: - Graphic design:

[9L]

Introduction:

Creating. Opening drawing. Setting up the drawing page. Using the rulers. Grid. And guidelines. Viewing document. Drawing and Shaping Objects:- Drawing. Moving & Shaping Object, drawing lines and curves, dimensions line. * Working with Style & Templates Organizing Objects: Changing the order of objects. Grouping, Ungrouping locking and unlocking objects. Using and setting layers . Aligning & editing objects data. Working with pattern and texture draw. fills. Applying and editing line ending shapes, splitting and erasing portions of objects positioning moving stretching and rotating objects.

Working with multiple on screen color palettes:

[10L]

Adding graphics symbols and specials characters. Editing. Formatting text and paragraph. Hyphenating text. Linking paragraph text frames, using spell checker and grammar, using thesaurus. Creating and editing blends. Envelopes , Creating and modifying vector and bitmap. Extrusions. Creating drop shadows. Creating and editing transparencies, contoured. Objects, Working with linked bitmap, cropping, coloring and converting bitmaps. Applying special effects to bitmaps by 3D ,effects, blur effects, contour effects, Creating documents for various formats, using layout. Previewing sizing and positioning a print job. Creating color separations, working with halftone and bitmap screens Importing and exporting files. OLE (Object linking and embedding).

Text Book:

1. PageMaker-Complete by R. Shamms, Mortier & Rick Wallacl ,Techmedia
2. Learning PageMaker 7 by Ramesh Bangia of Khanna Book Publishing Co Pvt Ltd\
3. Straight to the Point – MS Office 2003 By Dinesh Maidasani, Publisher: firewall
4. Master Visually Microsoft Office 2003 By Michael S. Toot, Publisher: visual
- 5:Mastering Excel: Building Dashboards by Mark Moore
6. Mastering WORD 6 for Windows - Mansfield – BPB
7. Mastering EXCEL 4 for Windows - Townsend –BPB

Lab : Office Automation Tools

Credit : 03

Marks: 25

Suggested list of Practical

PART-I

1. Using formulas and functions:
To prepare a Worksheet showing the monthly sales of a company in different branch offices (Showing Total Sales, Average Sales).
Prepare a Statement for preparing Result of 10 students in 5 subjects (using formula to get Distinction, I Class, II Class and Fail under Result column against each student).
2. Operating on the sheets:
Finding, deleting and adding records, formatting columns, row height, merging, splitting columns etc. Connecting the Worksheets and enter the data.
3. Creating a Chart:
To create a chart for comparing the monthly sales of a company in different branch offices.
4. Using the data consolidate command:
To use the data consolidate command to calculate the total amount budgeted for all departments (wages, travel and entertainment, office supplies and so on) or to calculate the average amount budgeted for – say, department office expenses.
5. Sorting Data, Filtering Data and creation of Pivot tables

PART-II

CorelDraw/Page Maker

1. Introduction
2. Basic Drawing Skills
3. Using Text and Color
4. Working with Objects
5. Adding special effects
6. Creating output
7. Layout and layers
8. Styles and templates

9. Advanced Effects.

Paper Title: Web Designing

Paper Code: SK2

Marks: 75

Credits : 03

Prerequisite Courses : Nil

Course objectives:

- How to design good user interfaces covering important design principles such as learnability , visibility, error prevention, efficiency and graphic design

Learning Outcomes:

- Implementation of user interfaces following design principles and using technologies such as HTML, CSS, JavaScript and JQuery.

Syllabus

Unit I : User Interface – Introduction, its importance, design principles–learnability, visibility, error prevention, efficiency, graphic design. Design Patterns for GUI – View tree, Listener, Widget, Model-View-Controller. Approaches to GUI programming – Procedural, Declarative, Direct Manipulation. Web UI – HTML, Javascript, JQuery.

[6L]

Unit II : Structure and Style with HTML and CSS

HTML

[6L]

Introduction. The development process, basic HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, simple HTML forms, web site structure, Meta tags, Character entities, frames and frame sets.

HTML5

[6L]

Introduction, New Elements, Canvas, SVG, Drag/Drop, Geolocation, Video, Audio, Input types, form elements, form attributes, semantic, web storage, app cache, web workers, SSE

CSS

[5L]

Introduction – Syntax, Id & Class, Backgrounds, Text, Fonts, Links, Lists, Tables. CSS Box Model – Border, Outline, Margin, Padding. Advanced - Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element,

Navigation Bar, Image Gallery, Image Opacity, Image Sprites, Media Types, Attribute Selectors.

CSS3

[5L]

Introduction, Borders, Backgrounds, Gradients, Text Effects, Fonts, 2D Transforms, 3D Transforms, Transitions, Animations, Multiple Columns.

Unit 3 : Javascript

[10L]

Introduction - What is JavaScript, Understanding Events, JavaScript Example, External JavaScript. Basic Elements – Comment, Variable, Global Variable, Data Types, Operators, If Statement, Switch, Loop: for and while, Function. JavaScript Objects – objects, Array. Browser Object Model - Browser Objects, Window Object, Document Object – getElementById, getElementsByName, getElementsByTagName, innerHTML property, inner Text property. Validation- form validation, email validation.

Unit 4 : Introducing jQuery

[7L]

JQuery : Introduction - Syntax, Selectors, Events. Effects- Hide/Show, Fade, Slide, Animate, stop(), Callback, Chaining. HTML/CSS- Add, Remove, CSS Classes, css(), Dimensions, slider. Traversing – ancestors, descendants, siblings, filtering.

Text Book:

1. Elisabeth Robson, Eric Freeman, —Head First HTML and CSS, O'Reilly
2. Ivan Bayross, —HTML 5 and CSS 3 Made Simple, BPB publication
3. Kogent Learning Solutions Inc., —HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and JQuery, Pearson Education.
4. Steven M. Jacobs, Ben Shneiderman, —Designing the User Interface : Strategies for effective human-computer interaction, 5th Edition, Pearson Education

Lab : Web Designing

Marks: 25

Credits: 03

List of Assignments: (the numbers in brackets indicate number of practicals) :

- 1) Case studies to review UI designs
- 2) Create a HTML page with the following :
 - a) title heading paragraph emphasis strong and image elements
 - b) complex HTML table
 - c) simple HTML Form covering major form elements
 - d) Embed Video in an HTML page
- 3) Using CSS do the following :
 - a) Create a Navigation bar (with dropdown) with CSS
 - b) Create a CSS Grid
 - c) Create a CSS3 based button
 - d) make an image rounded shape
 - e) Create a CSS based sticky footer
 - f) Create CSS3 Corner Ribbon
 - g) Create CSS3 blurry text effect
 - h) Create CSS3 speech bubble shape
 - i) Create image cross fade with CSS3 transition
 - j) Set style for link hover active and visited states of hyperlink
- 4) Write JavaScript functions to :
 - a) accept a string as a parameter and converts the first letter of each word of the string in upper case
 - b) check whether a given credit card number is valid or not.

- c) check whether a given value is an valid url or not.
- d) check whether a given email address is valid or not.
- e) print an integer with commas as thousands separators
- f) remove items from a dropdown list.

5)Use JQuery to :

- a) Disable buttons
- b) Make textbox read only
- c) Uncheck check boxes
- d) Confirm again
- e) Sort
- f) Switch rows and columns

A mini project combining all the technologies learnt using a front-end development framework such as bootstrap is recommended.

Paper Title : **Introduction to Programming**

Paper Code: SK3

Marks : **75**

Credits : **03**

Prerequisite Courses : Nil

Course Objectives :

- To provide skills of data analysis using Python programming language

Learning Outcome:

Students will learn Python programming, and apply it in data analysis & visualization.

Syllabus

Introduction to Python	[3L]
Motivation, programming paradigms, What Python can do, Python's technical strength, Python interpreter, Program execution, Execution model variations, How to run programs	
Basic Syntax	[6L]
Variable and Data Types, Operator, Conditional Statements - if, if- else, Nested if-else. Looping – For, While, Nested loops. Control Statements – Break, Continue, Pass.	
String Manipulation	[5L]
Accessing Strings, Basic Operations, String slices, Function and Methods.	
Lists	[3L]
Introduction, Accessing list, Operations, Working with lists, Function and Methods	
Tuple	[4L]
Introduction, Accessing tuples, Operations, Working, Functions and Methods	
Dictionaries	[4L]
Introduction, Accessing values in dictionaries, Working with dictionaries, Properties, Functions	
Functions	[6L]
Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables	
Modules	[5L]
Importing module. Math module. Random module. Packages. Composition	
Input-Output	[5L]
Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions	
Exception Handling	[4L]
Exception. Exception Handling - Except clause, Try ? finally clause. User Defined Exceptions	

Text Book:

1. Mark Lutz, Learning Python, O'Reilly Media, Third Edition, 2008

Reference Books:

1. Alex Martelli, Python – A Nutshell, O'Reilly Media, Second Edition, 2006

2. Wes McKinney, Python for Data Analysis, O'Reilly Media, 2012

Lab: Introduction to Programming

Credit: 03

Marks: 25

List of Experiments using Python Language

- 1) Program to compute a given formula
- 2) if else
- 3) nested if else
- 4) loop
- 5) loop
- 6) string manipulation
- 7) string manipulation
- 8) list
- 9) tuple
- 10) dictionary
- 11) function
- 12) module
- 13) Input-Output
- 14) Input-Output
- 15) exception handling

**Semester II Syllabus
Skill Component**

Paper Title: Computer Organization and Operating System
Paper Code: SK4
Marks: 75
Credits: 03

Prerequisite Courses : Nil

Course Objectives:

- To have a thorough understanding of the basic structure and operation of a digital computer.

Learning Outcome:

- Understand the CPU architecture and organization.
- Study the hierarchical memory system.
- Study the different ways of communicating with I/O devices and standard I/O interfaces & management of the I/O device.
- Students will understand Memory Management

Syllabus:

Computer System: [3L]
Function and structure of a computer, Interconnection of components, Performance of a computer. Computer Architecture – Princeton (Von Neumann) and Harvard architecture.

Memory Subsystem: [10L]
Characteristics of memory system, the memory hierarchy, Semiconductor memories, Types of ROM & RAM, Cache memory unit - Concept of cache memory, Organization of a cache memory unit, replacement algorithms, write policy, block size.

Input/ Output Subsystem: [8L]
General block diagram of External device & I/O module, Programmed I/O, Interrupt driven I/O, DMA, I/O channels and I/O processors. I/O interfaces –Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewire and Infiniband.

Introduction to Operating System: [4L]

Basic elements of a computer system: Processor, Main Memory, I/O Modules, System Bus, Instruction Execution; Operating Systems: Definition, Operating system Structure, operating system operations, Relationship between Kernel, OS, and Hardware, Operating system services, System calls, Types of system calls, System programs.

Process Management: [5L]

Process Definition, Process Control Block, Process States, Operations on Process; Interprocess communication, Threads and Microkernels

Memory Management: [10L]

Introduction, Swapping, Contiguous Memory Allocation, Paging, Page Table, Segmentation

Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

Storage Management [5L]

File System, Concepts, File Organization and Access Methods, Directory and Disk Structure.

Secondary Storage Structure - Overview, disk structure, Disk attachment, Disk scheduling

Text Book:

1. William Stallings, —Computer Organization and Architecture - Designing for performance, EEE, PHI, 9th Edition.
2. A. Silberchatz, Galvin, Gagne, 2008, Operating System Concepts, Wiley publication 8th Edition

Reference Books:

1. M. Morris Mano, —Computer System Architecture, Pearson Education, 3rd Edition, 2008
2. William Stallings, Operating Systems: Internals and Design Principles, Prentice Hall, 6th Edition

Lab: Computer Organization and Operating System

Marks: 25

Credits: 03

PART-I

Exploring the Functions and Components of a PC

1. Recognizing CPU Sockets, Removing and Installing a CPU, Cooling CPU
2. Identifying BIOS ROM, Accessing BIOS via the CMOS Setup Program, Configuring and Clearing CMOS Setup Program Passwords, Configuring BIOS Settings
3. Identifying Internal Expansion Slots, Installing Expansion Cards, Managing Hardware with Device Manager
4. Removing and Labeling Components and Cables, Removing a Motherboard, Identifying Motherboard Features, Researching New Motherboards, Installing a Motherboard.
5. Installing Parallel ATA Hard Drives, Installing Serial ATA Hard Drives, Configuring CMOS Settings, Comparing Solid-State Drives and Magnetic Hard Drives, troubleshooting Hard Drive Installations, Data Recovery from hard drive.
6. Installing Video, Configuring Multiple Displays.
7. Researching Laptop Upgrade Paths, Replacing and Upgrading RAM, Adjusting Power Management to Optimize Battery Life,
8. Examining Types of Printers, Installing a Printer, Maintaining and Troubleshooting Printers

PART-II

1. Demo/Review of Installing Linux / Windows Operating System, Partitioning and formatting disk, Installing applications device drivers, working with files, mounting file systems, checking system space, creating, modifying and deleting user accounts
2. Study of Basic commands of Linux.
3. Shell Programming in Unix/Linux, arithmetic operations, loops
5. Menu Driven Shell scripting
6. Filters and Pipes in LINUX

Paper Title: Data Structure

Paper Code: SK5

Marks: 75

Credits: 03

Prerequisite Courses : Knowledge of Programming

Course Objectives:

To understand different methods of organizing data and efficiently implement different data structures.

Learning outcome:

On completion of the course student will learn:

- Different data structures like Stack, Queues, Linked Lists, Graphs and their applications.
- Implementation of data structures.

Syllabus

Introduction to data structures:

[3L]

Concept, Data type, Data object, ADT, Need of Data Structure, Types of Data Structure

Algorithm analysis:

[3L]

Algorithm – definition, characteristics, Space complexity, time complexity, Asymptotic notation (Big O)

Linked List:

[8L]

Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List, polynomial manipulation, Generalized linked list – concept & representation.

Stacks:

[8L]

Introduction, Representation-static & dynamic, Operations, Application - infix to postfix & prefix, postfix evaluation, Simulating recursion using stack.

Queues:

[5L]

Introduction, Representation -static & dynamic, Operations, Circular queue, priority queue (with implementation), Concept of doubly ended queue.

Trees:

[10L]

Concept & Terminologies, Binary tree, binary search tree, Representation – static & dynamic, Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting

leaf, non-leaf & total nodes, non recursive inorder traversal, Expression Tree.

Graph:

[8L]

Concept & terminologies, Graph Representation – Adjacency matrix, adjacency list, Traversals – BFS & DFS, Application of BFS, DFS – Shortest path, Backtracking.

Text Book:

Data Structures and Algorithms in Python Roberto Tamassia, Michael H. Goldwasser Michael T. Goodrich, Wiley Student Edition

Reference:

1. Horowitz Ellis, Sahni Sartaj, *Fundamentals of Data Structures in C*, University Press, 2nd Edition, 2008.
2. Michael T. Goodrich, Roberto Tamassia, *Data Structures and algorithms in Java*, John Wiley & sons inc., 5th Edition, International Student version.
3. Langsam Yedidyah, Augenstein J. Moshe, Tenenbaum M. Aaron, *Data Structures using C and C++*, Pearson Education, Second Edition, 2009
4. Gilbeg Richard, Forouzan Behrouz, *Data Structures: A Pseudocode Approach with C++*, Cengage Learning, Second Edition

Lab : Data Structures

Credit: 03

Marks: 25

Programs using C language / Java Language that covers the following concepts:

1. Stack: Static/Dynamic stack implementation.
2. Stack: infix to postfix.
3. Stack: Evaluation of Postfix expression.
4. Queues: Static and Dynamic Queue Implementation
5. Queues: Circular queue
6. List: Singly Linked List,
7. List: Doubly Linked List
8. List: Circular Linked List

9. Linked List: Polynomial addition
10. Trees: Binary Search Tree: create, add, delete, display nodes.
11. Trees: BST traversal.
12. Graph: Representation of Graphs, Graph Traversals.
13. Graph: DFS, BFS.

Paper Title: Multimedia

Paper Code:SK6

Marks: 75

Credits: 03

Prerequisites: Nil

Course Objectives:

- On completion of the course the students will develop specific skills and competencies by making them proficient in Designing Graphical Images, Audio and Video Capture and Editing using Software tools

Learning Outcomes:

- To study Multimedia Concepts
- To develop their Creativity and publish a self-contained multimedia Application using multimedia authoring tools in various application areas.

Syllabus

INTRODUCTION TO MULTIMEDIA:

[6 L]

Commonly used terms associated with multimedia like CDROM, Storyboard, Script and Authoring tools.

Stages of a Multimedia Project: Planning and Costing, Designing and Producing, Testing and Delivering.

The Multimedia team and their roles: Project Manager, Writer, Video specialist, Audio specialist and Multimedia programmer.

Multimedia Software. Multimedia Hardware

MULTIMEDIA AUTHORING TOOLS:**[3L]**

Types of Authoring tools - card or page based tools, icon-based, event-driven tools, time-based and presentation tools and object-oriented tools.

MULTIMEDIA BUILDING BLOCKS:***TEXT*****[4L]**

Designing with Text, menus and buttons for navigation
Animating text
Hypermedia and Hypertext

SOUND**[6L]**

Basic Sound Concepts
Music
Speech
MIDI and Digital Audio

IMAGES**[8L]**

Making still images, Bitmaps, Clipart,
Capturing and Editing Images
Scanning Images
Vector Drawing
3D Drawing and Rendering

ANIMATION**[8L]**

Principles of Animation- persistence of vision, animation file formats Computer animation- kinematics and morphing
Making animations that work- a rolling ball, a bouncing ball and creating an animated scene

VIDEO**[8L]**

Video Broadcast Standards- NTSC, PAL, SECAM, HDTV
Integrating Computers and Television like Video Overlay Systems, Digitized Video Playback, Differences between Computer and Television Video
Recording Formats like S-VHA Video, Component (YUV), Component Digital, Composite Digital, Video Hardware Resolutions
Video Tips like Shooting platforms, Lighting, Chroma Key or Blue Screen
Video Compression methods like MPEG and DVI

ASSEMBLING AND DELIVERING A PROJECT**[2L]**

The four primary navigational structures used in multimedia like linear, hierarchical, non-linear and composite

Text Book:

Vaughan, Tay , —Multimedia: Making it Workll, 3rd edition, Tata McGraw-Hill

Reference Books:

1. Jeffcoate, Judith, —Multimedia in Practice, Technology and Applicationsll, Prentice Hall India.
2. Buford, J.F. K , —Multimedia Systemsll, Pearson Education
3. Elson-Cook, —Principles of Interactive Multimediall, McGraw Hill Higher Education. ISBN- 13: 978-0077096106

Lab: Multimedia**Credit: 03****Marks: 25**

List of suggested **PRACTICALS** using any Multimedia Software (the numbers in brackets indicate number of practicals) :

1. Image Handling: Cropping an image, adjusting image size, increasing the size of the work canvas, saving an image **[2]**
2. Layers: Adding layers, dragging and pasting selections on to layers, dragging layers between files, viewing and hiding layers, Editing layers, rotating selections, scaling an object, preserving layers transparency, moving and copying layers, duplicating layers, deleting layers, merging layers, using adjustment layers **[2]**
3. Channels and Masks: Channel palette, showing and hiding channels, splitting channels in to separate image, merging channels, creating a quick mask, editing masks using quick mask mode **[1]**
4. Painting and Editing: Brushes palette, brush shape, creating and deleting brushes, creating custom brushes, setting brush options, saving, loading and appending brushes, Options palette **[2]**
5. Opacity, pressure, or exposure , paint fade-out rate, making selections, using selection tools, adjusting selections, softening the edges of a selection, hiding a selection border, moving and

copying selections, extending and reducing selections, pasting and deleting selections [2]

6. Sound : Recording Sound using Sound Recorder (Capture), Sound capture through sound editing software , Sound editing, Noise correction, Effect enhancement ; Voice Recognition; Importing audio and saving audio from Audio CD. Sound Quality types: CD Quality, Radio Quality, Telephone Quality [2]

7. Video: Record video from video capture devices, webcams, screen capture or even streaming video and Video Editing [2]

8. Mini Project/Problem Statement/Case Study (integrating the above experiments) [2]

Annexure IV

Parvatibai Chowgule College of Arts and Science (Autonomous)
Margao, Goa

Syllabus for Mathematical Foundations of Computer Science

B.Voc.(Software Development)

(2017-2018)

Semester II

Paper Title: Mathematical Foundation of Computer Science

Paper Code:G5

Credits: 4

Prerequisite Courses : Nil

Course Objectives:

- To build mathematical foundations that are essential requirement in understanding various concepts related to computer science.

Learning Outcome:

On completion of the course students will learn the concepts of the following:

- Combination and permutation.
- Numbers systems and conversions
- Boolean Algebra and Logic
- Set, Relations and Functions

- 1. Combinatory:** [10L]
Permutations; Combinations; Counting; Summation; generating functions; recurrence relations.
- 2. Binary Number System:** [10L]
Decimal to binary conversion and vice versa, binary number representation (signed, 1's Complement and 2's complement) binary addition, subtraction, binary to octal, hexadecimal conversion and vice versa. Floating point representation.
- 3. Boolean Algebra:** [10L]
Boolean functions, truth table, DeMorgan's theorem, logic gates, Realization of Boolean Function using logic gates, Simplification using Karnaugh map.
- 4. Set, Relations and Functions:** [10L]
Venn diagram, set operations, relations and properties, closures, equivalence relations, Partial ordering, functions, function types, inverse of functions, composition of functions, recursive functions, growth of functions.
- 5. Logic:** [8L]
Propositional logic, first order logic, mathematical induction, deduction, proof by contradiction, program correctness.
- 6. Linear Algebra** [12L]
Adjoint, inverse of a matrix; Rank; Linear equations; Characteristics roots and vectors

Text Book:

Rosen H. Kenneth, *Discrete Mathematics and its Applications*, Tata McGraw Hill, seventh edition, 2011.

Reference:

Sarkar Kumar Swapan, *A Textbook of Discrete Mathematics*, S Chand & Company, 2005.

Annexure I

Department of Computer Science
B.Voc.(Software Development) - Course Structure
(2018 – 2019)

Semester	General Education Component			Skill Component		
I	COM-I.SD-G1 Language Paper-I	Theory Credits 4	Practical Credits 0	COM- I.SD-SK1 Office Automation Tools	Theory Credits 3	Practical Credits 3
	COM-I.SD-G2 Elements of Basic Statistics	Theory Credits 4	Practical Credits 0	COM- I.SD-SK2 Web Designing	Theory Credits 3	Practical Credits 3
	COM- I.SD-G3 Cyber Security	Theory Credits 4	Practical Credits 0	COM- I.SD-SK3 Introduction to Programming	Theory Credits 3	Practical Credits 3
	COM-II.SD-G4 Language Paper-II	Theory Credits 4	Practical Credits 0	COM-II.SD-SK4 Computer Organisation and Operating System	Theory Credits 3	Practical Credits 3
	COM-II.SD-G5 Mathematical	Theory Credits 	Practical Credits 	COM-II.SD-SK5 Data Structure	Theory Credits 	Practical Credits

II	foundation in Computer Science	4	0		3	3
	COM-II.SD-G6 Academic Writing	Theory Credits 4	Practical Credits 0	COM-II.SD-SK6 Multimedia	Theory Credits 3	Practical Credits 3
Outcome	1: Office Assistant 2: Programming Assistant 3: Technical Assistant 4: Hardware Technician 5: Desktop Publishers					
Semester	General Education Component			Skill Component		
III	COM-III.SD-G7 Environmental Studies-I	Theory Credits 2	Practical Credits 0	COM- III.SD-SK7 Object Oriented Paradigm	Theory Credits 3	Practical Credits 3
	COM- III.SD-G8 Business Communication	Theory Credits 4	Practical Credits 0	COM- III.SD-SK8 Computer Network	Theory Credits 3	Practical Credits 3
	COM- III.SD-G9	Theory Credits 4	Practical Credits 0	COM- III.SD-SK9	Theory Credits 3	Practical Credits 3

	Accounting for Non-accountants			Database Management Systems		
	Internship	Credits 2				
IV	COM-IV.SD-G10 Entrepreneurship	Theory Credits 4	Practical Credits 0	COM- IV.SD-SK10 Web Development Framework	Theory Credits 3	Practical Credits 3
	COM- IV.SD-G11 Environmental Studies-II	Theory Credits 2	Practical Credits 0	COM- IV.SD-SK11 Agile Software Engineering	Theory Credits 3	Practical Credits 3
	COM- IV.SD-G12 Personality Enhancement	Theory Credits 4	Practical Credits 0	COM- IV.SD-SK12 Mobile Application Development	Theory Credits 3	Practical Credits 3
	Internship	Credits 2				
	Outcome	1:Assistant Programmer 2:Android Application Developer 3:Web Designer 4: Network Administrator				

	5: Database Administrator					
Semester	General Education Component			Skill Component		
V	COM-V.SD-G13	Theory Credits	Practical Credits	COM-V.SD-SK13	Theory Credits	Practical Credits
	Lean startups and Innovation	4	0	Internet of Things	3	3
	COM-V.SD-G14	Theory Credits	Practical Credits	COM-V.SD-SK14	Theory Credits	Practical Credits
	Managerial Economics	4	0	Software Testing	3	3
	COM-V.SD-G15	Theory Credits	Practical Credits		Credits	
	Human Values and Professional Ethics	4	0	Project Work	6	
	COM-VI.SD-G16	Theory Credits	Practical Credits	COM-VI.SD-SK15	Theory Credits	Practical Credits
	E-Governance	4	0	Network Security	3	3
	COM-VI.SD-	Theory	Practical	COM-VI.SD-	Theory	Practical

VI	G17	Credits	Credits	SK16	Credits	Credits
	Nutrients and Health	4	0	Digital Marketing and E-Commerce	3	3
	COM-VI.SD-G18	Theory Credits	Practical Credits	Project Work	Credits	
	HCI and Design Thinking	4	0		6	
Outcome	1: Software Programmer 2: Software Developer 3: Server Administrator 4: Software Project Analyst 5: Software Tester 6: Lab Instructor					

Annexure II

**Semester III & Semester IV Syllabi for Skill Component
B.Voc.(Software Development)
(2018-2019)**

Semester III

Skill Component Syllabus

Course Title : Object Oriented Paradigm

Course Code : COM-III.SD-SK7

Marks : 75

Credits : 3

Total Hours: 45

Prerequisite Courses: Nil

Course Objectives:

- To learn the basic concepts and techniques of object oriented programming paradigm
- To introduce object oriented programming (OOP) using Java.

Learning Outcome:

- Understand the concept and underlying principles of Object-Oriented Programming.
- Understand how object-oriented concepts are incorporated into the Java programming language.
- Develop problem-solving and programming skills using the OOP concept.

Syllabus

1. Principles of OOP: [3Hrs]

Programming Paradigms, Basic concepts, OOP: major principles - encapsulation, abstraction, inheritance, polymorphism. Benefits of OOP, Applications of OOP.

2. Introduction to Java: [6Hrs]

Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, java.Math class, Arrays in java.

3. Objects and Classes: [7Hrs]

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

4. Inheritance and Polymorphism: [6Hrs]

Inheritance in java, super and sub class, Overriding, java.lang.Object class, Polymorphism, Dynamic binding, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, java.util package.

5. Event driven and GUI programming [7Hrs]

Windows and Layout Manipulation, Dialogs (Message, confirmation, input), Event Handling: Event sources, Listeners, Mouse and Keyboard Event Handling

6. Review on Exception Handling: [6Hrs]

Exception handling – what and why? Try and catch block. Multiple catch blocks. Nested try, finally block, throw keyword, throws keyword. Custom Exception.

7. Multithreading [5Hrs]

Running and starting thread using Thread class. Thread priorities. Running multiple threads. The Runnable interface. Synchronization and interthread communication.

8. UML Diagrams [5Hrs]

Class Diagrams , Use case Diagrams, Sequence Diagrams

Text Book:

1. Mahesh Matha, “Core Java, A Comprehensive Study “, PHI, India
2. Deitel & Deitel, Java - How to Program, Prentice Hall Publications

Reference Books:

1. Patrick Naughton, Herbert Schildt, Java 2 – The Complete Reference, McGraw Hill Education (India) Pvt. Ltd., 2002.
2. Patrick Naughton, The Java Handbook, McGraw Hill Education (India) Pvt. Ltd., 1996.
3. Balaguruswamy E, Programming with Java – A Primer, McGraw Hill Education (India) Pvt. Ltd., 2009.
4. Flanagan David, Java Examples in a Nutshell, Spd/O'Reilly Reprint, 2nd Edition.
5. Gosling J, Arnold K, & Holmes D, The Java Programming Language, Addison-Wesley

Professional, 3rd Edition, 2008.

Lab: Object Oriented Paradigm

Credit: 3

Marks: 75

Programs using Java language that covers the following concepts:

1. Classes and instances (1P)
2. Working with the java.Math class (1P)
3. Inheritance (2P)
4. Polymorphism, abstract classes and interfaces (3P)
5. Utilising the java.util package (1P)
6. Collections framework (1P)
7. Event handling and GUI (2P)
8. Exception handling(1P)
9. UML Diagrams(3P)

CourseTitle: Computer Networks

Course Code:COM-III.SD-SK8

Marks: 75

Credits: 3

Total Hours: 45

Prerequisite Courses :

- Introduction to Programming (COM-I.SD-SK3)

Course Objectives:

- To understand the basic concepts of Computer Networking
- Be familiar with the components required to build and design different types of networks.

Learning outcome:

- Gain Knowledge of the Reference models
- Understand basic concepts of data transmission medium, Compare various routing, transport protocols and Identify suitable protocol for a given network.
- Able to design the basic Computer network and maintain the networks
- Develop client server programs for different applications

Syllabus :

1. Introduction

[8Hrs]

Basics of Computer Networks, Classification: transmission technology, scale; Applications; Data Communications: data, signal, bandwidth, bit interval and bit rate, Modes of Communication. Layered network architecture, Networks models: OSI model, TCP / IP protocol suite; Guided and Unguided Transmission media, Multiplexing: FDM, TDM. Switching: Circuit switching, message switching, Packet Switching.

2. Data link layer

[12Hrs]

Data link control: Framing:Character Count, Character Stuffing, Bit Stuffing , Error Detection and correction, Flow and error control, HDLC; Multiple access: Random access – Controlled access , ALOHA, CSMA, CSMA/CD and CSMA/CA; Ethernet : IEEE standards, standard Ethernet, FastEthernet, Gigabit Ethernet; Connecting devices: repeater/hub, bridge, router and gateway, Backbone networks - Virtual LANS

3. Network layer

[14Hrs]

Functions of Network layer; Network Service types: Virtual Circuits, Datagrams; Logical addressing: IPv4, private and public IP addressing, special IP addresses, subnetting, IPV6 addressing Internet Protocol: Internetworking:IPv4, Fragmentation and reassembly , Address mapping : ARP, RARP, BOOTP, DHCP, ICMP . Routing: classification of routing, Shortest path routing, Distance Vector routing, Link State routing

4. Transport layer and Application layer

[9Hrs]

Process-to-Process delivery: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Quality of services (QoS); Application Layer: Domain Name System (DNS) , E-mail, FTP, HTTP.

5. Wireless Networks

[2Hrs]

Basics of wireless networking.

Text Book:

1. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Prentice-Hall, 5th Edition.
2. Behrouz A. Forouzan, “Data communication and Networking”, Tata McGraw – Hill, 2011, 4th Edition.

Reference Books:

1. James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Pearson Education, 2009, 5 th Edition,
2. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.

Lab : Computer Networks

Credits : 3

Marks : 75

List of Practicals

1. Installing virtual machines, Ethernet cabling (1P)
2. Study of network commands ping, ipconfig, netstat, traceroute (1P)
3. Setting up of LAN Network (1P)
4. IP address manipulation -Extract network id and Host id given netmask (1P)

5. Mini Project / Packet capture tool/ packet generator tool (1P)
6. UDP Socket programming (c/c++/Java/ Perl/Python) (1P)
7. TCP Socket programming –I (1P)
8. Configuring VLAN (DLink Switch)/ TCP Socket programming –II (1P)
9. Configuring routing tables (1P)
10. Configuring DHCP server/client (1P)
11. Configuring Telnet/SSH and ftp server. (1P)
12. Firewall Configuring (1P)

Course Title: Database Management System

Course Code:COM-III.SD-SK9

Marks: 75

Credits: 03

Total Hours: 45

Prerequisite Courses: Nil

Course objectives:

- To develop database model and apply to medium scale application.

Learning Outcomes:

- On completion of the course students will learn Database concepts and structures. They will be able to explain terms related to database design and management. Students will understand data modeling and database development process.
- Students will be able to construct and normalize data models and implement the same using any Relational Database Management System.
- Students will become proficient in using database query language, i.e. SQL.

Syllabus

1. Introduction to Database Systems: [3Hrs]

File Systems versus DBMS, The Relational Model, Levels of abstraction in a DBMS, Data independence, Structure of DBMS, Advantage of DBMS, People who deal with Databases.

2. Conceptual design and ER model: [8Hrs]

Overview of Database Design –The ER model-features, Key Constraints, Participation Constraints, weak Entities, Class Hierarchies, Aggregation.

3. The Relational Model and SQL: [14Hrs]

Attributes and domains, Relations, Integrity Constraints, Key Constraints, Foreign Key Constraints, General Constraints, Query Languages

SQL: The Form of Basic SQL query, Condition specification, SQL Join, Union, Intersect, Except, Nested queries - Aggregate Operators, updates, Null values, Embedded SQL, Triggers, Data Definition Language, Introduction to Database Security : views

4. Indexing: [3Hrs]

Properties of indexes: clustered vs unclustered indexes, dense vs sparse index, Primary vs secondary index.

5. Schema Refinement and Normal forms: [11Hrs]

Introduction, Schema Refinement, Functional Dependencies, Closure of a set of FDs and Attribute closure, Normal Form 1NF, 2NF, Third Normal Form, BCNF, Decomposition-Lossless-Join Decomposition, Dependency-Preserving Decomposition, Normalisation-Decomposition into BCNF, Decomposition into 3NF.

6. Transaction: [3Hrs]

The concept of transaction, transaction and schedule, Notion of consistency

7: Latest Trends [3Hrs]

NOSQL databases, Spatial Databases, Multimedia Databases, Distributed databases.

Text Book:

1. A Silberschatz, H F Korth, S Sudarshan, *Database system concepts*, McGraw-Hill ,sixth Edition

Reference Books:

1. Ramakrishan, J Gehrke, “*Database management systems*”, McGraw-Hill , 3rd edition
2. R Elmasri, S B Navathe, “*Fundamentals of database Systems*”, Pearson Education , 5th Edition

Lab : Database Management Systems

Credit : 3

Marks : 75

List of Practicals

1. ER diagram (2P)
 - a. ER diagram with specialization/generalization and aggregation.
 - b. Converting ER diagram to Schemas
 - c. Converting ER diagram with generalization/specialization, aggregation into schemaStudying RDBMS (2P)
2. Introduction to MySQL
 - a. Understanding client server architecture.
 - b. Installing a MySQL server and client
 - c. Creating databases in MySQL
3. SQL (5P)
 - a. Syntax
 - b. Insert, update, delete
 - c. Select
 - d. Aggregate functions
 - e. Wildcards
 - f. Aliases
 - g. in, union
 - h. joins
 - i. indexing
4. Transactions (1P)
5. Python database API (2P)

Tools like Mysql Workbench is recommended.

Semester IV

Skill Component Syllabus

Course Title: Web Development Framework

Course Code: COM-IV.SD-SK10

Marks: 75

Credits: 03

Total Hours: 45

Prerequisite Course:

- Web Designing(COM- I.SD-SK2)
- Introduction to programming(COM- I.SD-SK3)
- Object Oriented Paradigm(COM- III.SD-SK7)
- Database Management System(COM- III.SD-SK9)

Course Objectives:

- Introduction to the ReactJS JavaScript library for JS developers, starting from the very basics such as React components and JSX, props, state and more.
- Covers all the practical aspects of developing with React and managing data and server communication

Learning Outcomes:

- Understand the MVC architecture and use it to create applications.

Syllabus

1: Introduction to react [5Hrs]

History of front end libraries, Motivation for using React, Thinking in React, One way binding, JSX + CSS modules, Virtual DOM, ES6

2: React components [5Hrs]

Component lifecycle, Component API, Render functions, State, Props, Mixins

3: Interaction between components [15Hrs]

Passing data from parent to child, Passing data from child to parent, Passing data between 2 components at the same level, Forms, Refs, React-Router, API integration

4: Introduction to Node [6Hrs]

Brief overview on the benefits of using Node.js and how Node.js is used in modern web development, Node and NPM, Introduction to setting up a Node.js project, Importing modules using npm, Using core modules to make HTTP requests and manipulate the file system.

5: Introduction to the Express framework [9Hrs]

Set up a web server, Implementing API routing, Implementing middleware, Implementing URL parameters.

6: Introduction to setting up MySQL [5Hrs]

Settings up a database and connecting it to a Node.js server, Storing and retrieving data from the database.

Text Books

1. Basarat Ali Syed Apress; Beginning Node.js , 1st ed. edition , 4 December 2014
2. David Herron, Node.JS Web Development , Packt Publishing Limited; 3rd Revised edition edition (27 June 2016)

Reference Books

1. Stoyan Stefanov,React Up Running Building Web Applications, Shroff Publishers & Distributors Pvt Ltd (1 August 2016)
2. Vipul Amler, and Prathamesh Sonpatki,ReactJS by Example- Building Modern Web Applications with React, Packt Publishing Limited (18 April 2016)

Paper Title:Web Development Framework

Marks: 75

Credits: 03

Creating simple web server. (1P)

Connect to MySQL database.(1P)

CRUD using PHP database API's.(4P)

- a. Fetch data from a form, validate and insert in the database.

- b. Delete data in the database.
 - c. Update data in the database
 - d. Display data from the database.
- Uploading files.(1P)
Login functionality using sessions.(1P)
Using cookies to store website data. (1P)
Mini project. (3P)

Course Title: Agile Software Engineering

Course Code: COM-IV.SD-SK11

Marks: 75

Credits: 3

Total Hours: 45

Prerequisite Courses : Nil

Course Objectives:

- To apply agile and lean approach to software development.

Learning outcome:

- Plan and deliver an effective software engineering process, based on knowledge of widely used development lifecycle models.
- Develop Team working skills including general organization, planning and time management and inter-group negotiation.
- Develop pair programming, unit testing and refactoring skills.

Syllabus

1: Software processes

[9Hrs]

Introduction- software definition, Software myths from managers, ‘users and developers’ perspective, Software characteristics, Why engineering approach, definition(s) of software

engineering.Characteristics of software process.Software Development Processes and Methodologies: waterfall, prototyping, iterative, spiral, unified process, Agile methodologies

2: Introduction to Agile

[5Hrs]

Defining Agility, Agile manifesto and principles, Benefits of an Agile approach, Introduction to scrum and XP .

3:Project management using Scrum [6Hrs]

Defining scrum, scrum origins, Scrum team structure, Roles - (Product owner, Scrum master, development team), responsibilities and characteristics of each role. Sprints (timeboxed, short duration, consistent duration), sprint execution, sprint review.Requirements and user stories, product backlog, product backlog characteristics, flow management, estimation and velocity, scrum planning principles, planning (scrum planning principles, multilevel planning, portfolio planning).

4: Extreme Programming

[6Hrs]

Introduction to extreme programming, values, principles, Primary Practices - Sit together, Whole team, informative workspace, energized work, pair programming, stories, weekly cycle, quarterly cycle, Slack, Ten-minutes build, continuous integration, test first programming, incremental design.

Corollary Practices - Real Customer interaction, incremental deployment, team continuity, shrinking team, root-cause analysis, shared code, code and tests, single code base, incremental deployment, Negotiated scope contract, Pay-per-use

XP team - testers, interaction designers, architects, project managers, product managers, executives, technical writers, users, programmers, human resources, roles

5.Test Driven Design- Refactoring, Unit Testing and Pair programming

[12Hrs]

What is refactoring, why refactoring, principles of refactoring, bad smells and related refactorings. Unit testing- test case design, test suite. Pair programming- roles of driver and navigator, shifting roles, advantages of pair programming.Behavior driven design- brief introduction

6. Version management using Git

[4Hrs]

Version management, repository, pushing and pulling source code, branches, merging.

7. Lean Software Development

[3Hrs]

Introduction to lean, lean principles - Eliminate waste, Amplify learning, Decide as late as possible, Deliver as fast as possible, Empower the team, Build integrity in, See the whole.

Text Book:

1. Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison Wesley
2. Kent Beck, Cynthia Andres, Extreme Programming Explained: Embrace Change (XP Series), 2nd Edition

Reference Books:

1. Martin Fowler, Refactoring , Addison Wesley, 3rd Edition
2. Pankaj Jalote ,An Integrated Approach to Software Engineering . Narosa Publishing House, 2nd Edition.

ReferenceBook

1. Mike Cohn ,User Stories applied-For Agile Software Development, Pearson Education; First Edition edition (2016)
2. Mike Cohn ,Agile Estimating and Planning, Prentice Hall; 1 edition (November 11, 2005)
3. Mary Poppendick,Addison Wesley - Lean Software Development - An Agile Toolkit

Lab: Agile Software Engineering

Credit: 3

Marks: 75

List of practicals

(using Eclipse workbench with plugins)

1. Junit Testing (6P)
2. Refactoring (6P)
3. Git & Git hub(1P)
4. BDD using cucumber (1P)

Course Title: Mobile Application Development

CourseCode:COM-IV.SD-SK12

Marks: 75

Credits: 3

Total Hours: 45

Prerequisite Courses :

Object Oriented Paradigm(COM-III.SD-SK7)

Web Designing(COM-I.SD-SK2)

Database Management System(COM-III.SD-SK9)

Course Objective:

To develop applications for mobile devices, including smart phones and tablets, introduced to the current mobile platforms, mobile application development environments and mobile device input methods.

Learning Outcome :

Upon successful completion of the course, the student will demonstrate the ability to:

- Explain mobile devices, including their capabilities and limitations.
- Review current mobile platforms and their architectures.
- Develop mobile applications on a popular mobile platform.
- Evaluate development with another mobile platform.

Syllabus

1: Introduction to mobile devices [3Hrs]

Mobile devices vs. desktop devices, Why we Need Mobile App, Different Kinds of Mobile Apps, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment - App Store, Google Play, Windows Store, Development environments – Android Studio, PhoneGAP, Native vs. web applications.

2: Mobile OS Architectures [3Hrs]

Comparing and Contrasting architectures of Android, iOS and Windows, Underlying OS (Darwin vs. Linux vs. Windows), Kernel structure and native level programming, Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management, Security.

3: Android overview [4Hrs]

Introduction to Android. Overview of android stack, Introduction to OS layers, Android features. Linux Kernel, Libraries, Android Runtime, Application Framework, Dalvik VM

4: Android Components – Introduction [4Hrs]

Activities, Services, Broadcast Receivers ,Content Providers.

5: Building UI with Activities [5Hrs]

Activities, Views, layouts and Common UI components, Creating UI through code and XML, Activity life cycle, Intents, Communicating data among Activities.

6: Advanced UI [5Hrs]

Selection components (GridView, ListView, Spinner), Adapters, Custom Adapters, Menus, Toast, Custom Toast,Dialogs, Status bar Notifications.

7: Intent, Intent Filters and Broadcast Receivers [5Hrs]

Role of filters, Intent-matching rules, Filters in your manifest, Filters in dynamic Broadcast Receivers, Creating Broadcast receiver, Receiving System Broadcast, Understanding Broadcast action, category and data, Sending Broadcast.

8: Data Storage [6Hrs]

Shared Preferences, Android File System, Internal storage, External storage. SQLite Introducing SQLite, SQLiteOpenHelper and creating a database, Opening and closing a database, Working with cursors, inserts, updates, and deletes.

9: Services [5Hrs]

Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication (AIDL Services). Web Services and WebView - Consuming web services, Receiving HTTP Response (XML, JSON), Parsing JSON and XML, Using WebView.

12. Firebase [5Hrs]

Introduction to Firebase and cloud messaging, real time database,authentication.

Text Books:

1. Wei-Ming Lee ,Beginning Android 4 Development, John Wiley & Sons
2. Satya Komateneni, Dave MacLean Pro Android 4 (Apress)

Reference Books:

1. Ed Brunette -Hello Android - Introducing Google's Mobile Development platform - The Pragmatic Bookshelf
2. Onur Cinar, Android Apps with Eclipse (Apress) ,1st Edition

Lab: Mobile Application Development

Credit: 3

Marks: 75

List of practicals

1. Getting Started with Android – Installing the Development Environment, Configuring Android Stack (1P)
2. Creating the First Android Application - Creating a Simple Android Project, Debugging Application through DDMS. setting up environment. AVD Creation, Executing Project on Android Screen. (2P)
3. Android application development - Use of GUI components to implement a simple application such as a Calculator. (1P)
4. Review the earlier application making use of the advanced UI components. (1P)
5. Implementing Data storage application - an application to make Insert , update , Delete and retrieve operation on the database. (2P)
6. Optimizing your app performance with Services/Multithreading/Multiprocessing (1P).
7. Libraries[2P]
8. Firebase[3P]
9. Mini Project (2P)

Annexure III

**Semester III & Semester IV Syllabi for General Component
B.Voc.(Software Development)
(2018-2019)**

Semester III

General Component Syllabus

Course Title: Environmental Studies - I

Course Code: COM-III.SD-G7

Marks:50

Credits: 02

Total Hours:30

Course Prerequisite:

- Nil

Course Objectives:

- To create awareness among the student community about environmental issues such as biodiversity, sustainable lifestyle and resource equitability.
- To study conservative measures for environment protection.

Learning Outcomes:

- At the end of the course, the students will be able to appreciate the environment and various assets it offers us.
- They will also understand how unplanned development and over exploitation of nature and its resources will affect the basic survival of man.
- They will be aware of various precautions to be taken and methods followed to have a fair interaction between man and nature.

Syllabus

1: The multidisciplinary nature of environmental studies: [3Hrs]

The multidisciplinary nature of environmental studies, definition, scope, importance, Need for public awareness, Institutions in environment, components and types of environment, people in the environment

2: Natural resources: [13Hrs]

Renewable (forest, water, land) and non renewable resources (Energy, food, Minerals, Fossil fuel, coal, crude oil, natural gas, nuclear energy), Natural resources and associated problems, Uses and exploitation of resources, Problems associated with resources, Resource cycle, Antarctica as a resource – food, water, minerals, biota, Role of individual in conservation of

natural resources, Case study: Mining in Goa, Case study: Mangroves of Goa, Case study: Chipko movement, Case study: Social forestry in Goa, Case study: Issue with mhadei.

3: Ecosystem: [6Hrs]

Introduction, types of ecosystem, Components of ecosystems – biotic and abiotic, structure and function, energy flow within the ecosystem, Ecological pyramid, food chain, food web and trophic levels, ecological niche, Ecological succession

4: Biodiversity and its conservation: [8Hrs]

Introduction: Definition: genetic, species, ecosystem Diversity, Biogeographical classification of India, Value of biodiversity: consumptive value productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local level, India as a mega diversity region, Hotspots of biodiversity, Endangered and endemic species of India, conservation of biodiversity : In-situ and ex-situ

Text Book:

1. Asthana, D. K., Asthana M. : A Text book of Environmental Studies. S Chand and Company Limited, New Delhi.2009
2. Bharucha E. : Text Book of Environmental Studies. University Press(India)Private Limited, Hyderabad(A.P.) India. 2013

Reference Books:

1. Mishra,D.D: Fundamental Concepts in Environmental Studies. S.Chand and Company Limited,New Delhi..2009
2. Rana, S.V.S. : Essentials of Ecology and Environmental Science, Prentice Hall of India Private Limited New Delhi 2003.
3. Sharma, P.D. : Environmental Biology and Toxicology ,Rastogi Publications,Meerut, India 2011.
4. Shinde,P.G. , Pendse S., Dongre P. : Environmental Education. Sheth Publishers Pvt. Ltd, Mumbai, India 2007.

Course Title: Business Communication

Course Code: COM-III.SD-G8

Marks: 100

Credits: 4

Total Hours:60

Prerequisite Courses : Nil

Course Objectives:

- To develop and enhance communication skills that are required for the modern work-place
- To learn the dynamics involved in spoken communication, including non-verbal interaction
- To understand the essential elements of Written Communication as required in business activities.

Learning outcome:

- To apply creative thinking abilities necessary for effective communication in the modern workplace situation
- To demonstrate clarity, precision, conciseness and coherence in use of language
- To learn how to make one's writing better, faster and more successful
- To produce successful documents in any given situation in different formats, while considering the writer's objectives, the reader's needs, the reader-writer relationship and the context.
- To increase personal confidence in delivering speeches to small & large audiences
- To understand and gain non-verbal skills essential to effective oral communication.
- Make proper presentations that disseminate information, conduct negotiation and use persuasion.

Syllabus

1: Overview of Business Communication – I : [7Hrs]

Process of Communication, Levels of Communication, Communication Networks (formal & informal)

2: Overview of Business Communication – II : [7Hrs]

Barriers to Communication, strategies to avoid miscommunication.

3: Non-verbal communication: [7Hrs]

Non-verbal communication, Interpretation & Effectiveness

4: Interpersonal communication: [8Hrs]

Small Talk & Group communication

5: Rhetorical communication: [6Hrs]

Negotiation & Persuasion skills

6: Public Speaking & Presentation: [10Hrs]

Public Speaking: Preparation for Public Speaking, Speech Writing, Delivery of Speech, Types of Speeches, Professional Presentations, Anxiety Management.

7: Written Communication: [7Hrs]

Effective Writing: Principles & strategies, Technical Writing

8: Business Writing: [8Hrs]

Business communication: Emails, Memos, Letters, Reports, Proposal

Text Books:

1. K. K. Sinha - Business Communication - Galgotia Publishing Company, New Delhi.
2. C. S. Rayudu - Media and Communication Management - Himalaya Publishing House, Bombay.

Reference Books

1. Rajendra Pal and J. S. Korlhalli - Essentials of Business Communication - Sultan Chand & Sons, New Delhi.

2. Nirmal Singh - Business Communication (Principles, Methods and Techniques) Deep & Deep Publications Pvt. Ltd., New Delhi.
3. Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra Kothavade -Business Communication - Diamond Publications, Pune.
4. R. Sharma, Krishna Mohan Business Correspondence and Report Writing - Tata McGrawHill Publishing Company Limited, New Delhi

Course Title:Accounting for Non-accountants

Course Code:COM-III.SD-G9

Marks: 100

Credits: 4

Total Hours:60

Course Prerequisites: Nil

Course Objectives:

The key objective of this course is to provide the students an exposure to the accounting discipline and help them to understand the language of accounting.

Learning outcome:

On completing the course, the students will be able to:

- Understand the accounting process, appreciate various issues in accounting,
- Understand the nature of final accounts, and
- Resolve the differences between financial accounting, cost accounting and management accounting.

Syllabus

1: The Accounting Process

[15Hrs]

Theoretical Framework of Accounting; Generally Accepted Accounting Principles, Concepts and Conventions; Capital and Revenue transactions: capital and revenue expenditures, capital and revenue receipts; Measurement, Valuation and Accounting estimates; Double entry system, Books of prime entry, Subsidiary Books; Recording of Cash and Bank transactions; Preparation

of Ledger Accounts; Preparation of Trial Balance- interpretation and usefulness; Rectification of Errors; Opening entries, Transfer entries, Adjustment entries, Closing entries.

2: Issues in Accounting

[10Hrs]

Reconciliation Statements and Accounting for Depreciation: Bank Reconciliation Statement; Receivables / Payables Reconciliation Statement; Stock Reconciliation Statement. Depreciation Policy; Methods, Computation and Accounting treatment.

3: Preparation of Final Accounts

[15Hrs]

Profit making concern: (for sole proprietorship concern and partnership firm only): Preparation of Trading Account, Profit & Loss Account and Balance Sheet; Accounting treatment of bad debts, reserve for bad and doubtful debts, provision for discount on debtors and provision for discount on creditors. Not-for-Profit making concern: Preparation of Receipts and Payments Account; Preparation of Income and Expenditure Account; Preparation of Balance Sheet.

4: Fundamentals of Cost Accounting

[12Hrs]

Cost and Management Accounting – Generally Accepted Cost Accounting Principles; Accounting for Material cost (including Accounting of Inventory – LIFO, FIFO, Weighted, Average Cost Methods); Accounting for Labour costs, Direct Expenses and Overheads. Preparation of Cost Statements: Cost Data collection, Cost Sheet formats; Preparation of Cost Sheets (historical cost sheets and estimated cost sheets).

5: Fundamentals of Management Accounting

[8Hrs]

Marginal Costing and Break-even analysis – basic knowledge; Application of Marginal Costing for decision-making.

Text Books:

1. Gibson, Charles H., Financial Statement Analysis, Cengage Learning, Delhi 2013.
2. Singal, Santosh, Accounting and Financial Analysis, International Book House, New Delhi 2012.

Semester IV

General Component Syllabus

Course Title:Entrepreneurship

Course Code: COM-IV.SD-G10

Marks: 100

Credits: 4

Total Hours:60

Prerequisite Courses : Nil

Course Objectives:

- The key objective of this course is to provide the required skills to the students interested in pursuing entrepreneurship.

Learning outcome:

On completing the course, the students will be able to:

- Identify and evaluate business opportunities,
- Evaluate risks
- Pursue innovations,
- Understand the economics of entrepreneurship,
- Prepare a business plan.

Syllabus

1: Identifying and Evaluating Business Opportunities

[15Hrs]

Analysis of Business Environment; Government Policies – Fiscal, Financial, Commercial, Environmental, Technological, and Labour Policies. Infrastructure and Local Environment; Generating alternative ideas; Market size and growth rates; market share; location and competition; Use of SWOT and Porter's Four Forces Analysis; Techno-economic feasibility, Technology and resources/materials.

2: Risk and Innovation

[10Hrs]

Importance and management of risk; market/commercial risk, technological risk, financial risk, social risk, political risk, personal risk; Differences between Risk and Uncertainty;

Schumpeter's, Drucker's and other's views; Types and forms of innovations; innovative imitation; Imitation; Patents and Copyrights.

3: Sources, Uses and Management of Resources [10Hrs]

Financial Resources - Sources of funds; Uses of funds; Fixed and Working Capital; Material Resources: Supply and distribution chains; Government and local resources; Human Resources.

4: Costing, Pricing and Marketing [10Hrs]

Costing Strategies – Absorption and marginal costing; Costing for inventories; Pricing and pricing strategies(skimming price, penetration price, mark-up, marginal-cost price); Break- even analysis and break- even chart. Marketing techniques and strategies.

5: Preparing the Business Plan [15Hrs]

Components and Uses of the Business Plan; Creating a Business Plan; Sources of funds; Marketing Plan Expenditures and Revenues; Profitability; Growth Rate of the business and the Rate of Return.

Text Books:

1. Charantimath, Poornima M., Entrepreneurship Development and Small Business Enterprises, Pearson, Chennai (2014).
2. Manila, Entrepreneurship Development, Colombo Plan Staff College for Technical Education, Tata McGraw Hill, New Delhi (1999),.

Reference Books:

1. Chandra, Prasana, Projects: Planning, Analysis, Selection, Implementation & Review, Tata McGraw Hill, New Delhi.
2. Kuriloff, Arthur H; Hemphill, John M. Starting and Managing the Small Business, , McGraw-Hill, New York.

Course Title: Environmental Studies - II

Course Code:COM-IV.SD-G11

Marks: 50

Credits: 02

Total Hours:30

Course Prerequisite:

- Nil

Course Objectives:

- To create awareness among students about the current environmental issues.
- To know the role of law in environment protection.

Learning Outcomes:

- At the end of the course, the students will realize the major issues of environment, how we as citizens can play an active role in conserving environment.
- They will also visit various ecosystems and hence be able to appreciate the biodiversity in a more better way.

Syllabus

1: Environmental pollution:

[10Hrs]

Introduction, pollutants, types of pollution, environmental degradation due to pollution, Control measures, Effect on public health due to air, water, soil, marine, noise, thermal and nuclear pollution, Solid waste management – Causes, effects and control measures, Biomedical waste – source, effect on human health, disposal of biomedical waste, effective management. Role of an individual in prevention of pollution, Pollution case studies –Chernobyl accident (1986), Bhopal gas tragedy(1984), Arsenic poisoning (West Bengal) , Soil erosion in Goa,.Smog and Photochemical smog, Oil spill Disaster mitigation and management- floods, earthquake, cyclone, tsunami and landslides. Bioremediation

2: Social issues and the environment:

[9Hrs]

Water conservation, waste land reclamation,sewage treatment, consumerism and waste products, Climate change – global warming, acid rain, ozone layer, nuclear accidents, holocaust), Wildlife protection, Environmental ethics – issues and possible solutions, Environment protection acts 1986, Air (prevention and control of pollution Act) 1981, Water (prevention and control of pollution Act) 1974, Wild life Protection Act, 1972. Forest Conservation Act 1980, Biological

diversity rule (2004), Issues involved in enforcement of environmental legislation, Portals of Public sensitization (formal and informal) (lecture/ seminars/debate/role plays)

3: Human population and the environment: [6Hrs]

Pattern of population growth, Declining trend in population growth, Demographic trap, national family welfare programme, Human rights, HIV/AIDS, Women and child welfare, role of IT in environment and human health. Pandemic communicable diseases (Ebola, H1N1)

4: Field work: [5Hrs]

Visit to municipal solid waste treatment plant, Sewage treatment plant, industrial estate, Study of simple ecosystem (pond, river, sea shore,lake, hill slopes), Prepare a simple inventory of campus biodiversity.

Text Book:

1. Asthana, D. K., Asthana M. A Text book of Environmental Studies. S Chand and Company Limited, New Delhi. (2009):
2. Bharucha E. Text Book of Environmental Studies. University Press(India)Private Limited, Hyderabad(A.P.) India. (2013)

Reference Books:

1. Mishra,D.D. Fundamental Concepts in Environmental Studies. S.Chand and Company Limited,New Delhi. (2009):
2. Rana, S.V.S.: Essentials of Ecology and Environmental Science, Prentice Hall of India Private Limited New Delhi. (2003)
3. Sharma, P.D.: Environmental Biology and Toxicology ,Rastogi Publications,Meerut, India. (2011)
4. Shinde,P.G. , Pendse S., Dongre P.: Environmental Education. Sheth Publishers Pvt. Ltd, Mumbai, India. (2007)

Course Title:Personality Enhancement

Course Code:COM-IV.SD-G12

Marks: 100

Credits: 04

Total Hours:60

Course Prerequisite:

- Nil

Course Objectives:

- Enable students to develop and enhance their presentation skills that are required for the present day work environment themselves well and help them build their self confidence.
- To enhance their soft skills of confidence building, self esteem and self image through personal grooming & social etiquette.
- To understand and learn techniques of non verbal communication to maintain healthy realationships at workplace
- Develop skills required for self motivation and managing stress in a competitive environment.

Learning Outcomes:

- To learn to present themselves well and positively influence other people's perceptions of them in a business environment
- To project the right self image and behavioral etiquette by being well groomed.
- To learn soft skills like good manners, empathy, ability to collaborate and negotiate and develop ettiquettes that are needed in a social and business setting.
- To build a positive body language to appear more approachable, confident and professional
- To understand and learn techniques required to sustain good mental health for everyday functioning.

Syllabus:

1: Self Assessment, Self Acceptance, Self Esteem and Confidence [4Hrs]

Building a positive image of yourself, knowing yourself, gaining self confidence and self esteem

2:Body Language-Posture and Gestures [6Hrs]

Presenting a positive image through non-verbal communication

3:Ettiquette/Protocol,Dressing-up,Hygiene, Diet and Exercise [10Hrs]

Expected ettiquettes in a bussines setting

4:Team Work and Character building [8Hrs]

Skills development for a team player, leadership and developing good values

5:Motivation

[8Hrs]

Positive and negative motivation; Internal and external, motivated performance and reinforcement

6:Conflicts and Stress Management

[12Hrs]

The art of prioritizing and scheduling. Causes and consequences of conflicts; methods of conflict-resolution. Causes of stress at workplace; Stress (its effects, causes and ways of coping with stress), Recognizing emotions and values of regulating emotions.

7:Understanding Emotions

[12Hrs]

Emotions: Feeling, Thinking, and Communicating, Theories of emotion: James-Lange, Cannon-Bard, Schachter-Singer and Lazarus. Motivation: Nature and types; need hierarchy model.

Text Books:

1. Barun Mitra "Personality Development and Soft Skills", Oxford Second Edition (2016).
2. Elizabeth Hurlock "Personality Development" McGraw Hill Education (2017)

ANNEXURE I

**Parvatibai Chowgule College of Arts and Science
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE
B.Voc (Software Development)**

To be Offered to students taking admission to Third Year B.Voc
(Software Development) from 2019-20

**T.Y.B.Voc (Software Development)
General Component and Skill Component syllabus**

Semester	General Education Component			Skill Component		
I	COM-I.SD-G1 Language Paper-I	Theory Credits 4	Practical Credits 0	COM- I.SD-SK1 Office Automation Tools	Theory Credits 3	Practical Credits* 3
	COM-I.SD-G2 Elements of Basic Statistics	Theory Credits 2	Practical Credits 0	COM- I.SD-SK2 Web Designing	Theory Credits 3	Practical Credits 3
	COM- I.SD-G3 Cyber Security	Theory Credits 4	Practical Credits 0	COM- I.SD-SK3 Introduction to Programming	Theory Credits 3	Practical Credits 3
II	COM-II.SD-G4 Language Paper-II	Theory Credits 4	Practical Credits 0	COM-II.SD-SK4 Computer Organization and Operating System	Theory Credits 3	Practical Credits 3
	COM-II.SD-G5 Mathematical foundation in Computer Science	Theory Credits 4	Practical Credits 0	COM-II.SD-SK5 Data Structure	Theory Credits 3	Practical Credits 3
	COM-II.SD-G6 Academic Writing	Theory Credits 4	Practical Credits 0	COM-II.SD-SK6 Multimedia	Theory Credits 3	Practical Credits 3
	COM-II.SD-G7 Elements of Basic Statistics II	Theory Credits 2	Practical Credits 0			
Outcome	1: Office Assistant 2: Programming Assistant 3: Technical Assistant 4: Hardware Technician 5:Desktop Publishers					
Semester	General Education Component			Skill Component		

III	COM-III.SD-G8 Environmental Studies-I	Theory Credits 2	Practical Credits 0	COM- III.SD-SK7 Object Oriented Paradigm	Theory Credits 3	Practical Credits 3
	COM- III.SD-G9 Business Communication	Theory Credits 4	Practical Credits 0	COM- III.SD-SK8 Computer Network	Theory Credits 3	Practical Credits 3
	COM- III.SD-G10 Entrepreneurship	Theory Credits 4	Practical Credits 0	COM- III.SD-SK9 Database Management Systems	Theory Credits 3	Practical Credits 3
	Internship	Credits 2				
IV	COM-IV.SD-G11 Accounting for Non-accountants	Theory Credits 4	Practical Credits 0	COM- IV.SD-SK10 Web Development Framework	Theory Credits 3	Practical Credits 3
	COM- IV.SD-G12 Environmental Studies-II	Theory Credits 2	Practical Credits 0	COM- IV.SD-SK11 Agile Software Engineering	Theory Credits 3	Practical Credits 3
	COM- IV.SD-G13 Personality Enhancement	Theory Credits 4	Practical Credits 0	COM- IV.SD-SK12 Mobile Application Development	Theory Credits 3	Practical Credits 3
	Internship	Credits 2				
Outcome	1:Assistant Programmer 2:Android Application Developer 3:Web Designer 4: Network Administrator 5: Database Administrator					
Semester	General Education Component			Skill Component		

V	COM-V.SD-G14 Digital Marketing	Theory Credits 4	Practical Credits 0	COM-V.SD-SK13 Design and Analysis of Algorithms	Theory Credits 3	Practical Credits 3
	COM-V.SD-G15 Organizational Behavior	Theory Credits 4	Practical Credits 0	COM-V.SD-SK14 Software Testing	Theory Credits 3	Practical Credits 3
	COM-V.SD-G16 Maths for Competitive Exams	Theory Credits 4	Practical Credits 0	Project Work	Credits 6	
VI	COM-VI.SD-G17 E-Commerce	Theory Credits 4	Practical Credits 0	COM- VI.SD-SK15 Network Administration	Theory Credits 3	Practical Credits 3
	COM- VI.SD-G18 Independent studies	Theory Credits 4	Practical Credits 0	COM- VI.SD-SK16 Cloud Computing	Theory Credits 3	Practical Credits 3
	COM-VI.SD-G19 HCI	Theory Credits 4	Practical Credits 0	Project Work	Credits 6	
Outcome	1: Software Programmer 2: Software Developer 3: Server Administrator 4: Software Project Analyst 5: Software Tester 6: Lab Instructor					

- * 1 Practical Credit=3 Hrs

General Component Syllabus

Semester V

Course Title: Digital Marketing

Course Code: COM-V.SD-G14

Marks: 100

Credits: 4

Course Objectives:

- To Build Accessible Websites that is optimized for the Search Engines.
- To study various online Marketing Strategies.
- Analyze and research Internet to improve the quality and marketability of the Websites.

Course Outcomes:

At the end of the course students will be able to:

CO1: Optimize the website for various search engines.

CO2: Market the company/product using Search Engine and Social Media.

CO3: Analyze the Web for improving the marketing strategy.

1: Search Engine Optimisation (SEO):

[13Hrs]

Introduction to Online Search; Function of Search Engines Google Page Rank; Introduction to Search Engine Optimisation; Building Accessible Site; Keyword Research and Optimisation; Link Building Strategies; Useful Tools for SEO; The Past, Present and Future of SEO.

Hands on Session: Using Search Engine Optimization tools (like Google & Bing search console, hubspot, webceo, Google page speed).

2: Search Engine Marketing (SEM):

[2Hrs]

Introduction to Internet and Search Engine Marketing; Google Ad words; Ad words Account Structure; Navigating in Google Ad words; Working with Keywords; Creating Ads in Google Ad words; Creating and Managing your First Ad Campaign; Ad words Reporting and Account Performance Reports.

Hands on session: Using Search Engine Marketing tools (like Google ad words, Google ad words certifications, search, display, remarketing formats, Facebook marketing, linked in advertising).

3: Social Media Marketing (SMM): **[12Hrs]**

Introduction to the World of SMM; Why Social Media?; Getting Started with Social Media; Building Relationships via Facebook, Twitter, LinkedIn, YouTube; Handling Positive and Negative Comments; Social Media Content Base Creation.

Hands on session: Using Social Media Marketing tools (like hootsuite, buffer, sproutsocial, klear, twitonomy, social mention, Google alerts, mention)

4: Email Marketing: **[8Hrs]**

Importance of Email marketing; Email Marketing Software's; Subscriber List; Email Marketing Campaign; Newsletters; Measuring the results.

Hands on session: Using Email Marketing tools (campaign monitor, mailgun, mandrill, phplist, amazon ses).

5: WEB Analytics: **[12Hrs]**

Web Analytics and Intelligence Tools; Basic Metrics Demystified; Introduction to Google Analytics; Goals and Actionable Insights; Data Management; Social Media Analytics; Social Media Goals and KPI's; Tools for Social Media Analytics.

Hands on Session: Using Web Analytics tools (like Google analytics, compete.com, crazyegg, Facebook insights, twitter insights).

6: Marketing Automation: **[3Hrs]**

Introduction to Marketing Automation. Advantages of using Marketing Automation Software, Issues with Marketing Automation.

Text Books:

- Damian Ryan, “*Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation*”, Kogan Page Publisher, 3 edition, 2014.

Reference Books:

- Calvin Jones and Damian Ryan, “**The Best Digital Marketing Campaigns in the World:**
- Nick Smith, “*Successful SEO and Search Marketing in a Week*”, Teach Yourself Publisher, 2013.
- Lee Odden , “ *Optimize: How to Attract and Engage More Customers by Integrating SEO, Social Media, and Content Marketing*”, Wiley Publishing, 1st edition, 2012.
- AvinashKaushik, “*Web Analytics 2.0: The Art of Online Accountability & Science of Customer Centricity (Sybex)*”, Wiley Publishing, 2nd edition 2013.

Course Title: Organizational Behavior

Course Code: COM-V.SD-G15

Marks: 100

Credits: 4

Prerequisite Courses: nil

Course Objectives:

- To enable the students to understand the impact that individual, group & structures have on behavior within the organizations and apply such knowledge towards improving Organizational effectiveness.

Course outcome:

CO1: Organizational Behavior Fundamental Concepts.

CO2: Learn how to deal with work stress in an organization.

CO3: Learning how to lead a team.

Syllabus:

1: Fundamentals of Organizational Behavior

[10Hrs]

Nature, Scope, Definition and Goals of Organizational Behavior Fundamental Concepts of Organizational Behavior Models of Organizational Behavior Emerging aspects of Organizational Behavior: TQM, Managing Cultural Diversity, Managing the Perception Process

2: Attitude Values and Motivation

[10Hrs]

Effects of employee attitudes Personal and Organizational Values Job Satisfaction Nature and Importance of Motivation Achievement Motive Theories of Work Motivation: Maslow's Need Hierarchy Theory, McGregcrs's Theory 'X' and Theory 'Y'

3: Personality

[10Hrs]

Definition of Personality, Determinants of Personality Theories of Personality – Trait and Type Theories, The Big Five Traits, Mytes-Briggs Indicator, Locus of Control, Type A and Type B Assessment of Personality.

4: Work Stress

[10Hrs]

Meaning and definition of Stress, Symptoms of Stress Sources of Stress: Individual Level, Group Level, Organizational Level Stressors, Extra Organizational Stressors Effect of Stress – Burnouts Stress Management – Individual Strategies, Organizational Strategies Employee Counseling

5: Group Behavior and Leadership

[10Hrs]

Nature of Group, Types of Groups Nature and Characteristics of team Team Building, Effective Teamwork Nature of Leadership, Leadership Styles Traits of Effective Leaders.

6: Conflict in Organizations

[10Hrs]

Nature of Conflict, Process of Conflict Levels of Conflict – Intrapersonal, Interpersonal Sources of Conflict Effects of Conflict Conflict Resolution.

Textbooks

1. Organizational Behavior Text, Cases and Games- By K. Aswathappa, Himalaya

Publishing House, Mumbai, Sixth Edition (2005)

2. Organizational Behavior Human Behavior at Work By J. W. Newstrom, Tata McGraw Hill

Publishing Company Limited, New Delhi, 12th Edition (2007)

3. Organizational Behavior - By Fred Luthans
4. Organizational Behavior - By Super Robbins
5. Organizational Behavior - Anjali Ghanekar
6. Organizational Behavior Fundamentals, Realities and Challenges By Detra Nelson, James Campbell Quick Thomson Publications
7. Organizational Behavior through Indian Philosophy By N. M. Mishra, Himalaya Publication House

Course Title: E-Commerce

Course Code: COM-VI.SD-G17

Marks: 100

Credits: 4

Prerequisite Courses: Nil

Course Objectives:

This course aims to study the working of E-Commerce website and the various background processes involved. As part of the course the student will study the activities associated with e-commerce like buying, selling and payment, understand the various technologies used in e-commerce websites and security mechanisms involved in e-commerce websites.

Course Outcomes:

At the end of the course students will be able to :

CO1: Understand various E-Commerce Strategies.

CO2: Understand the Working of an E-Commerce Website.

CO3: Evaluate the various Payment Mechanisms.

CO4: Develop an E-Commerce Website.

1: Introduction to Electronic E-Commerce

[4Hrs]

The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic Commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, Electronic Commerce in Perspective.

Hands on session: Open source website/blog creation tools by adding appropriate themes and plugins.

2: The Value Chain

[5Hrs]

Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains.

Hands on session: Drag & drop website builder which can also be used to build an ecommerce website without any programming experience.

3: Competitive Advantage

[6Hrs]

Competitive Advantage, Porter's Model, First Mover Advantage, Sustainable Competitive, Competitive Advantage using e-commerce

Hands on session: Open source platforms to create online stores and handle payments (eg: x-cart, Magento)

4: Business Strategy

[8Hrs]

Introduction to Business Strategy: Michael Porter's 5 force analysis, Strategic Implications of IT, Technology, Business Environment, Business Capability, Existing Business Strategy, Strategy Formulation and Implementation Planning, e-Commerce Implementation - technical and business , e-Commerce Evaluation, Auction methods.

Hands on session: Open source content management systems (eg: Joomla)

5: Electronic Data Interchange

[7Hrs]

EDI Definition, EDI Technology, EDI Standards, EDI Communications

Hands on session: Web analytics tools (eg: Motomo)

6: Electronic Payment System

[10Hrs]

Overview of the electronic payment technology; limitations of traditional payment instruments. Electronic or Digital Cash-Properties of Electronic Cash, Digital Cash in action. Electronic Checks-benefits of electronic checks, electronic checks in action, NetCheck: A Prototype Electronic Check System. Online Credit Card-Based Systems- types of credit card payments,

Secure Electronic Transactions (SET). Other Emerging Financial Instruments: POS (Point of Sale), E-Cash, Net Banking, Credit/Debit Cards and Electronic Benefits and Security Issues. Case Studies of the various modes of electronic payment of various types of websites.

Hands on session: Open source subscription billing system and payment gateways

7: E-Business

[6Hrs]

EDI Application in business, E- Commerce Law, Forms of Agreement, Govt policies and Agenda. Case Study of Internet bookshops, Grocery supplies, software supplies and support, electronic newspapers, Internet banking, Virtual auctions, online, share dealing. Business to Legal issues: Risks involved; Paper Document vs. Electronic document, Authentication of Electronic document, Laws, Legal issues for Internet Commerce: Trademarks and Domain names, Copyright, Jurisdiction issues, Service provider liability, Enforceable online contract.

Hands on session: Open source support center for your application users Users can open a ticket and get their issues resolved. Useful in issue tracking and management

8: Firewall and Internet Security

[8Hrs]

Firewalls and Network Security: Types of firewalls, Firewall Security Policies, Emerging Firewall Management Issues. Transaction Security: Types of Online Transactions, Requirements for Transaction Security. Encryption and Transaction Security: Secret-Key encryption, Public-Key Encryption , Implementation and Management Issues. Digital Certificate. Security Threats to E Commerce, Virtual Organization, Business Transactions on Web, E Governance and EDI.

APPOINTLET: A Service integrated with Google calendar and helps manage all appointments. Useful in applications where an appointment is required. (<https://www.appointlet.com/>).

9: Consumer E-Commerce

[3Hrs]

Consumer trade transaction, Internet, Page on the Web, Elements of E-Commerce with VB, ASP, SQL.

Hands on session: Open source services to create landing pages for an application. A good landing page sometimes defines whether a user will visit the site or turn away.

10: M-Commerce

[3Hrs]

Basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.

Hands on session: Open source E-Commerce mobile apps to create a m-commerce

Textbook:

- e-COMMERCE Strategy, Technologies and Applications by David Whiteley; TataMcGraw Hill.
- Electronic Commerce A Manager's Guide by Ravi Kalakota and Andrew B. Whinston. Published by Pearson Education.
- E-Commerce The Cutting Edge of Business by Kamlesh K Bajaj and Debjani Nag. Second Edition; Tata McGraw Hill.

Course Title: Human Computer Interface

Course Code: COM-VI.SD-G19

Marks: 100

Credits: 4

Prerequisite Courses: Nil

Course Objectives:

To study the different aspects of human computer interaction and the computer interface design concepts.

Course Outcomes:

At the end of the course students will be able to :

CO1 : Understand the intricacies of human interaction with a computer System.

CO2 : Understand the principles of good screen design and layouts.

CO3 : Understand the different navigation schemes on windows based interface; learn the different types of selection devices and components of a window based interface.

CO4 : Analyze Requirements of system.

CO5 : Classify human users based on their abilities, personalities.

CO6: Designing prototypes. Evaluate the design of user interfaces. Compare the interfaces different products.

Syllabus

1. **Introduction:** [7Hrs]

Human-Computer Interaction, Evaluating Designs, The Birth of HCI. Importance of user Interface, Importance of good design, Benefits of good design, principles & heuristics of good design.

Hands on Session: Paper Prototyping using templates

2. **Human interaction with computers:** [9Hrs]

Human characteristics, Human consideration, Human interaction speeds, Understanding business functions. User centred design- Need-finding: Participant Observation, Interviewing, Additional Need finding, contextual inquiry & persona.

Hands on Session: Conducting survey interview and summarizing the result

3. **Rapid Prototyping:** [6Hrs]

Story boarding. Paper Prototyping and Mockup, Video Prototyping, Creating and Comparing Alternatives.

Hands on Session: Persona- conducting contextual interview and developing persona

4. **Direct Manipulation and Representations:** [9Hrs]

Various user interaction models- command, menu, Direct Manipulation. Mental Models. Heuristics (guidelines) for design.

Hands on session: GUI design- form design, menu design, help, error messages

5. **Graphical Interface Design:** [8Hrs]

Graphical user interface, standards such as Microsoft windows HCI guidelines, Windows: Navigation schemes selection of window; Selection of devices based and screen based controls,

Components, Text and messages, Icons, Multimedia, Colors., controls, Help & error messages design.

Hands on session: Web UI design- pages, navigation, controls, Page submission – Asynchronous

6. Web user interface design: [7Hrs]

Jjessy James Garette five layers of user experience.

Hands on session: Report designs

7. Heuristic Evaluation: [6Hrs]

Heuristic Evaluation — Why and How?

Hands on session: Heuristic evaluation and Story boarding

8. Visualization: [8Hrs]

Visualization, Amount of information, Focus and emphasis, Presentation information simply and meaningfully, Information retrieval on web, Statistical graphics.

Hands on session: Visualization and info graphics

Text books:

1. Alan Cooper & Robert Reimann, About Face 2.0: The Essentials of Interaction Design, Wiley
2. Alan Dix, Janet Finlay, Gregory D. Abowd, and Russell Beale, Human-Computer Interaction, Pearson, 3rd Edition, 2004.
3. Ben Shneiderman and Catherine Plaisant, Designing the User Interface: Strategies for Effective Human-Computer Interaction Pearson Addison-Wesley, 5th Edition, 2009
4. Donald A. Norman, The Design of Everyday Things, Basic Books, 2002

T.Y.B.Voc.(Software Development)

2019-20

SKILL COMPONENT SYLLABUS

SEMESTER-V

Course Title: Design and Analysis of Algorithms

Course Code: COM-V.SD-SK13

Marks: 75

Credits: 3

Course Objectives:

1. To study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
2. To ensure that students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms and compare with one another, and how there are still some problems for which it is unknown whether there exist an efficient algorithm, and how to design efficient algorithms.

Course Outcomes: On completion of the course students will learn the following:

CO1: To explain basic concepts related to the design and analysis of algorithms.

CO2: To describe classical algorithms and their complexity.

CO3: To design and analyze selected algorithms.

Syllabus

1. Introduction

[8Hrs]

What is an Algorithm?, Rules for writing Algorithms, Properties of Algorithms, Framework for design and analysis of algorithms(RAM model of computation),Recursive Algorithms, Space and Time Complexity by Tabular method(Performance Analysis).

2. Divide and Conquer

[8Hrs]

Elements of Divide and Conquer Algorithms, QuickSort algorithm, Merge sort analysis, Strassen's algorithm for matrix multiplication, Analysis of Binary Search,The Maximum subarray Problem.

3. Dynamic programming

[8Hrs]

General Method, caching v/s computation, Fibonacci numbers by recursion, Fibonacci numbers by caching, Fibonacci numbers by dynamic programming, Optimal Binary Search Tree, Rod Cutting Problem.

4. Greedy algorithms

[6 Hrs]

Elements of greedy strategy, Activity-selection problem, Job sequencing with deadlines. Knapsack problem.

5. Graph Algorithms

[10Hrs]

Elementary graph algorithms- Techniques for Graphs(Graph cycles, Topological sorting, maximum flow) Minimum spanning tree, growing a spanning tree, Kruskal and Prim algorithms.

6. Backtracking

[5Hrs]

General Method, 8-Queen's problem, sum of subsets, Graph coloring.

Text books

Thomas H. Cormen, Charles E. Leiserson, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", IEEE, PHI, Third Edition

Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia, 2nd Edition

Reference Books

A. Aho, J. Hopcroft, J. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, Eighth Edition

Lab: Design and Analysis of Algorithms

Credit : 3

Marks : 75

Lab Assignments are to be done using a Programming Language for the following :

Programs to implement

1. GCD of 2 numbers using Iterative approach and Recursive approach
2. QuickSort
3. Binary Search using Recursive approach
4. Fibonacci numbers using Dynamic Programming approach.
5. Activity Selection Problem using Dynamic Programming approach.
6. job sequencing with Deadlines.
7. Knapsack Problem
8. Rod Cutting Problem.
9. Optimal Binary Search Tree.
10. graph using matrix and linked list
11. Kruskal's Algorithm
12. Prim's Algorithm
13. Graph coloring
14. Sum of subsets
15. Topological sorting

Course Title: Software Testing

Course Code: COM-V.SD-SK14

Marks: 75

Credits: 3

Prerequisite Courses: Introduction to Programming (COM- I.SD-SK3)

Course Objectives:

To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.

To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.

To learn how to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.

Course outcome:

CO1: Understand Software Testing process of an applications.

CO2: Apply modern Software Testing process in relation to Software Development and Project Management.

CO3: Create Test Strategies and plans, design test cases, prioritize and execute them.

CO4: Have an ability to identify and understand various Software Testing problems and solve them.

Syllabus:

1. Software Testing principles [5Hrs]

Software testing principles, Levels of software testing, Test activities, SDLC and Testing, Verification & Validation, Quality Assurance, Quality Control.

2. White box testing techniques [3Hrs]

Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage , Multiple condition coverage, Inspections, Walkthroughs Code Review

3. Black Box Testing [3Hrs]

Boundary value analysis, Equivalence partitioning, Cause Effect Graphing.

4. Functional Testing (Part 1) [12Hrs]

Performance Testing, Stress testing, Configuration Testing, Security Testing

4. Functional Testing (Part 2) [12Hrs]

Recovery Testing, Integration Testing, Regression Testing, and Acceptance Testing.

5. Testing process [5Hrs]

Comparison of different techniques, Test Plan, Test case Design Procedure Specification, Test Case Execution and Analysis, Test Documentation, Reporting test results.

6. Testing web Application [5Hrs]

Testing concepts for web apps, Content Testing, User Interface Testing, Component Level Testing, Navigation Testing, Configuration Testing, Security Testing, and Performance Testing.

LIST OF BOOKS

1. Srinivasan Desikan, Gopalswamy Ramesh , “Software Testing : Principles and Practices”, Pearson Education, 2006
2. Software Testing in the Real World, by E. Kit (1995)
3. The Web Testing Handbook, by S. Splaine and S. Jaskiel
4. Testing Applications on the Web, by H. Nguyen, R. Johnson, and M. Hackett
5. Software Testing and Continuous Quality Improvement, by W. Lewis, et al
6. How to Break Software Security, by J. Whittaker, et al

Lab: Software Testing

Credit: 3

Marks: 75

List of suggested **PRACTICALS** using any testing tool such as Selenium or equivalent:

1. Planning Test Cases (2P)
2. Generating Test Cases/Test Suite (2P)
3. Enhancing Tests (3P)
4. Debugging Tests (2P)
5. Running Tests (2P)
6. Analyzing Results (2P)

7. Reporting Defects (2P)
8. Test Reporting (2P)

SEMESTER-VI

Course Title: Network Administration

Course Code: COM- VI.SD-SK15

Marks: 75

Credits: 3

Prerequisite Courses:

Introduction to Programming (COM- I.SD-SK3)

Course Objectives:

To understand the theory and concepts of Network Administration

Course outcome:

1. At the end of the course students will be able to :

CO1: Apply basic networking concepts to setup, maintain and troubleshoot web servers.

CO2: Understand user management and roles in database

CO3: Demonstrate expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention and encryption

Syllabus :

1: Network Interface Configuration [4Hrs]

Debian nic configuration, dhcp client, fixed ip, arp, ifconfig, ping, route, hostname.

2: SSH Client and Server [3Hrs]

About SSH, Log into remote server, Pass wordless ssh, X Forwarding, Troubleshooting ssh, sshd, sshd keys,

3: Iptables [3Hrs]

Introduction to iptables, firewall rules ,xinetd and inetd, network file system

4: Apache Server Configuration [5Hrs]

Introduction to Apache Web Server, port virtual hosts on Debian, httpd, name resolution, troubleshooting apache, aliases and redirects, .htaccess, traffic, self signed cert on Debian.

5 : Introduction to protocols: [15 Hrs]

Basics of TCP/IP, IP address (IPv4 and IPv6), Internet Architecture, peer to peer and client server networks, subnetting, supernetting , and basic Network commands.

6: Views [6Hrs]

Introduction to views, data independence, security, updates on views, comparison between tables and views.

7: User Access and Security: [6Hrs]

Creating and modifying use accounts, creating and using roles, granting and revoking privileges, Managing user groups with profiles

8: Distributed Database: [3Hrs]

Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed

TEXT BOOKS:

1. William Stallings, —Computer Organization and Architecture - Designing for performance, EEE, PHI, 9th Edition
2. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Prentice-Hall, 5th Edition.
3. A Silberschatz, H F Korth, S Sudarshan, Database system concepts, McGraw-Hill ,9th Edition

Lab: Network Administration

Credits: 3

Marks : 75

List of Practical

A.

1. Network Interface Configuration: ping, dhcpch, ip link, ifconfig, route (2P)
2. SSH: setting up a ssh server and client, running commands remotely (2P)
3. Iptables: setting up firewall rules (2P)
4. Apache Server: setting up and maintaining an Apache Web Server (3P)

B.

Managing users: creating/Deleting groups, users, setting passwords, setting permissions to groups and users, Device Manager

Setting up client server network (Installing server OS)

Configuring Telnet and ftp server.

Remote desktop connection

Router

DHCP server Configuration

7. Web server Installation
8. Install MySQL server and client, mysql workbench
9. Managing Views: Creating and modifying views, Using views, Inserting, Updating and deleting data through views (2)
10. User Access and Security: Creating and modifying use accounts, creating and using roles, granting and revoking privileges, Managing user groups with profiles (2)

Course Title: Cloud Computing
Course Code: COM-V.SD-SK16
Marks: 75
Credits: 3

Prerequisite Courses: Computer Organization and Operating Systems (COM-V.SD-SK4)

Course Objectives:

To make students understand the key elements of cloud computing.

- To understand the difference between deploying applications on the cloud and the local infrastructure.
- To understand various cloud service models.

Course Outcomes:

On completion of the course students will be able to:

CO1: Explain the core concepts of the cloud computing paradigm.

CO2: Characterize the different cloud services ie. Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS).

Syllabus:

1: Overview of Computing Paradigm [7Hrs]

Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing

2: Introduction to cloud computing: [7Hrs]

Cloud Computing definition, History of Cloud Computing, How Cloud Computing Works, Benefits and challenges of cloud computing, Issues for Cloud Computing.

3: Cloud Computing Architecture [10Hrs]

Comparison with traditional computing architecture (client/server), Cloud Computing Service Models, Deployment Models- Public cloud, Private cloud, Hybrid cloud and Community cloud, Key drivers to adopting cloud, Impact of cloud on users, Governance in the cloud.

4: Infrastructure as a Service (IaaS)

[7Hrs]

Introduction to IaaS: IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Docker Container, CloudStack, Open Stack, Virtual Machine (VM). Resource Virtualization: Server, Storage, Network. Examples: Amazon EC2, Load balancing

5: Platform as a Service (PaaS)

[7Hrs]

Introduction to PaaS: What is PaaS, Service Oriented Architecture (SOA). Cloud Platform and Management: Computation, Storage, Examples: Google App Engine, Microsoft Azure, Salesforce.com.

6: Software as a Service (SaaS)

[7Hrs]

Introduction to SaaS, Web services, Web 2.0, Web OS, Introduction to MapReduce, Case Study on SaaS.

Text Books:

1. Tim mather, subrakumarswamryandsharhedLatif, "Cloud Computing Security and Privacy", O'Reilly publication.
2. Richard Hill, Laurie Hirsch, Peter Lake, SiavashMoshiri, "Guide to Cloud Computing Principles and Practices", Springer, 2013.
3. RajkumarBuyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wile,2011.
4. Nikos Antonopoulos, Lee Gillam"Cloud Computing: Principles, Systems and Applications", Springer, 2012.
5. Ronald L. Krutz, Russell Dean Vines,"Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India, 2010.

Lab: Cloud Computing

Credit: 3

Marks: 75

1. Setup owncloud [2]
2. Cloud Server Management using VestaCP/Froxlor/ISPConfig3 [4]
 - a. DNS Setup
 - b. Email Configuration
 - c. Domain management
3. Apache CloudStack [4]
 - a. Installation
 - b. VPN
 - c. Working with Instances, Network, Storage
4. Container Management Using Docker [5]
 - a. Installing docker
 - b. Creating containers
 - c. Package and run a custom app using docker

ANNEXURE II

Parvatibai Chowgule College of Arts and Science
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE

B.Voc(Software Development)
Program Structure

To be Offered to students taking admission to First Year
B.Voc(Software Development) from 2019-20

Semester	General Education Component			Skill Component		
I	CSD-GE1 Language Paper-I	Theory Credits 4	Practical Credits 0	CSD-SK1 Computer Organization and Operating System	Theory Credits 3	Practical Credits* 3
	CSD-GE2 Elements of Basic Statistics	Theory Credits 2	Practical Credits 0	CSD-SK2 Web Designing	Theory Credits 3	Practical Credits 3
	CSD-GE3 Cyber Security	Theory Credits 4	Practical Credits 0	CSD-SK3 Introduction to Programming	Theory Credits 3	Practical Credits 3
II	CSD-GE4 Office Automation Tools	Theory Credits 4	Practical Credits 0	CSD-SK4 Database Management Systems	Theory Credits 3	Practical Credits 3
	CSD-GE5 Mathematical foundation in Computer Science	Theory Credits 4	Practical Credits 0	CSD-SK5 Network Administration	Theory Credits 3	Practical Credits 3
	CSD-GE6 Academic Writing	Theory Credits 4	Practical Credits 0	CSD-SK6 Multimedia	Theory Credits 3	Practical Credits 3
	CSD-GE7 Elements of Basic StatisticsII	Theory Credits 2	Practical Credits 0			
Outcome	1: Office Assistant 2: Network Administrator 3: Technical Assistant 4: Desktop Publishers					
Semester	General Education Component			Skill Component		

III	CSD-GE8 Environmental Studies-I	Theory Credits 2	Practical Credits 0	CSD-SK7 Object Oriented Paradigm	Theory Credits 3	Practical Credits 3
	CSD-GE9 Business Communication	Theory Credits 4	Practical Credits 0	CSD-SK8 Computer Network	Theory Credits 3	Practical Credits 3
	CSD-GE10 Entrepreneurship	Theory Credits 4	Practical Credits 0	CSD-SK9 Server Side Programming	Theory Credits 3	Practical Credits 3
	Internship	Credits 2				
IV	CSD-GE11 Accounting for Non-accountants	Theory Credits 4	Practical Credits 0	CSD-SK10 Web Development Framework	Theory Credits 3	Practical Credits 3
	CSD-GE12 Environmental Studies-II	Theory Credits 2	Practical Credits 0	CSD-SK11 Agile Software Engineering	Theory Credits 3	Practical Credits 3
	CSD-GE13 Personality Enhancement	Theory Credits 4	Practical Credits 0	CSD-SK12 Mobile Application Development	Theory Credits 3	Practical Credits 3
	Internship	Credits 2				
Outcome	1:Assistant Programmer 2:Android Application Developer 3:Web Designer 4: Database Administrator					
Semester	General Education Component			Skill Component		
	CSD-GE14 Digital Marketing	Theory Credits 4	Practical Credits 0	CSD-SK13 Data Structure	Theory Credits 3	Practical Credits 3

V	CSD-GE15 Organizational Behaviour	Theory Credits 4	Practical Credits 0	CSD-SK14 Software Testing	Theory Credits 3	Practical Credits 3
	CSD-GE16 Maths for Competitive Exams	Theory Credits 4	Practical Credits 0	Project Work	Credits 6	
VI	CSD-GE17 E-Commerce	Theory Credits 4	Practical Credits 0	CSD-SK15 Design and Analysis of Algorithms	Theory Credits 3	Practical Credits 3
	CSD-GE18 Independent studies	Theory Credits 4	Practical Credits 0	CSD-SK16 Cloud Computing	Theory Credits 3	Practical Credits 3
	CSD-GE19 Human Computer Interaction	Theory Credits 4	Practical Credits 0	Project Work	Credits 6	
Outcome	1: Software Developer 2: Server Administrator 3: Web Developer 4: Software Tester 5: Lab Instructor					

- * 1 Practical Credit=3 Hrs

Semester-I

Skill Component Syllabus

Course Title: Computer Organization and Operating System

Course Code: CSD-SK1

Marks: 75

Credits: 03

Total Hours: 45

Prerequisite Courses : Nil

Course Objectives:

- To have a thorough understanding of the basic structure and operation of a digital computer.

Course Outcome:

CO1: Understand the Von Neumann architecture.

CO2: To have a thorough understanding of the basic structure and operation of a digital computer.

CO3: Understand the function of an operating system.

Syllabus:

1: Computer System: [3Hrs]

Function and structure of a computer, Interconnection of components, Performance of a computer. Computer Architecture – Princeton (Von Neumann) and Harvard architecture.

2: Memory Subsystem: [10Hrs]

Characteristics of memory system, the memory hierarchy, Semiconductor memories, Types of ROM & RAM, Cache memory unit - Concept of cache memory, Organization of a cache memory unit, replacement algorithms, write policy, block size.

3: Input/ Output Subsystem: [8Hrs]

General block diagram of External device & I/O module, Programmed I/O, Interrupt

driven I/O, DMA, I/O channels and I/O processors. I/O interfaces –Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewire and Infiniband.

4: Introduction to Operating System: [4Hrs]

Basic elements of a computer system: Processor, Main Memory, I/O Modules, System Bus, Instruction Execution; Operating Systems: Definition, Operating system Structure, operating system operations, Relationship between Kernel, OS, and Hardware, Operating system services, System calls, Types of system calls, System programs.

5: Process Management: [5Hrs]

Process Definition, Process Control Block, Process States, Operations on Process; Interprocess communication, Threads and Microkernels

6: Memory Management: [10Hrs]

Introduction, Swapping, Contiguous Memory Allocation, Paging, Page Table, Segmentation
Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

7: Storage Management [5Hrs]

File System, Concepts, File Organization and Access Methods, Directory and Disk Structure. Secondary Storage Structure - Overview, disk structure, Disk attachment, Disk scheduling.

Text Book:

1. William Stallings, —Computer Organization and Architecture - Designing for performance, EEE, PHI, 9th Edition.
2. A. Silberchatz, Galvin, Gagne, 2008, Operating System Concepts, Wiley publication 8th Edition.

Reference Books:

1. M. Morris Mano, —Computer System Architecture, Pearson Education, 3rd Edition, 2008
2. William Stallings, Operating Systems: Internals and Design Principles, Prentice Hall, 6th Edition

Lab: Computer Organization and Operating System

Marks: 75

Credits: 03

PART-I

Exploring the Functions and Components of a PC

1. Recognizing CPU Sockets, Removing and Installing a CPU, Cooling CPU
2. Identifying BIOS ROM, Accessing BIOS via the CMOS Setup Program, Configuring and Clearing CMOS Setup Program Passwords, Configuring BIOS Settings
3. Identifying Internal Expansion Slots, Installing Expansion Cards, Managing Hardware with Device Manager
4. Removing and Labeling Components and Cables, Removing a Motherboard, Identifying Motherboard Features, Researching New Motherboards, Installing a Motherboard.
5. Installing Parallel ATA Hard Drives, Installing Serial ATA Hard Drives, Configuring CMOS Settings, Comparing Solid-State Drives and Magnetic Hard Drives, troubleshooting Hard Drive Installations, Data Recovery from hard drive.
6. Installing Video, Configuring Multiple Displays.
7. Researching Laptop Upgrade Paths, Replacing and Upgrading RAM, Adjusting Power Management to Optimize Battery Life,
8. Examining Types of Printers, Installing a Printer, Maintaining and Troubleshooting Printers

PART-II

1. Demo/Review of Installing Linux / Windows Operating System, Partitioning and formatting disk, Installing applications device drivers, working with files, mounting file systems, checking system space, creating, modifying and deleting user accounts
2. Study of Basic commands of Linux.
3. Shell Programming in Unix/Linux, arithmetic operations, loops
5. Menu Driven Shell scripting
6. Filters and Pipes in LINUX

Course Title: Web Designing

Course Code: CSD-SK2

Marks: 75
Credits : 03
Total Hours: 45

Prerequisite Courses : Nil

Course objectives:

- How to design good user interfaces covering important design principles such as learnability , visibility, error prevention, efficiency and graphic design

Course Outcomes:

CO1: Apply markup language for presenting of information in web pages.

CO2: Able to design responsive websites

CO3: Implement different frameworks used for web designing

Syllabus

1: User Interface

[6Hrs]

Introduction, its importance, design principles–learnability, visibility, error prevention, efficiency, graphic design. Design Patterns for GUI – View tree, Listener, Widget, Model-View-Controller. Approaches to GUI programming – Procedural, Declarative, Direct Manipulation. Web UI – HTML, Javascript, JQuery.

2: Structure and Style with HTML and CSS

[6Hrs]

HTML: Introduction. The development process, basic HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, simple HTML forms, web site structure, Meta tags, Character entities, frames and frame sets.

3: HTML5

[6Hrs]

Introduction, New Elements, Canvas, SVG, Drag/Drop, Geolocation, Video, Audio, Input types, form elements, form attributes, semantic, web storage, app cache, web workers, SSE

4: CSS

[5Hrs]

Introduction – Syntax, Id & Class, Backgrounds, Text, Fonts, Links, Lists, Tables. CSS Box Model – Border, Outline, Margin, Padding. Advanced - Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Navigation Bar, Image Gallery, Image Opacity, Image Sprites, Media Types, Attribute Selectors.

5: CSS3

[5Hrs]

Introduction, Borders, Backgrounds, Gradients, Text Effects, Fonts, 2D Transforms, 3D Transforms, Transitions, Animations, Multiple Columns.

6: Javascript

[10Hrs]

Introduction - What is JavaScript, Understanding Events, JavaScript Example, External JavaScript. Basic Elements – Comment, Variable, Global Variable, Data Types, Operators, If Statement, Switch, Loop: for and while, Function. JavaScript Objects – objects, Array. Browser Object Model - Browser Objects, Window Object, Document Object – getElementById, getElementsByName, getElementsByTagName, innerHTML property, inner Text property. Validation- form validation, email validation.

7: Introducing jQuery

[7Hrs]

JQuery : Introduction - Syntax, Selectors, Events. Effects- Hide/Show, Fade, Slide, Animate, stop(), Callback, Chaining. HTML/CSS- Add, Remove, CSS Classes, css(), Dimensions, slider. Traversing – ancestors, descendants, siblings, filtering.

Text Book:

1. Elisabeth Robson, Eric Freeman, —Head First HTML and CSS, O'Reilly
2. Ivan Bayross, —HTML 5 and CSS 3 Made Simple, BPB publication
3. Kogent Learning Solutions Inc., —HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and JQuery, Pearson Education.
4. Steven M. Jacobs, Ben Shneiderman, —Designing the User Interface : Strategies for effective human-computer interaction, 5th Edition, Pearson Education

Lab : Web Designing

Marks: 75

Credits: 03

List of Assignments:

- 1) Case studies to review UI designs
- 2) Create a HTML page with the following :
 - a) title heading paragraph emphasis strong and image elements
 - b) complex HTML table
 - c) simple HTML Form covering major form elements
 - d) Embed Video in an HTML page
- 3) Using CSS do the following :
 - a) Create a Navigation bar (with dropdown) with CSS
 - b) Create a CSS Grid
 - c) Create a CSS3 based button
 - d) make an image rounded shape
 - e) Create a CSS based sticky footer
 - f) Create CSS3 Corner Ribbon
 - g) Create CSS3 blurry text effect
 - h) Create CSS3 speech bubble shape
 - i) Create image cross fade with CSS3 transition
 - j) Set style for link hover active and visited states of hyperlink
- 4) Write JavaScript functions to :
 - a) accept a string as a parameter and converts the first letter of each word of the string in upper case
 - b) check whether a given credit card number is valid or not.
 - c) check whether a given value is an valid url or not.
 - d) check whether a given email address is valid or not.
 - e) print an integer with commas as thousands separators
 - f) remove items from a dropdown list.
- 5) Use JQuery to :
 - a) Disable buttons
 - b) Make textbox read only
 - c) Uncheck check boxes
 - d) Confirm again
 - e) Sort
 - f) Switch rows and columns

A mini project combining all the technologies learnt using a front-end development framework such as bootstrap is recommended.

Course Title : Introduction to Programming

Course Code: CSD-SK3

Marks : 75

Credits : 03

Total Hours: 45

Prerequisite Courses : Nil

Course Objectives :

- To provide skills of data analysis using Python programming language.

Course Outcome:

CO1: Explain computer programming concepts

CO2: Able to design algorithmic solution to a problem

CO3: Covert algorithms to python programs

CO4: Design program with interactive input and output

Syllabus

1: Introduction to Python [3Hrs]

Motivation, programming paradigms, What Python can do, Python's technical strength, Python interpreter, Program execution, Execution model variations, How to run programs

2: Basic Syntax [6Hrs]

Variable and Data Types, Operator, Conditional Statements - if, if- else, Nested if-else. Looping – For, While, Nested loops. Control Statements – Break, Continue, Pass.

3: String Manipulation [5Hrs]

Accessing Strings, Basic Operations, String slices, Function and Methods.

4: Lists [3Hrs]

Introduction, Accessing list, Operations, Working with lists, Function and Methods

5: Tuple [4Hrs]

Introduction, Accessing tuples, Operations, Working, Functions and Methods

6: Dictionaries [4Hrs]

Introduction, Accessing values in dictionaries, Working with dictionaries, Properties, Functions

7: Functions [6Hrs]

Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables

8: Modules [5Hrs]

Importing module. Math module. Random module. Packages. Composition

9: Input-Output [5Hrs]

Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions

10: Exception Handling [4Hrs]

Exception. Exception Handling - Except clause, Try ? finally clause. User Defined Exceptions

Text Book:

1. Mark Lutz, Learning Python, O'Reilly Media, Third Edition, 2008

Reference Books:

1. Alex Martelli, Python – A Nutshell, O'Reilly Media, Second Edition, 2006

2. Wes McKinney, Python for Data Analysis, O'Reilly Media, 2012

Lab: Introduction to Programming

Credit: 03

Marks: 75

List of Experiments using Python Language

1) Program to compute a given formula

2) if else

3) nested if else

4) loop

5) loop

6) string manipulation

7) string manipulation

- 8) list
- 9) tuple
- 10) dictionary
- 11) function
- 12) module
- 13) Input-Output
- 14) Input-Output
- 15) exception handling

Semester-I

General Component Syllabus

Course Title: Cyber Security

Course Code: CSD-GE3

Marks: 100

Credits: 4

Duration: 60 HRS

Prerequisites : Nil

Course Objectives:

- To develop awareness and understand the concept of Cyber Security.
- To understand the aspects related to Cyber Security.
- To take measures to protect individual privacy and prevent loss/theft of data.

Course Outcome:

On completion of this course the student will be able to:

CO1: Understand the working of a computer network.

CO2: Be aware of the various measures that need to be taken in order to protect data.

CO3: Able to understand various forms of crimes in cyber world.

CO4: Gain knowledge about various rights given to the individual to protect their intellectual property.

Syllabus

Basics of Computer Networking: [12Hrs]

Networking basics, why networking of computer is needed, Introduction to Wireless networks, Internet – role and importance, IP Addressing– public Vs Private, Static Vs Dynamic, www & related protocols.

2. Emerging threats in Cyber Space: [12Hrs]

Threats in Cyber Space, Classification of threats, BYOD and portable devices threats, 0-day attacks, insider threats, Cyber Warfare, Malware threats, mobile apps threats. Social media and its safe usages: Social media- its usages, Social Networking - types, usages, importance, social networking safety.

3. Online Privacy: [10Hrs]

Privacy – basic concepts, Sensitive personal information, Privacy policies (case study of Google/Facebook or any other privacy policies), Privacy laws, IPR, Ethics & safe practices.

4. Cyber Crimes – An Introduction: [10Hrs]

Introduction – Types of cyber crimes (Phishing, Social Engineering, Denial of Service, Cyber stalking, ID-theft, etc), How to report cyber crimes, its impact– social, personal, financial; Cyber Terrorism.

5. Cyber Laws: [8Hrs]

Evolution and purpose, offense; defense, bailable and non-bailable offenses, provisions related to e-commerce, provisions for cyber crimes, adjudicating officers, CERT-IN- its role and powers

6. Cyber Forensic: [8Hrs]

Data recovery, evidence collection, cloning of devices, media sanitization

List of suggested Activities

1. Connecting to Network, Sharing directories.
2. Connecting to shares, Set up a common storage.
3. Advanced Networking: Identify IP address, ping
4. Set up a basic firewall, Setup a wireless n/w, Set up a security level, Setup free online backup
5. Setting up and maintaining the laptop, data storage devices and smart phone.
6. Ensuring secure-environments wrt online shopping, wi-fi networks, passwords, social networking and online banking)

Reference Books:

1. Rick Lehtinen and G.T. Gangemi, Computer Security Basics, O'ReillyMedia, Inc., 2nd edition, 2006
2. Wall, David, Cybercrime: The Transformation of Crime in the Information Age. Polity Publishing, 2007.
3. Michael Cross, Scene of the Cyber Crime: Cyber Forensics Handbook, Syngress Publishing, 2nd Edition, 2002.

4. Chander, Harish, CyberLaws and IT Protection, Prentice Hall India Learning, 2012

Semester-II
Skill Component Syllabus

Course Title: Database Management System

Course Code: CSD-SK4

Marks: 75

Credits: 03

Total Hours: 45

Prerequisite Courses: Nil

Course objectives:

- To develop database model and apply to medium scale application.

Course Outcomes:

CO1: Able to model an application's data requirements using conceptual modeling tools like ER diagrams.

CO2: Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.

CO3: Use a database management system to create, populate, maintain, and query a database.

Syllabus

1. Introduction to Database Systems: [3Hrs]

File Systems versus DBMS, The Relational Model, Levels of abstraction in a DBMS, Data independence, Structure of DBMS, Advantage of DBMS, People who deal with Databases.

2. Conceptual design and ER model: [8Hrs]

Overview of Database Design –The ER model-features, Key Constraints, Participation Constraints, weak Entities, Class Hierarchies, Aggregation.

3. The Relational Model and SQL: [14Hrs]

Attributes and domains, Relations, Integrity Constraints, Key Constraints, Foreign Key Constraints, General Constraints, Query Languages

SQL: The Form of Basic SQL query, Condition specification, SQL Join, Union, Intersect, Except, Nested queries - Aggregate Operators, updates, Null values, Embedded SQL, Triggers, Data Definition Language, Introduction to Database Security : views

4. Indexing: [3Hrs]

Properties of indexes: clustered vs unclustered indexes, dense vs sparse index, Primary vs secondary index.

5. Schema Refinement and Normal forms: [11Hrs]

Introduction, Schema Refinement, Functional Dependencies, Closure of a set of FDs and Attribute closure, Normal Form 1NF, 2NF, Third Normal Form, BCNF, Decomposition-Lossless-Join Decomposition, Dependency-Preserving Decomposition, Normalisation-Decomposition into BCNF, Decomposition into 3NF.

6. Transaction: [3Hrs]

The concept of transaction, transaction and schedule, Notion of consistency

7: Latest Trends [3Hrs]

NOSQL databases, Spatial Databases, Multimedia Databases, Distributed databases.

Text Book:

1. A Silberschatz, H F Korth, S Sudarshan, *Database system concepts*, McGraw-Hill ,8th Edition

Reference Books:

1. Ramakrishnan, J Gehrke, "*Database management systems*", McGraw-Hill , 3rd edition
2. R Elmasri, S B Navathe, "*Fundamentals of database Systems*", Pearson Education , 6th Edition

Lab : Database Management Systems

Credit : 3

Marks : 75

List of Practicals

1. ER diagram (2P)
 - a. ER diagram with specialization/generalization and aggregation.
 - b. Converting ER diagram to Schemas
 - c. Converting ER diagram with generalization/specialization, aggregation into schema

Studying RDBMS (2P)
2. Introduction to MySQL
 - a. Understanding client server architecture.
 - b. Installing a MySQL server and client
 - c. Creating databases in MySQL
3. SQL (5P)
 - a. Syntax
 - b. Insert, update, delete
 - c. Select
 - d. Aggregate functions
 - e. Wildcards
 - f. Aliases
 - g. in, union
 - h. joins
 - i. indexing

4. Transactions (1P)

5. Python database API (2P)

Tools like Mysql Workbench is recommended.

Course Title: Network Administration

Course Code: CSD-SK5

Marks: 75

Credits: 3

Prerequisite Courses: Nil

Course Objectives:

To understand the theory and concepts of Network Administration

Course outcome:

At the end of the course students will be able to :

CO1: Apply basic networking concepts to setup, maintain and troubleshoot web servers.

CO2: Understand user management and roles in database

CO3 : Demonstrate expertise in configuring host and network level technical security controls to include host firewalls, user access controls, host logging, network filtering, intrusion detection and prevention and encryption

Syllabus :

1: Network Interface Configuration [4Hrs]

Debian nic configuration, dhcp client, fixed ip, arp, ifconfig, ping, route, hostname.

2: SSH Client and Server [3Hrs]

About SSH, Log into remote server, Pass wordless ssh, X Forwarding, Troubleshooting ssh, sshd, sshd keys,

3: Iptables [3Hrs]

Introduction to iptables, firewall rules ,xinetd and inetd, network file system

4: Apache Server Configuration [5Hrs]

Introduction to Apache Web Server, port virtual hosts on Debian, httpd, name resolution, troubleshooting apache, aliases and redirects, .htaccess, traffic, self signed cert on Debian.

5 : Introduction to protocols: [15 Hrs]

Basics of TCP/IP, IP address (IPv4 and IPv6), Internet Architecture, peer to peer and client server networks, subnetting, supernetting , and basic Network commands.

6: Views [6Hrs]

Introduction to views, data independence, security, updates on views, comparison between tables and views.

7: User Access and Security: [6Hrs]

Creating and modifying use accounts, creating and using roles, granting and revoking privileges, Managing user groups with profiles

8: Distributed Database: [3Hrs]

Introduction of DDB, DDBMS architectures, Homogeneous and Heterogeneous databases, Distributed data storage, Advantages of Data Distribution, Disadvantages of Data Distribution Distributed

TEXT BOOKS:

1. William Stallings, —Computer Organization and Architecture - Designing for performance, EEE, PHI, 9th Edition
2. Andrew S. Tanenbaum, David J. Wetherall “Computer Networks”, Prentice-Hall, 5th Edition.
3. A Silberschatz, H F Korth, S Sudarshan, Database system concepts, McGraw-Hill ,9th Edition

Lab : Network Administration

Credits : 3

Marks : 75

List of Practical

A.

1. Network Interface Configuration: ping, dhcpch, ip link, ifconfig, route (2P)
2. SSH: setting up a ssh server and client, running commands remotely (2P)
3. Iptables: setting up firewall rules (2P)
4. Apache Server: setting up and maintaining an Apache Web Server (3P)

B.

Managing users: creating/Deleting groups, users, setting passwords, setting permissions to groups and users, Device Manager

Setting up client server network (Installing server OS)

Configuring Telnet and ftp server.

Remote desktop connection

Router

DHCP server Configuration

7. Web server Installation
8. Install MySQL server and client, mysql workbench (1P)
9. Managing Views: Creating and modifying views, Using views, Inserting, Updating and deleting data through views (2P)
10. User Access and Security: Creating and modifying use accounts, creating and using roles, granting and revoking privileges, Managing user groups with profiles (2P)

Course Title: Multimedia

Course Code: CSD-SK6

Marks: 75

Credits: 03

Total Hours: 45

Prerequisite Courses Nil

Course Objectives:

- On completion of the course the students will develop specific skills and competencies by making them proficient in Designing Graphical Images, Audio and Video Capture and Editing using Software tools

Course Outcomes:

CO1: Develop specific skills in designing Graphical Images, Audio and Video Capture and Editing using Software tools

CO2: Understand the industrial standard of video, audio and image formats.

CO3: Understand where and when to use image manipulation software tools.

Syllabus

1: Introduction to Multimedia:

[6Hrs]

Commonly used terms associated with multimedia like CDROM, Storyboard, Script and Authoring tools. Stages of a Multimedia Project: Planning and Costing, Designing and Producing, Testing and Delivering. The Multimedia team and their roles: Project Manager, Writer, Video specialist, Audio specialist and Multimedia programmer. Multimedia Software. Multimedia Hardware.

2: Multimedia Authoring Tools: [3Hrs]

Types of Authoring tools - card or page based tools, icon-based, event-driven tools, time-based and presentation tools and object-oriented tools.

Multimedia Building Blocks:

3: Text

[4Hrs]

Designing with Text, menus and buttons for navigation, Animating text, Hypermedia and Hypertext

4: Sound [6Hrs]

Basic Sound Concepts, Music, Speech, MIDI and Digital Audio

5: Images [8Hrs]

Making still images, Bitmaps, Clipart, Capturing and Editing Images, Scanning Images, Vector, Drawing, 3D Drawing and Rendering.

6: Animation [8Hrs]

Principles of Animation- persistence of vision, animation file formats Computer animation , kinematics and morphing, Making animations that work- a rolling ball, a bouncing ball and creating an animated scene.

7: Video [8Hrs]

Video Broadcast Standards- NTSC, PAL, SECAM, HDTV, Integrating Computers and, Television like Video Overlay Systems, Digitized Video Playback,, Differences between Computer and Television Video, Recording Formats like S-VHA Video, Component (YUV), Component Digital, Composite, Digital, Video Hardware Resolutions, Video Tips like Shooting platforms, Lighting, Chroma Key or Blue Screen, Video Compression methods like MPEG and DVI.

8: Assembling and Delivering a project [2Hrs]

The four primary navigational structures used in multimedia like linear, hierarchical, non-linear and composite

Text Book:

1: Vaughan, Tay , —Multimedia: Making it Work, 3rd edition, Tata McGraw-Hill

Reference Books:

1. Jeffcoate, Judith, —Multimedia in Practice, Technology and Applications, Prentice Hall India.
2. Buford, J.F. K , —Multimedia Systems, Pearson Education
3. Elson-Cook, —Principles of Interactive Multimedia, McGraw Hill Higher Education. ISBN-13: 978-0077096106

Lab: Multimedia

Credit: 03

Marks: 75

List of suggested **PRACTICALS** using any Multimedia Software (the numbers in brackets indicate number of practicals) :

1. Image Handling: Cropping an image, adjusting image size, increasing the size of the work canvas, saving an image (2P)
2. Layers: Adding layers, dragging and pasting selections on to layers, dragging layers between files, viewing and hiding layers, Editing layers, rotating selections, scaling an object, preserving layers transparency, moving and copying layers, duplicating layers, deleting layers, merging layers, using adjustment layers (2P)
3. Channels and Masks: Channel palette, showing and hiding channels, splitting channels in to separate image, merging channels, creating a quick mask, editing masks using quick mask mode (1P)
4. Painting and Editing: Brushes palette, brush shape, creating and deleting brushes, creating custom brushes, setting brush options, saving, loading and appending brushes, Options palette (2P)
5. Opacity, pressure, or exposure , paint fade-out rate, making selections, using selection tools, adjusting selections, softening the edges of a selection, hiding a selection border, moving and copying selections, extending and reducing selections, pasting and deleting selections (2P)
6. Sound : Recording Sound using Sound Recorder (Capture), Sound capture through sound editing software , Sound editing, Noise correction, Effect enhancement ; Voice Recognition; Importing audio and saving audio from Audio CD. Sound Quality types: CD Quality, Radio Quality, Telephone Quality (2P)
7. Video: Record video from video capture devices, webcams, screen capture or even streaming video and Video Editing (2P)
8. Mini Project/Problem Statement/Case Study (integrating the above experiments) (2P)

Semester-II

General Component Syllabus

Course Title: Office Automation Tools

Course Code: CSD-GE4

Credits: 4

Marks: 100

Prerequisites: Nil

Course Objective:

The main objectives of this course to provides basic training of computer and its most common software use in office work

Course Outcomes:

CO1: Examine spreadsheet concepts and explore the Microsoft Office Spreadsheet environment.

CO2: Learn to use functions and formulas.

CO3: Work with pivot tables and charts.

Syllabus

1: Getting started with Spreadsheet [10 Hrs]

Introducing Spreadsheet, entering and editing worksheet data, essential worksheet operations, working with cells and ranges, introducing tables, worksheet formatting, understanding Spreadsheet files, using and creating templates.

2: Working with formulas and functions [12 Hrs]

Introducing formulas and functions, formulas that manipulate text, working with date and times, formulas for count and sum, loop up values, financial applications, and miscellaneous calculations, introducing array formulas.

3: Creating charts and Graphics [12 Hrs]

Getting started with making charts, advanced charting, data visualization using conditional formatting, sparkline graphics, pictures and drawing

4: Advanced Spreadsheet features [11 Hrs]

Customizing Spreadsheet user interface, custom number formats, data validation, worksheets, linking and consolidating worksheets, Spreadsheet and internet, data protection.

5: Analyzing data with Spreadsheet [10 Hrs]

Importing and cleaning data, introducing pivot tables, Analyzing data with pivot tables, What if analysis, Analyzing data using goal seeking and solver, analyzing data with analysis ToolPak, working with get and Transform

6: Google sheets

[5Hrs]

Google sheets email trigger, email reminders, email validation, notification script, extensions, expense tracker, data visualization

Textbook:

1: John Walkenbach, Microsoft Spreadsheet 2016 Bible, The Comprehensive Tutorial

Resource,Wiley

2: Matthew Guay , Michael Grubbs , Jeremey DuVall Jesse Boum, The Ultimate Guide to Google Sheets, Zapier

Course Title: Mathematical Foundation of Computer Science

Course Code: CSD-GE5

Marks: 100

Credits: 4

Total Hours: 60

Prerequisite Courses : Nil

Course Objectives:

- To build mathematical foundations that are essential requirement in understanding various concepts related to computer science.

Course Outcome:

CO1: Apply counting principles to determine Probabilities.

CO2: Demonstrate an understanding of relations and functions and determine their properties.

CO3: Evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

CO4: Write an argument using logical notation and determine if the argument is valid or not.

1. Combinatory: [10Hrs]

Permutations; Combinations; Counting; Summation; generating functions; recurrence relations.

2. Binary Number System: [10Hrs]

Decimal to binary conversion and vice versa, binary number representation (signed, 1's Complement and 2's complement) binary addition, subtraction, binary to octal, hexadecimal conversion and vice versa. Floating point representation.

3. Boolean Algebra: [10Hrs]

Boolean functions, truth table, DeMorgan's theorem, logic gates, Realization of Boolean Function using logic gates, Simplification using Karnaugh map.

4. Set, Relations and Functions: [10Hrs]

Venn diagram, set operations, relations and properties, closures, equivalence relations, Partial ordering, functions, function types, inverse of functions, composition of functions, recursive functions, growth of functions.

5. Logic:

[8Hrs]

Propositional logic, first order logic, mathematical induction, deduction, proof by contradiction, program correctness.

6. Linear Algebra

[12Hrs]

Adjoint, inverse of a matrix; Rank; Linear equations; Characteristics roots and vectors

Text Book:

1: Rosen H. Kenneth, *Discrete Mathematics and its Applications*, Tata McGraw Hill, seventh edition, 2011.

Reference Books:

1: Sarkar Kumar Swapan, *A Textbook of Discrete Mathematics*, S Chand & Company, 2005.

ANNEXURE III-A

**Parvatibai Chowgule College of Arts and Science
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE
B.Voc(Software Development)**

Summary of changes incorporated in the syllabus of B.Voc(Software Development) at the board of studies meeting held on 16th February 2019

Review of Syllabus of Semester I and Semester II

Course Title: Data Structure

Course Code: CSD-SK13

Marks: 75

Credits: 03

Prerequisite: Introduction to Programming (CSD-SK3)

Course Objectives:

To understand different methods of organizing data and efficiently implement different data structures.

Course outcome:

On completion of the course student will be able to:

CO1: Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include arrays, linked lists, binary trees, heaps, and hash tables.

CO2: knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching and sorting of each data structure.

CO3: Analyzing and compare algorithms for efficiency using Big-O notation.

CO4: Implementing projects requiring the implementation of the above data structures.

Syllabus

1: Introduction to data structures: [3Hrs]

Concept, Data type, Data object, ADT, Need of Data Structure, Types of Data Structure

2: Stacks: [5Hrs]

Introduction, Representation-static & dynamic, Operations, Application - infix to postfix & prefix, postfix evaluation, Simulating recursion using stack.

3: Queues: [5Hrs]

Introduction, Representation -static & dynamic, Operations, Circular queue, priority queue (with implementation), Concept of doubly ended queue.

4: Linked List: [8Hrs]

Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List, polynomial manipulation, Generalized linked list – concept & representation.

5: Trees: [10Hrs]

Concept & Terminologies, Binary tree, binary search tree, Representation – static & dynamic,

Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, non-recursive inorder traversal, Expression Tree.

6: Graph: [8Hrs]

Concept & terminologies, Graph Representation – Adjacency matrix, adjacency list, Traversals – BFS & DFS, Application of BFS, DFS – Shortest path

7: Sorting Techniques: [6Hrs]

Bubble sort, Merge sort, Selection sort, Sequential Searching, Binary Searching

Text Book:

Data Structures and Algorithms in Python Roberto Tamassia, Michael H. Goldwasser Michael T. Goodrich, Wiley Student Edition

Reference:

1. Horowitz Ellis, Sahni Sartaj, Fundamentals of Data Structures in C, University Press, 2 nd Edition, 2008.
- 2 . Michael T. Goodrich, Roberto Tamassia , Data Structures and algorithms in Java, John Wiley & sons inc.,5th Edition, International Student version.
3. Langsam Yedidyah, Augenstein J. Moshe, Tenenbaum M. Aaron , Data Structures using C and C++, Pearson Education, Second Edition ,2009
4. Gilbeg Richard, Forouzan Behrouz, Data Structures: A Pseudocode Approach with C++, Cengage Learning, Second Edition

Lab: Data Structures

Credit: 03

Marks: 75

Programs using C language / Java Language that covers the following concepts:

1. Stack: Static/Dynamic stack implementation.
2. Stack: infix to postfix.
3. Stack: Evaluation of Postfix expression.
4. Queues: Static and Dynamic Queue Implementation
5. Queues: Circular queue
6. List: Singly Linked List,
7. List: Doubly Linked List
8. List: Circular Linked List
9. Linked List: Polynomial addition
10. Trees: Binary Search Tree: create, add, delete, display nodes.
11. Trees: BST traversal.

12. Graph: Representation of Graphs, Graph Traversals.

13. Graph: DFS, BFS.

Course Title: Office Automation Tools

Course Code: CSD-GE4

Credits: 4

Marks: 100

Prerequisites: Nil

Course Objective:

The main objectives of this course to provides basic training of computer and its most common software use in office work

Course Outcomes:

CO1: Examine spreadsheet concepts and explore the Microsoft Office Spreadsheet environment.

CO2: Learn to use functions and formulas.

CO3: Work with pivot tables and charts.

Syllabus

1: Getting started with Spreadsheet [10 Hrs]

Introducing Spreadsheet, entering and editing worksheet data, essential worksheet operations, working with cells and ranges, introducing tables, worksheet formatting, understanding Spreadsheet files, using and creating templates.

2: Working with formulas and functions [12 Hrs]

Introducing formulas and functions, formulas that manipulate text, working with date and times, formulas for count and sum, loop up values, financial applications, and miscellaneous calculations, introducing array formulas.

3: Creating charts and Graphics [12 Hrs]

Getting started with making charts, advanced charting, data visualization using conditional formatting, sparkline graphics, pictures and drawing

4: Advanced Spreadsheet features [11 Hrs]

Customizing Spreadsheet user interface, custom number formats, data validation, worksheets, linking and consolidating worksheets, Spreadsheet and internet, data protection.

5: Analyzing data with Spreadsheet [10 Hrs]

Importing and cleaning data, introducing pivot tables, Analyzing data with pivot tables, What if analysis, Analyzing data using goal seeking and solver, analyzing data with analysis ToolPak, working with get and Transform

6: Google sheets

[5Hrs]

Google sheets email trigger, email reminders, email validation, notification script, extensions, expense tracker, data visualization

Textbook:

1: John Walkenbach, Microsoft Spreadsheet 2016 Bible, The Comprehensive Tutorial

Resource, Wiley

2: Matthew Guay , Michael Grubbs , Jeremy DuVall Jesse Boum, The Ultimate Guide to Google

Sheets, Zapier

(Summary of changes incorporated in the syllabus of B.Voc(Software Development) at the board of studies meeting held on 16th February 2019)

Semester	Course Title	Existing (Indicate only the unit where the change is proposed)	Changes Proposed	Specify the reason for change
V	Data Structure	Unit 7	Sorting Techniques are added th the syllabus	It is necessary to teach sorting techniques as it will prove important in Design and Analysis of Algorithms while finding time complexity
II	Office Automation Tools	Unit 5 and Unit 6	Analyzing data with spreadsheets and Google Sheets	These topics are very important considering the amount of data stored in sheets and hoogle sheets allows automating reminders to users by writing scripts

**Parvatibai Chowgule College of Arts and Science
(Autonomous)
Margao, Goa**

**B.Voc.(Software Development)
(2020-2021)**

Offered to students taking admission to First Year B.Voc from 2019-20

Semester	General Education Component		Skill Component			
		T	P		T	P
I	Language Paper I: CSD-GE1	4	0	Computer Organization and Operating System CSD-SK1	3	3
	Elements of Basic Statistics CSD-GE2	2	0	Web Design CSD-SK2	3	3
	Cyber Security CSD-GE3	4	0	Introduction to Programming CSD-SK3	3	3
II	Office Automation Tools CSD-GE4	4	0	Database Management Systems CSD-SK4	3	3
	Mathematical foundation of Computer Science CSD-GE5	4	0	Content Management System CSD-SK5	3	3
	Academic Writing CSD-GE6	4	0	Multimedia CSD-SK6	3	3
	Elements of Basic Statistics II CSD-GE7	2	0			
III	Environmental Studies-I CSD-GE8	2	0	Object Oriented Programming CSD-SK7	3	3
	Business Communication CSD-GE9	4	0	Computer Networks CSD-SK8	3	3
	Accounting for Non-accountants CSD-GE10	4	0	Server Side Programming CSD-SK9	3	3
	Internship	2				
	Entrepreneurship CSD-GE11	4	0	Web Development Framework CSD-SK10	3	3
	Environmental Studies-II CSD-GE12	2	0	Software Engineering CSD-SK11	3	3

IV	Personality Enhancement CSD-GE13	4	0	Mobile Application Development CSD-SK12	3	3
	Internship	2				
V	Digital Marketing CSD-GE14	4	0	Data Structures CSD-SK13	3	3
	Organization Behavior CSD-GE15	4	0	Software Testing CSD-SK14	3	3
	Math for Competitive Exams CSD-GE16	4		Project Work	6	
VI	E-commerce CSD-GE17	4	0	Network Security CSD-SK15	3	3
	Independent Studies CSD-GE18	4	0	Cloud Computing CSD-SK16	3	3
	Human Compute Interactions CSD-GE19	4	0	Project	6	

Offered to students taking admission to First Year B.Voc from 2018-19

Semester	General Education Component			Skill Component		
		T	P		T	P
I	Language Paper I: COM- I.SD-G1	4	0	Office Automation Tools COM- I.SD-SK1	3	3
	Elements of Basic Statistics COM- I.SD-G2	2	0	Web Design COM- I.SD-SK2	3	3
	Cyber Security COM- I.SD-G3	4	0	Introduction to Programming COM- I.SD-SK3	3	3
II	Language Paper II: COM- II.SD-G4	4	0	Data Structure COM-II.SD-SK4	3	3
	Mathematical foundation of Computer Science COM-II.SD-G5	4	0	Computer Organization and Operating System COM-II.SD-SK5	3	3
	Academic Writing COM-II.SD-G6	4	0	Multimedia COM-II.SD-SK6	3	3
	Elements of Basic Statistics II COM-II.SD-G7	2	0			
III	Environmental Studies-I COM-III.SD-G8	2	0	Object Oriented Programming COM-III.SD-SK7	3	3
	Business Communication COM-III.SD-G9	4	0	Computer Networks COM-III.SD-SK8	3	3
	Accounting for Non-accountants COM-III.SD-G10	4	0	Database Management Systems COM-III.SD-SK9	3	3
	Internship	2				
	Entrepreneurship COM-IV.SD-G11	4	0	Web Development Framework COM-IV.SD-SK10	3	3
	Environmental Studies-II COM-IV.SD-G12	2	0	Agile Software Engineering COM-IV.SD-SK11	3	3

IV	Personality Enhancement COM-IV.SD-G13	4	0	Mobile Application Development COM-IV.SD-SK12	3	3
	Internship	2				
V	Digital Marketing COM-V.SD-G14	4	0	Design Analysis of Algorithms COM-V.SD-SK13	3	3
	Organization Behavior COM-V.SD-G15	4	0	Software Testing COM-V.SD-SK14	3	3
	Math for Competitive Exams COM-V.SD-G16	4		Project Work	6	
VI	E-commerce COM-VI.SD-G17	4	0	Content Management System COM-VI.SD-SK15	3	3
	Independent Studies COM-VI.SD-G18	4	0	Cloud Computing COM-VI.SD-SK16	3	3
	Human Compute Interactions COM-VI.SD-G19	4	0	Project	6	

Course Title: Computer Organization And Operating System

Course Code: CSD-SK1

Marks: 75

Credits: 3

Duration: 45 hrs

Prerequisite Course : Nil

Course Objectives:

- To have a thorough understanding of the basic structure and operation of a digital computer.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Describe Von Neumann architecture.

C02: Explain Basic Structure, Function and Operation of a digital computer.

C03: Explain Memory Subsystem in a computer.

C04: Describe the function of a Processor, Memory, I/O and System Bus.

C05: State the difference between various types of Operating Systems.

C06: Explain the role an OS plays in Memory, Processor and Storage Management.

UNIT I

[15HRS]

Computer System

Function and structure of a computer, Interconnection of components, Performance of a computer. Computer Architecture – Princeton (Von Neumann) and Harvard architecture

Memory Subsystem:

Characteristics of memory system, the memory hierarchy, Semiconductor memories, Types of ROM & RAM, Cache memory unit - Concept of cache memory, Organization of a cache memory unit, replacement algorithms, write policy, block size.

Input/ Output Subsystem:

General block diagram of External device & I/O module, Programmed I/O, Interrupt driven I/O, DMA, I/O channels and I/O processors. I/O interfaces – Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewire and Infiniband.

UNIT II

[15HRS]

Introduction to Operating System:

Basic elements of a computer system: Processor, Main Memory, I/O Modules, System Bus, Instruction Execution; Operating Systems: Definition, Operating system Structure, operating system operations, Relationship between Kernel, OS, and Hardware, Operating system services, System calls, Types of system calls, System programs.

Process Management:

Process Definition, Process Control Block, Process States, Operations on Process; Interprocess communication, Threads and Microkernels.

UNIT III

[15HRS]

Memory Management:

Introduction, Swapping, Contiguous Memory Allocation, Paging, Page Table, Segmentation, Virtual Memory: Introduction, Demand Paging, Page Replacement, Allocation of Frames, Thrashing

Storage Management

File System, Concepts, File Organization and Access Methods, Directory and Disk Structure. Secondary Storage Structure - Overview, disk structure, Disk attachment, Disk scheduling

REFERENCES

Mandatory Reading:

1. William Stallings (2013). Computer Organization and Architecture (9th ed) Pearson
2. William Stallings (2019). Operating Systems: Internals and Design Principles (9th ed) Pearson

Supplementary Reading:

1. Andrew S. Tanenbaum (2016). Operating Systems: Internals and Design Principles (4th ed) Pearson Education India.

Web References:

1. https://www.tutorialspoint.com/operating_system/index.htm
2. <https://www.geeksforgeeks.org/computer-organization-and-architecture-tutorials/>
3. https://en.wikipedia.org/wiki/Operating_system

Practical: Computer Organization And Operating System

Marks : 75

Duration: 45 hrs

Credits: 3

PART-I

[5P]

1. Exploring the Functions and Components of a PC
 - a) Identifying each components
 - b) Learning their function.
2. Building a PC from Scratch.
 - a) Installing the motherboard
 - b) Identifying the CPU socket type and motherboard compatibility.
 - c) Installation of and RAM and its comparability with the motherboard.
 - d) Power Supply requirements and installation.
 - e) Cable management.
3. BIOS ROM Setup.

- a) Changing the boot priority
- b) Understanding UEFI and Legacy boot.
- c) Setting a bios password

PART-II

[10P]

1. Partitioning and formatting disk
2. Making a flash drive/ CD ROM bootable.
3. Installing an OS
4. Installing applications device
5. Configuring Display Settings I.e multiple displays
6. Printer setup and configuration
7. Creating, modifying and deleting user account
8. Dual booting with windows
9. Adding and removing software
10. Manually Mounting Partitions
11. Setting up a Virtual OS using Virtual Box
12. Study of Basic commands of Linux.
13. Shell Programming in Unix/Linux, arithmetic operations, loops
14. Menu Driven Shell scripting
15. Filters and Pipes in LINUX

Course Title: Web Design

Course Code: CSD-SK2

Marks: 75

Credits : 03

Duration: 45 hrs

Prerequisite Course: Nil

Course objectives:

- How to design websites that are responsive.
- Create interactive web applications using javascript.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Demonstrate the use of various HTML and CSS elements

C02: Design responsive websites

C03: Implement frameworks used in web designing.

C04: Build interactive applications using Javascript

C05: Apply markup language for presenting of information in web pages

SYLLABUS

UNIT I: HTML and CSS

[15HRS]

HTML Introduction. The development process, basic HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, simple HTML forms, web site structure, Meta tags, Input types, form elements, form attributes, CSS Introduction – Syntax, Id & Class, Backgrounds, Text, Fonts, Box Model – Border, Outline, Margin, Padding. Advanced - Grouping/Nesting, Dimension, Display, Positioning, Floating, Align, Pseudo-class, Pseudo-element, Navigation Bar, Image Gallery, Image Opacity, Media Types, Transitions and Animations.

UNIT II: Javascript

[15HRS]

Introduction - What is JavaScript, Understanding Events, JavaScript Example, External JavaScript. Basic Elements – Comment, Variable, Global Variable, Data Types, Operators, If Statement, Switch, Loop: for and while, Function. JavaScript Objects – objects, Array. Browser Object Model - Browser Objects, Window Object, Document Object – getElementById, getElementsByName, getElementsByTagName, innerHTML property, inner Text property. Validation- form validation, email validation.

UNIT III: Bootstrap and jQuery Framework

[15HRS]

JQuery Introduction - Syntax, Selectors, Events. Effects- Hide/Show, Fade, Slide, Animate, stop(), Callback, Chaining. HTML/CSS- Add, Remove, CSS Classes, css(), Dimensions, slider.aversing – ancestors, descendants, siblings, filtering, bootstrap components - alert, button, card, carousel. Forms, list groups, modal, navbar, pagination, progress

REFERENCE

Mandatory Reading:

1. Elisabeth R, Eric F, (2012). *Head First HTML and CSS* (2nd ed). Canada, O'Reilly Media, Inc.

Supplementary Reading:

1. Ivan B (2017), *HTML5 and CSS3 Made Simple* (1st ed). India, BPB publication
2. DT Editorial Services (2016), –*HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and JQuery* (2nd ed). India, Dreamtech Press.

Web References:

<https://www.w3schools.com/html/>

<https://www.w3schools.com/css/>

<https://www.w3schools.com/jquery/>

<https://www.w3schools.com/bootstrap/>

Practical: Web Design

Marks: 75

Duration: 45 hrs

Credits: 03

List of Assignments:

Creating a webpage using the following html tags (1P)

Creating a webpage styled using CSS (1P)

Embed Video and audio in an HTML page (1P)

Create a simple navigation bar (1P)

Replicate the footer of a website (1P)

Replicate a website (2P)

Using javascript validate (3P)

Check whether a given email address is valid or not.

Check whether a value is a number or not.

Check whether a given credit card number is valid or not.

Check whether a given credit card number is valid or not.

Using jQuery (3P)

Show and hide html elements

Using Bootstrap (2P)

Create a responsive website using bootstrap

Course Title: Introduction to Programming

Course Code: CSD-SK3

Marks: 75

Credits: 03

Duration: 45 hrs

Prerequisite Course : Nil

Course Objective:-

- Imbibe basic programming skills and industry level coding standards.

Course Outcomes: On completion of the course student will be able to

C01: Explain the different programming paradigms.

C02: Write computer program to solve basic computational problems.

C03: Write computer program that perform basic I/O operations.

C04: Use python function, modules and exceptions effectively for solving complex problems.

UNIT I

[15HRS]

Introduction to Python:

Introduction to programming: History of Programming, Algorithm, Other Programming Languages, Programming Paradigms. Setting up Python: Installation, Python Interpreter, Python IDLE, Running Python Programs.

Basic Syntax

Variable and Data Types, Operators, Conditional Statements: if, if – else, Nested if-else. Looping: For, While, Nested Loops, Control Statements: break, continue, pass.

UNIT II

[15HRS]

String:

Accessing Strings, Basic Operations, String slices, Function and Methods.

Lists:

Introduction, Accessing list, Operations, Working with lists, Function and Methods

Dictionaries

Introduction, Accessing values in dictionaries, Working with dictionaries, Properties, Functions.

UNIT III

[15HRS]

Functions

Defining a function, Calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables.

Modules

Importing module. Math module. Random module. Packages.

Exception Handling

Exception. Exception Handling - Except clause, Try, finally clause. User Defined Exceptions

REFERENCES

Mandatory Reading:

1. Martin C. Brown (2018). *Python: The Complete Reference* (4th ed) McGraw Hill Education

Supplementary Reading:

1. Mark Lutz (2013). *Learning Python* (5th ed) O'Reilly

Web References:

1. <https://www.learnpython.org/>
2. <https://www.tutorialspoint.com/python/index.htm>
3. https://www.youtube.com/watch?v=_uQrJ0TkZlc&t=823s

Practical: Introduction to Programming**Marks : 75****Duration: 45 hrs****Credits: 3**

1. Installing python and getting familiar with the python IDLE.
2. Basic math operators.
3. Relational and Logical Operators
4. Scope and Indentation
5. If statement
6. While loop
7. For loop
8. Input from keyboard and Type casting
9. File Operations
10. String manipulation
11. Lists
12. Dictionary
13. Modules
14. Functions
15. Exception Handling

Course Title: Database Management System

Course Code: CSD-SK4

Marks: 75

Credits: 03

Duration: 45 hrs

Prerequisite Course : Nil

Course objectives:

- To develop database model and apply to medium scale application.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Model an application's data requirements using conceptual modeling tools like ER diagrams.

C02: Apply Normalization theory to normalization a database.

C03: Use a database management system to create, populate, maintain, and query a Database.

CO4: Analyze a given problem and select an appropriate database.

SYLLABUS

UNIT I: Introduction to database and ER models [15HRS]

File Systems versus DBMS, The Relational Model, Levels of abstraction in a DBMS, Data independence, Structure of DBMS, Advantage of DBMS, People who deal with Databases. Overview of Database Design –The ER model-features, Key Constraints, Participation Constraints, weak Entities, Class Hierarchies, Aggregation.

UNIT II: SQL [15HRS]

Attributes and domains, Relations, Integrity Constraints, Key Constraints, Foreign Key Constraints, General Constraints, Query Languages SQL: The Form of Basic SQL query, Condition specification, SQL Join, Union, Intersect, Except, Nested queries - Aggregate Operators, updates, Null values, Embedded SQL, Triggers, Data Definition Language, Introduction to Database Security : views.

UNIT III: Schema Refinement, Normal forms, transactions and Latest trends [15HRS]

Introduction, Schema Refinement, Functional Dependencies, Closure of a set of FDs and Attribute closure, Normal Form 1NF, 2NF, Third Normal Form, BCNF, Decomposition Lossless -Join Decomposition, Dependency-Preserving Decomposition, Normalisation Decomposition into BCNF, Decomposition into 3NF, The concept of transaction, transaction and schedule, Notion of consistency, NOSQL databases, Spatial Databases, Multimedia Databases, Distributed databases.

REFERENCE

Mandatory Reading:

1. Silberschatz A, Korth H F, Sudarshan S (), *Database system concepts* (8th ed). India, McGraw-Hill.

Supplementary Reading:

1. Ramakrishnan, Gehrke J (2013). *Database management systems* (3rd ed.), McGraw-Hill
2. Elmasri R, Navathe S (). *Fundamentals of database Systems* (6th ed.). India, Pearson Education

Web References:

<https://www.tutorialspoint.com/sql/index.htm>

<https://www.w3schools.com/sql/>

<https://dev.mysql.com/doc/>

<https://www.guru99.com/sql.html>

Practical: Database Management Systems

Credit: 3

Duration: 45 hrs

Marks: 75

List of Practicals

1. ER diagram (2P)
2. Create database and tables (2P)
3. Basic SQL queries (2P)
4. Joins (2P)
5. Transactions (2P)
6. Python Database API (2P)
7. Mini project (3P)

Course Title: Multimedia

Course Code: CSD-SK6

Marks: 75

Credits: 03

Duration: 45 hrs

Prerequisite Course: Nil

Course Objectives:

- Develop specific skills and competencies by making them proficient in Designing Graphical Images, Audio and Video Capture and Editing using Software tools.

Course Outcomes:

C01: Develop specific skills in designing Graphical Images, Audio and Video Capture and Editing using Software tools

C02: Explain the industrial standard of video, audio and image formats.

C03: Explain where and when to use image manipulation software tools.

C04: Describe the process of editing audio/video/image content.

UNIT I:

[15HRS]

Introduction to Multimedia :

Commonly used terms associated with multimedia like CDROM, Storyboard, Script and Authoring tools. Stages of a Multimedia Project: Planning and Costing, Designing and Producing, Testing and Delivering. The Multimedia team and their roles: Project Manager, Writer, Video specialist, Audio specialist and Multimedia programmer. Multimedia Software. Multimedia Hardware.

Multimedia Authoring Tools:

Types of Authoring tools - card or page based tools, icon-based, event-driven tools, time-based and presentation tools and object-oriented tools.

UNIT II:

[15HRS]

Multimedia Building Blocks:

Designing with Text, menus and buttons for navigation , Animating text , Hypermedia and Hypertext Basic Sound Concepts , Music , Speech , MIDI and Digital Audio Making still images, Bitmaps, Clipart, Capturing and Editing Images , Scanning Images , Vector, Drawing , 3D Drawing and Rendering.

Animation

Principles of Animation- persistence of vision, animation file formats Computer animation , kinematics and morphing , Making animations that work- a rolling ball, a bouncing ball and creating an animated scene.

UNIT III:

[15HRS]

Video

Video Broadcast Standards- NTSC, PAL, SECAM, HDTV , Integrating Computers and, Television like Video Overlay Systems, Digitized Video Playback, , Differences between Computer and Television Video , Recording Formats like S-VHA Video, Component (YUV), Component Digital, Composite , Digital, Video Hardware Resolutions , Video Tips like Shooting platforms, Lighting, Chroma Key or Blue Screen , Video Compression methods like MPEG and DVI.

Assembling and Delivering a project

The four primary navigational structures used in multimedia like linear, hierarchical, non-linear and composite.

REFERENCES

Mandatory Reading:

1. Vaughan, T. (2011). *Multimedia: Making it work*. McGraw-Hill.

Supplementary Reading:

1. Vic, C. (2016). *Multimedia Foundations: Core Concepts for Digital Design*. Routledge

Web References:

1. <https://www.youtube.com/watch?v=aCisC3sHneM>

2. <https://www.gimp.org/tutorials/>

3. <https://www.infotrendnow.com/2018/08/openshot-tutorial.html>

Practical: Multimedia

Credit: 03

Duration: 45 hrs

Marks: 75

List of PRACTICALS

1. Image Handling:

[1P]

Cropping an image, adjusting image size, increasing the size of the work canvas, saving an image

2. Layers:

[2P]

Adding layers, dragging and pasting selections on to layers, dragging layers between files, viewing and hiding layers, Editing layers, rotating selections, scaling an object, preserving layers transparency, moving and copying layers, duplicating layers, deleting layers, merging layers, using adjustment layers.

3. Channels and Masks:

[2P]

Channel palette, showing and hiding channels, splitting channels in to separate image, merging channels, creating a quick mask, editing masks using quick mask mode

4. Painting and Editing:

[2P]

Brushes palette, brush shape, creating and deleting brushes, creating custom brushes, setting brush options, saving, loading and appending brushes, Options palette.

5. Image Editing Effects and Tools:

[2P]

Opacity, pressure, or exposure , paint fade-out rate, making selections, using selection tools, adjusting selections, softening the edges of a selection, hiding a selection border, moving and copying selections, extending and reducing selections, pasting and deleting selections

6. Sound :

[2P]

Recording Sound using Sound Recorder (Capture), Sound capture through sound editing software , Sound editing, Noise correction, Effect enhancement ; Voice Recognition; Importing audio and saving audio from Audio CD. Sound Quality types: CD Quality, Radio Quality, Telephone Quality

7. Video:

[2P]

Record video from video capture devices, webcams, screen capture or even streaming video and Video Editing

8. Mini Project/Problem Statement/Case Study (integrating the above experiments) [2P]

Course Title : Object Oriented Paradigm

Course Code : CSD-SK7

Marks : 75

Credits : 3

Duration: 45 hrs

Prerequisite Course : Nil

Course Objectives:

- To learn the basic concepts and techniques of object oriented programming paradigm
- To introduce object oriented programming (OOP) using Java.

Course Outcomes:

On successful completion of this course students will be able to:

C01 : Explain the benefits of object oriented design and understand when it is an appropriate methodology to use.

C02 : Differentiate between the top-down and bottom-up approach.

C03: Develop problem-solving and programming skills using the OOP concept.

C04 : Apply the concepts of object-oriented programming using Java.

C05: Design object oriented solutions for small systems involving multiple objects.

C06: Develop GUI for an application.

SYLLABUS:

Unit I:

[15HRS]

Principles of OOP

Programming Paradigms, Basic concepts, OOP: major principles - encapsulation, abstraction, inheritance, polymorphism. Benefits of OOP, Applications of OOP.

Introduction to Java

Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, java.Math class, Arrays in java.

Unit II:

[15HRS]

Objects and Classes

Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Inheritance and Polymorphism.

Inheritance in java, super and sub class, Overriding, java.lang.Object class, Polymorphism, Dynamic binding, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, java.util package.

Unit III:

[15HRS]

Event driven and GUI programming

Windows and Layout Manipulation, Dialogs (Message, confirmation, input), Event Handling: Event sources, Listeners, Mouse and Keyboard Event Handling.

Exception Handling

Exception handling – what and why? Try and catch block. Multiple catch blocks. Nested try, finally block, throw keyword, throws keyword. Custom Exception.

Multithreading

Running and starting thread using Thread class. Thread priorities. Running multiple threads. The Runnable interface. Synchronization and inter thread communication.

Mandatory Reading:

1. Matha, M. P. (2011). *Core Java: a comprehensive study*. PHI Learning.

Supplementary Reading:

1. Balaguruswamy, E. (2014). *Programming with Java-A Primer*. McGraw-Hill Professionals.

Web References:

1. www.tutorialspoint.com/java/index.htm
2. https://www.w3schools.com/java/java_intro.asp
3. <https://www.geeksforgeeks.org/java/>

Practical: Object Oriented Paradigm

Credit: 3

Duration: 45 hrs

Marks: 75

Programs using Java language that covers the following concepts:

1. Classes and instances (2P)
1. Working with the java.Math class (1P)
2. Inheritance (1P)
3. Polymorphism, abstract classes and interfaces (2P)
4. Utilising the java.util package (1P)
5. Collections framework (2P)
6. Event handling and GUI (2P)
7. Exception handling (2P)
8. Mini Project (2P)

Course Title: Computer Networks

Course Code: CSD-SK8

Marks: 75

Credits: 3

Duration: 45 hrs

Prerequisite Course : Nil

Course Objectives:

- Gain Knowledge of the Reference models
- Understand basic concepts of data transmission medium, Compare various routing, transport protocols and Identify suitable protocol for a given network.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Select the most appropriate networking architecture and technologies for the given organization structure.

C02: Compare and contrast the layers in OSI model and TCP/IP.

C03: Explain the functionalities provided by each layer in the OSI model.

C04: Define the concept used for error handling in Datalink layer

C05: Develop client server programs for different applications.

C06: Design basic computer network.

SYLLABUS

UNIT I: Introduction and Data Link Layer

[15HRS]

Basics of Computer Networks, Classification: transmission technology, scale; Applications; Data Communications: data, signal, bandwidth, bit interval and bit rate, Modes of Communication. Layered network architecture, Networks models: OSI model, TCP / IP protocol suite; Guided and Unguided Transmission media, Multiplexing: FDM, TDM. Switching: Circuit switching, message switching, Packet Switching. Data link control: Framing: Character Count, Character Stuffing, Bit Stuffing , Error Detection and correction, Flow and error control, HDLC; Multiple access: Random access – Controlled access , ALOHA, CSMA, CSMA/CD and CSMA/CA; Ethernet : IEEE standards, standard Ethernet, Fast Ethernet, Gigabit Ethernet; Connecting devices: repeater/hub, bridge, router and gateway, Backbone networks - Virtual LANS.

UNIT II: Network Layer

[15HRS]

Functions of Network layer; Network Service types: Virtual Circuits, Datagrams; Logical addressing: IPv4, private and public IP addressing, special IP addresses, subnetting, IPV6 addressing Internet Protocol: Internetworking:IPv4, Fragmentation and reassembly , Address mapping : ARP, RARP, BOOTP, DHCP, ICMP . Routing: classification of routing, Shortest path routing, Distance Vector routing, Link State routing 4. Transport layer and Application layer.

UNIT III: Transport and Application Layer

[15HRS]

Process-to-Process delivery: User Datagram Protocol (UDP), Transmission Control Protocol(TCP), Quality of services (QoS); Application Layer: Domain Name System (DNS) , E-mail,FTP, HTTP.5. Wireless Networks

REFERENCE

Mandatory Reading:

1. Andrew T, David J (2013). Computer Networks (5th ed.). India, Prentice-Hall,

Supplementary Reading:

1. Behrouz A (2011), Data communication and Networking (4th ed.). Amarica McGraw Hill Education.

2. James F, Keith R (2009). Computer Networking - A Top-Down Approach Featuring the Internet (5th ed.). Amarica, Pearson Education

Web References:

<https://www.javatpoint.com/computer-network-tutorial>

<https://www.geeksforgeeks.org/computer-network-tutorials/>

<https://www.studytonight.com/computer-networks/>

<https://www.softwaretestinghelp.com/computer-networking-basics/>

Practical: Computer Networks

Credits: 3

Duration: 45 hrs

Marks: 25

List of Practicals

1. Installing virtual machines, Ethernet cabling [1P]
2. Study of network commands ping, ipconfig, netstat, traceroute [1P]
3. Setting up of LAN Network [1P]
4. IP address manipulation -Extract network id and Host id given netmask [1P]
5. Mini Project / Packet capture tool/ packet generator tool [1P]
6. UDP Socket programming (c/c++/Java/ Perl/Python) [1P]
7. TCP Socket programming [1P]
8. Configuring routing tables [1P]
9. Configuring DHCP server/client [1P]

10. Configuring Telnet/SSH and ftp server. [1P]
11. Firewall Configuring [2P]
12. Write (c/c++/Java/ Perl/Python) program to implement Bit and byte stuffing. [3P]

Course Title: Server Side programming

Course Code: CSD-SK9

Marks: 75

Credits: 03

Duration: 45hrs

Prerequisite Course: Object Oriented Programming

Course Objectives:

- Provide an in depth understanding of a server side language, and use it to develop applications
- Design and implement basic server-side scripts.
- Create responsive and interactive web applications using frameworks

Course Outcomes:

On successful completion of this course students will be able to:

C01: Explain the core features and functionalities of PHP

C02: Design interactive web application using core PHP

C03: Develop basic server side script to interact with users and the database

C04: Build a web application using laravel framework

C05: Utilize MVC model

UNIT I:

[15HRS]

Static vs. Dynamic web pages, Need for Server Side technologies, Multi Tier Web Architecture, file architecture of a web server, Variable Types, Constants, Decision Making-If...Else, Elself, Loop Types - For, while, do while, foreach, Array, string, functions, Object Oriented Concepts - Class, Object, member variable, member function, Inheritance, Polymorphism, overloading, Data Abstraction, Encapsulation. Constructor, Destructor.

UNIT II

[15HRS]

Use of PHP Tags, Tag Styles, Calling Functions, include, Processing GET and POST request, uploading files to server, cookies, sessions, Difference between MySQLi and PDO, database connection using PDO, CRUD - Create, Read, Update, Delete, records in database, pagination, login, difference between XML and AJAX, defining AJAX array, parse AJAX using JQuery, AJAX request, AJAX response.

UNIT III

[15HRS]

Introduction to Laravel, Routing in Laravel, MVC in Laravel, Caching in Laravel, Event subscribers in Laravel, Package Development, Templates, Creating an Application, Testing in Laravel, Database Configuration, Helpers in Laravel, Laravel Pagination, Laravel Security, Authentication Facade, Validation in Laravel, Eloquent ORM, Artisan Command Line Interface, Deploy Application using Laravel.

REFERENCE

Mandatory Reading:

1. Leon A, Zee S(2004), Core PHP Programming (3rd ed.).Prentice Hall Professional
2. Stauffer, M. (2019). Laravel: Up & Running: A Framework for Building Modern PHP Apps. O'Reilly Media.

Supplementary Reading:

1. Williams, H. E., & Lane, D. (2004). *Web Database Applications with PHP and MySQL: Building Effective Database-Driven Web Sites*. O'Reilly Media, Inc.
2. Brinzarea, B., & Hendrix, A. (2009). *Ajax and PHP: Building modern Web applications*. Packt Publishing Ltd.

Web References:

<https://www.w3schools.com/php/>
<https://www.tutorialspoint.com/php/index.htm>
<https://laravel.com/docs/6.x>
<https://www.tutorialspoint.com/laravel/index.htm>

Practical :Server Side programming

Marks: 75

Duration: 45hrs

Credits: 03

PHP Classes and instances,PHP Controls Structures [1P]

PHP Array Programming, Inheritance [1P]

CRUD using PHP database API's. [3P]

- Fetch data from a form, validate and insert in the database.
- Delete data in the database.
- Update data in the database

- Display data from the database.

Uploading files and session management.	[1P]
Implementing MVC	[2P]
Migrations in Laravel	[1P]
Using Forms and Gathering Input in Laravel	[1P]
Creating a registration & user login form in Larvael	[1P]
Using Controllers and Routes for URLs and APIs in Laravel	[1P]
Eloquent ORM in Laravel	[1P]
Creating and Using Composer Packages	[1P]
Security & Session [[1P]

Course Title: Web Development Framework

Course Code:CSD-SK10

Marks: 75

Credits: 03

Duration: 45 hrs

Prerequisite Course :

- Web Design
- Object Oriented Paradigm
- Database Management System

Course Objective:-

- Use Web Frameworks and Libraries to develop interactive web applications.

Course Outcomes: On completion of the course student will be able to

C01: Use ReactJS to build rich and interactive front end applications.

C02: Use NodeJS to develop back end application to accept POST,GET,PUT,DELETE requests.

C03: Develop REST API's using NodeJS.

C04: Write non-blocking and blocking JavaScript code.

C05: Explain Framework and Libraries with respect Web Development.

UNIT I

[15HRS]

ReactJS

History of front end libraries, Motivation for using React, Thinking in React, One way binding, JSX + CSS modules, Virtual DOM, ES6

ReactJS:components

Component lifecycle, Component API, Render functions, State, Props, Mixins

UNIT II

[15HRS]

ReactJS:Interaction between components

Passing data from parent to child, Passing data from child to parent, Passing data between 2 components at the same level, Forms, Refs, React-Router, API integration.

NodeJS: Introduction

Brief overview on the benefits of using Node.js and how Node.js is used in modern web development, Node and NPM, Introduction to setting up a Node.js project, Importing modules using npm, Using core modules to make HTTP requests and manipulate the file system.

UNIT III

[15HRS]

NodeJS: Express framework

Set up a web server, Implementing API routing, Implementing middle-ware, Implementing URL parameters.

NodeJS: MySQL module

Settings up a database and connecting it to a NodeJS server, Storing and retrieving data from the database.

REFERENCES

Mandatory Reading:

1. Brett McLaughlin (2011). *What Is Node ?* (1st ed) O'Reilly Media
2. Alex Banks (2017). *Learning React. (1st ed)* Shroff/O'Reilly

Reference Books:

1. Mario Casciaro (2016). *Node.js Design Patterns* (2nd ed) Packt Publishing Limited

Web References:

1. <https://www.tutorialspoint.com/nodejs/index.htm>
2. <https://reactjs.org/docs/getting-started.html>
3. <https://www.youtube.com/watch?v=Ke90Tje7VS0>

Practical: Web Development Framework

Marks: 75

Duration: 45hrs

Credits: 03

1. Creating a simple web server. (1P)
2. Connect to MySQL database. (1P)
3. CRUD using MySQL database API's. (4P)
 - a. Fetch data from a form, validate and insert in the database.

- b. Delete data in the database.
- c. Update data in the database
- d. Display data from the database.

- 4. Uploading files. (1P)
- 5. Login functionality using sessions. (1P)
- 6. Using cookies to store website data. (1P)
- 7. Mini project. (3P)

Course Title : Software Engineering

Course Code : CSD-SK11

Marks : 75

Credits : 3

Duration: 45hrs

Prerequisite Course : Nil

Course Objectives:

- To understand the various software development methodologies and estimation of software projects.
- To analyze and design software projects.
- To study the various phases of a S/W Development Project.

Course Outcomes:

On successful completion of this course students will be able to:

C01 :Understand the various Software Development Methodologies

C02: Apply Estimation techniques to live projects

C03: Analyze Software Projects.

C04: Design Software Projects.

SYLLABUS:

Unit I:

[15HRS]

SOFTWARE PROCESS:

Characteristics of software process, Software Development Processes and Methodologies: waterfall, prototyping, iterative, spiral, unified process, Benefits of iterative and incremental approach with emphasis on Unified process, CASE Tools, Agile methodologies.

PROJECT MANAGEMENT:

Planning a Software Project Cost estimation, Project Scheduling, Software configuration, management plans, Quality Assurance plans, Project Monitoring plans and Risk Management. Techniques such as Interviewing , Requirement Workshop, brainstorming, prototyping. Characteristics of SRS.

Unit II:

[15HRS]

OOAD and UML:

OOAD: Definition; object oriented analysis; object oriented design and modeling; Assigning responsibilities.

UML: Main UML diagrams Class diagram , sequence diagram, activity diagram, use case diagram. Use case model use case diagram , use case descriptions, use case realization using sequence and activity diagrams. Supplementary requirements. Advanced use case model features.

Requirements: Functional and non-functional

System Design : Class diagram, sequence diagram, activity diagram, state chart diagram, deployment diagram. Brief introduction to other UML diagrams.

SOFTWARE ARCHITECTURE PATTERNS:

Major Architectural Styles (patterns) like Layered Architecture, Pipe and Filter, Shared (Central), Data Store, Event Driven, Model-View-Controller (MVC), Distributed & Emerging Service Oriented Architecture (SOA) and Elementary GRASP Patterns.

Unit III:

[15HRS]

HUMAN COMPUTER INTERACTION:

HCI Definition; User categories, Interface Design-Internal & External Interface design, user interface design, Interface design guidelines.

CODING:

Coding styles, standards, peer reviews, checklist.

TESTING:

Testing Fundamental, Functional Testing, Structural Testing, Testing Object-Oriented Programs, Testing Process and Metrics.

DOCUMENTATION and MAINTENANCE:

Need for Software Documentation. Types of documentation, Need for Maintenance; Types of Maintenance.

RE ENGINEERING:

Business Process Re engineering, Software Re engineering, Reverse Engineering, Restructuring, Forward Engineering, The Economics of Re engineering.

References:

Mandatory

1. Pressman R.S., (2017). *Software Engineering: A Practitioner's Approach*, 6th edition:McGraw Hill
2. Larman C.,(2015). *Applying UML and patterns*, 3rd Edition: Addison Wesley

Supplementary

1. Jalote P., (2010) *An Integrated Approach to Software Engineering*, 3rd Edition :Narosa Publishing House
2. Sommerville I.,(2015) *Software Engineering*, 10th Edition:Adison Wesley
3. Fowler M., (2003) *UML Distilled*, 3rd Edition:Addison Wesley

Web References:

https://www.tutorialspoint.com/software_engineering
<https://www.w3schools.in/sdlc-tutorial>
<https://www.geeksforgeeks.org/software-engineering>
<https://www.javatpoint.com/software-engineering-tutorial>

Practical : Software Engineering

Credit : 3

Duration: 45hrs

Marks : 75

List of suggested PRACTICALS :

For a given project/case study

- 1) Requirements Gathering Techniques (2P)
- 2) Gantt Chart (2P)
- 3) USE Case diagram and Use Case descriptions for the Use Cases (3P)
- 4) Class Diagram (2P)
- 5) Sequence Diagram (2P)
- 6) Activity Diagram (2P)
- 7) State Chart Diagram (2P)

Course Title: Mobile Application Development

Course Code: CSD-SK12

Marks: 75

Credits: 3

Prerequisite Course: Nil

Course Objective:

- To develop applications for mobile devices, including smart phones and tablets, introduced to the current mobile platforms, mobile application development environments and mobile device input methods.

Course Outcomes :

On successful completion of this course students will be able to:

C01: Define mobile platforms and their architectures.

C02: Compare development for different mobile platforms.

C03: Demonstrate the use of Android Components.

C04: Develop Mobile applications for Android Platform.

C05: Make use of SQLite database.

C06: Test Mobile applications for Android Platform.

SYLLABUS:

Unit I:

[15HRS]

Introduction to mobile devices

Mobile devices vs. desktop devices, Why we Need Mobile App, Different Kinds of Mobile Apps, ARM and intel architectures, Power Management, Screen resolution, Touch interfaces, Application deployment : App Store, Google Play, Windows Store, Native vs. web applications.

Android Overview

Introduction to Android. Overview of android stack, Introduction to OS layers, Android features. Linux Kernel, Libraries, Android Runtime, Application Framework, Dalvik VM.

Mobile OS Architectures

Comparing and Contrasting architectures of Android, iOS and Windows, Underlying OS (Darwin vs. Linux vs. Windows), Kernel structure and native level programming, Runtime (Objective-C vs. Dalvik vs. WinRT), Approaches to power management, Security.

Android Components

Activities, Services, Broadcast Receivers ,Content Providers.

Unit II:

[15HRS]

Building UI with Activities

Activities, Views, layouts and Common UI components, Creating UI through code and XML, Activity life cycle, Intents, Communicating data among Activities.

Advanced UI

Selection components (GridView, ListView, Spinner), Adapters, Custom Adapters, Menus, Toast, Custom Toast, Dialogs, Status bar Notifications.

Intent Filters and Broadcast Receivers

Role of filters, Intent-matching rules, Filters in your manifest, Filters in dynamic Broadcast Receivers, Creating Broadcast receiver, Receiving System Broadcast, Understanding Broadcast action, category and data, Sending Broadcast.

Unit III:

[15HRS]

Data Storage

Shared Preferences, Android File System, Internal storage, External storage. SQLite Introducing SQLite, SQLiteOpenHelper and creating a database, Opening and closing a database, Working with cursors, inserts, updates, and deletes

Services

Overview of services in Android, Implementing a Service, Service lifecycle, Inter Process Communication (AIDL Services). Web Services and WebView - Consuming web services, Receiving HTTP Response (XML, JSON), Parsing JSON and XML, Using WebView,

Firestore

Introduction to Firestore and cloud messaging, real time database, authentication.

References

Mandatory Readings:

1. Lee, W. M. (2012). *Beginning android 4 application Development*. John Wiley & Sons.

Supplementary Reading:

1. Burnette, E. (2009). *Hello, Android introducing Google's mobile development platform 2nd*.

Web References:

<http://developer.android.com>

<https://www.tutorialspoint.com/android/index.htm>

<https://abhiandroid.com/>

Practical: Mobile Application Development

Credit: 3

Duration: 45hrs

Marks: 75

List of practicals

1. Getting Started with Android (1P)
2. Creating a basic Android Application (2P)
3. Making use of GUI components (2P)
4. Making use of advanced UI components. (1P)
5. Implementing Data storage application (2P)
6. Implementing Services/Multithreading/Multiprocessing (2P)
7. Firestore (2P)
8. Mini Project (3P)

Course Title: Data Structure

Course Code: CSD-SK13

Marks: 75

Credits: 03

Duration: 45hrs

Prerequisite Course : Introduction to Programming

Course Objectives:

- To understand different methods of organizing data and efficiently implement different data structures.

Course Outcomes:

On successful completion of this course students will be able to:

CO1: Select appropriate data structures as applied to specified problem definition.

CO2: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.

CO3: make use of appropriate sorting/searching technique for given problem.

CO4: Design advance data structure using NonLinear data structure.

SYLLABUS

UNIT I

[15HRS]

Concept, Data type, Data object, ADT, Need of Data Structure, Types of Data Structure, Stack Introduction, Representation-static & dynamic, Operations, Application - infix to postfix & prefix, postfix evaluation, Simulating recursion using stack, Introduction, Representation - static & dynamic, Operations, Circular queue, priority queue (with implementation), Concept of doubly ended queue.

UNIT II:

[15HRS]

Introduction to List, Implementation of List – static & dynamic representation, Types of Linked List, Operations on List, Applications of Linked List, polynomial manipulation, Generalized linked list – concept & representation, Concept & Terminologies, Binary tree, binary search tree, Representation – static & dynamic, Operations on BST – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, non-recursive inorder traversal, Expression Tree.

UNIT III:

[15HRS]

Concept & terminologies, Graph Representation – Adjacency matrix, adjacency list, Traversals – BFS & DFS, Application of BFS, DFS – Shortest path, Bubble sort, Merge sort, Selection sort, Sequential Searching, Binary Searching

REFERENCE

Mandatory Reading:

1. Horowitz E, Sahni S (2008), *Fundamentals of Data Structures in C* (2nd ed.). University Press.

Supplementary Reading:

1. Langsam Y, Augenstein M, Tenenbaum A (2009). *Data Structures using C and C++* (2nd ed.). Pearson Education

2. Gilbeg R, Forouzan B, *Data Structures: A Pseudocode Approach with C++* (2nd ed.). Cengage Learning

Web References:

<https://www.javatpoint.com/data-structure-tutorial>

https://www.tutorialspoint.com/data_structures_algorithms/index.htm

<https://www.geeksforgeeks.org/data-structures/>

<https://www.studytonight.com/data-structures/>

Practical: Data Structures

Credit: 03

Duration: 45hrs

Marks: 75

Programs using C language / Java Language that covers the following concepts:

1. Stack: Static/Dynamic stack implementation.
2. Stack: infix to postfix. [2P]
3. Stack: Evaluation of Postfix expression.
4. Queues: Static and Dynamic Queue Implementation
5. Queues: Circular queue
6. List: Singly Linked List, [2P]
7. List: Doubly Linked List [2P]
8. List: Circular Linked List [2P]
9. Linked List: Polynomial addition
10. Trees: Binary Search Tree: create, add, delete, display nodes. [2P]

Course Title: Software Testing

Course Code: CSD-SK14

Marks: 75

Credits: 3

Duration: 45hrs

Prerequisite Course : Nil

Course Objectives:

1. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
2. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
3. To learn how to plan a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Define Software Testing process for an applications.

C02: Apply Software Testing process in relation to Software Development and Project Management.

C03: Create Test Strategies and plans, design test cases, prioritize and execute them.

C04: Identify various Software Testing problems and solve them.

C05: Identify the needs of software test automation, and define and develop a test tool to support test automation.

CO6: Use software testing methods and modern software testing tools for their testing projects

SYLLABUS

Unit I

[15HRS]

Software Testing principles

Software testing principles, Levels of software testing, Test activities, SDLC and Testing, Verification & Validation, Quality Assurance, Quality Control.

White Box Testing Techniques

Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage , Multiple condition coverage, Inspections, Walkthroughs Code Review.

Black Box Testing

Boundary value analysis, Equivalence partitioning, Cause Effect Graphing.

Unit II:

[20HRS]

Functional Testing

Performance Testing, Stress testing, Configuration Testing, Security Testing, Recovery Testing, Integration Testing, Regression Testing, and Acceptance Testing.

Unit III:

[10HRS]

Testing process

Comparison of different techniques, Test Plan, Test case Design Procedure Specification, Test Case Execution and Analysis, Test Documentation, Reporting test results

Testing web Application

Testing concepts for web apps, Content Testing, User Interface Testing, Component Level Testing, Navigation Testing, Configuration Testing, Security Testing, and Performance Testing.

REFERENCES

Mandatory Reading:

1. Desikan, S., & Ramesh, G. (2006). *Software testing: principles and practice*. Pearson Education India.

Supplementary Reading:

1. Kit E. *Software Testing in the Real World*, United States: Addison-Wesley Publishing Co.
2. Lewis, W. E. (2017). *Software testing and continuous quality improvement*. Auerbach publications.

Web References :

1. www.guru99.com/software-testing.html
2. https://www.tutorialspoint.com/software_testing/index.htm
3. <https://www.javatpoint.com/software-testing-tutorial>

Practical: Software Testing

Credit: 3

Duration: 45hrs

Marks: 75

List of suggested PRACTICALS using any testing tool such as Selenium or equivalent:

1. Planning Test Cases (2P)
2. Generating Test Cases/Test Suite (2P)
3. Enhancing Tests (3P)
4. Debugging Tests (2P)
5. Running Tests (2P)
6. Analyzing Results (2P)
7. Test Reporting (2P)

Course Title: Design Analysis of Algorithms

Course Code: CSD-SK15

Marks: 75

Credits: 3

Duration: 45hrs

Prerequisite Course : Nil

Course Objectives:

- To study paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice.
- To ensure that students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms and compare with one another, and how there are still some problems for which it is unknown whether there exist an efficient algorithm, and how to design efficient algorithms.

Course Outcomes:

On successful completion of this course students will be able to:

C01: Explain basic concepts related to the design and analysis of algorithms.

C02: Describe divide-and-conquer paradigm, Dynamic Paradigm and Greedy Paradigm and explain

when an algorithmic design situation calls for it

C03: Explain the major graph algorithms and their analyses.

CO4: Analyze the performance of an Algorithm.

CO5: Choose appropriate algorithm and design technique for solving problem.

SYLLABUS

Unit I:

[15HRS]

Introduction

What is an Algorithm, Rules for writing Algorithms, Properties of Algorithms, Framework for design and analysis of algorithms(RAM model of computation), Recursive Algorithms, Space and Time Complexity by Tabular method(Performance Analysis).

Divide and Conquer

Elements of Divide and Conquer Algorithms, QuickSort algorithm, Merge sort analysis, Strassen's algorithm for matrix multiplication, Analysis of Binary Search, The Maximum subarray Problem.

Unit II:

[15HRS]

Dynamic programming

General Method, caching v/s computation, Fibonacci numbers by recursion, Fibonacci numbers by caching, Fibonacci numbers by dynamic programming, Optimal Binary Search Tree, Rod Cutting Problem.

Greedy algorithms

Elements of greedy strategy, Activity-selection problem, Job sequencing with deadlines. Knapsack problem.

Unit III:

[15HRS]

Graph Algorithms

Elementary graph algorithms- Techniques for Graphs(Graph cycles, Topological sorting, maximum flow) Minimum spanning tree, growing a spanning tree, Kruskal and Prim algorithms.

Backtracking

General Method, 8-Queen's problem, sum of subsets, Graph coloring.

References

Mandatory Reading:

Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). *Introduction to algorithms*. MIT press.

Supplementary Reading :

Aho, A. V., & Hopcroft, J. E. (1974). *The design and analysis of computer algorithms*. Pearson Education India.

Web References :

1. www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2. <https://www.javatpoint.com/daa-tutorial>
3. <https://www.guru99.com/design-analysis-algorithms-tutorial.html>

Practical: Design and Analysis of Algorithms

Credit : 3

Duration: 45hrs

Marks : 75

Practical Assignments are to be done using a Programming Language for the following :

Programs to implement

1. GCD of 2 numbers using Iterative and Recursive approach
(1P)
2. QuickSort (1P)
3. Binary Search using Recursive approach (1P)
4. Fibonacci numbers using Dynamic Programming approach.
(1P)

5. Activity Selection Problem using Dynamic Programming approach. (1P)
6. job sequencing with Deadlines. (1P)
7. Knapsack Problem (1P)
8. Rod Cutting Problem. (1P)
9. Optimal Binary Search Tree.
- (2P)
10. Graph using matrix and linked list (2P)
11. Graph Coloring Problem (2P)

Course Title: Cloud Computing

Course Code: CSD-SK16

Marks: 75

Credits: 3

Duration: 45hrs

Prerequisite Course : Nil

Course Objectives:

- To make students understand the key elements of cloud computing.
- To understand the difference between deploying applications on the cloud and the local infrastructure.
- To understand various cloud service models.

Course Outcomes:

On completion of the course students will be able to:

CO1: Explain the core concepts of the cloud computing paradigm.

CO2: Characterize the different cloud services ie. Infrastructure, Platform and Software as a Service (IaaS, PaaS, SaaS).

CO3: Deploy application in a production environment.

CO4: Host a cloud platform like Apache OpenStack and OpenCloud

Syllabus:

Unit I

[15HRS]

Overview of Computing Paradigm

Recent trends in Computing: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing

Introduction to cloud computing:

Cloud Computing definition, History of Cloud Computing, How Cloud Computing Works, Benefits and challenges of cloud computing, Issues for Cloud Computing.

Unit II

[15HRS]

Comparison with traditional computing architecture (client/server), Cloud Computing Service Models, Deployment Models- Public cloud, Private cloud, Hybrid cloud and Community cloud, Key drivers to adopting cloud, Impact of cloud on users, Governance in the cloud.

Infrastructure as a Service (IaaS)

Introduction to IaaS: IaaS definition, Introduction to virtualization, Different approaches to virtualization, Hypervisors, Machine Image, Docker Container, CloudStack, OpenStack, Virtual Machine (VM). Resource Virtualization: Server, Storage, Network. Examples: Amazon EC2, Load balancing

Unit III

[15HRS]

Platform as a Service (PaaS)

Introduction to PaaS: What is PaaS, Service Oriented Architecture (SOA).Cloud Platform and Management: Computation, Storage, Examples: Google App Engine, Microsoft Azure, Salesforce.com.

Software as a Service (PaaS)

Introduction to SaaS, Web services, Web 2.0, Web OS, Introduction to MapReduce, Case Study on SaaS.

References:-

Mandatory Reading:

1. Hill, R., Hirsch, L., Lake, P., & Moshiri, S. (2012). *Guide to cloud computing: principles and practice*. Springer Science & Business Media.

Supplementary Reading:

1. Furht, B., & Escalante, A. (2010). *Handbook of cloud computing* (Vol. 3). New York: Springer.

Web References:

1. https://www.tutorialspoint.com/cloud_computing/index.htm
2. <https://www.guru99.com/cloud-computing-for-beginners.html>
3. <https://www.techopedia.com/definition/2/cloud-computing>

Practical: Cloud Computing

Credit: 3

Duration: 45hrs

Marks: 75

1. Setup owncloud [2]
2. Cloud Server Management using VestaCP/Froxlor/ISPConfig3 [4]
 - a. DNS Setup
 - b. Email Configuration
 - c. Domain management
3. Apache CloudStack [4]
 - a. Installation
 - b. VPN

c. Working with Instances, Network, Storage

4. Container Management Using Docker

[5]

a. Installing docker

b. Creating containers

c. Package and run a custom app using docker

Course Title: Content Management System

Course Code:

Marks: 75

Credits: 03

Prerequisite Course : Nil

Course Objectives:

- Use and manage different content management system.
- Design and deploy websites developed using a content management system.

Course Outcomes:

On successful completion of this Course students will be able to:

C01: Install and maintain content management systems

C02: Develop website using different content management systems

CO3: Make use of plugins to add more functionality

CO4: Create users and manage them

UNIT I:

[15HRS]

Wordpress

WordPress dashboard, Types of users, WordPress settings panel, Permalinks and RSS feeds, Creating and managing posts, Setting up post categories, Creating and managing pages, Managing comments, Installing and updating plugins, Customising WordPress themes, WordPress theme options, WordPress Security / backup / domain transfers, Migration From Different Platforms, Optimization of WordPress Website, SEO Plugin

Woocommerce

Introduction to Woocommerce, Woocommerce installation, Creating product: Creating your product - General data, Inventory data, Shipping data, Attributes, Advanced data, Grouped products, Virtual products, Downloadable products, External/Affiliate products, Setting up categories, tags, and product images.

UNIT II

[15HRS]

Jumla

Joomla Global Configuration, Article Manager, Archive Manager, Frontpage Manager, Section Manager, Category Manager, Media Manager, Menu Manager, Component Manager, Content Manager, Extensions Manager, Module Manager, Plugin Manager, Template Manager, Understanding the concept of Joomla Positions, Changing the layout structure by changing the module position, Understanding Basic Joomla Template, Customizing Joomla Template, Building Custom Joomla Template, Understanding templateDetails.xml File, Creating templateDetails.xml File using tmpl_builder, Linking CSS, Linking Javascript, Understanding include, Displaying content in XHTML, Creating template, installation package, Creating Custom Forms, Changing the Form appearance using CSS.

UNIT III

[15HRS]

Drupal

Drupal Overview, Drupal Site Building, Introduction to Drush, Setting a New Site Title and Logo, Adding More Users, Assigning Roles and Permissions to Site Users, Creating a Blog, Working with Blocks, Working with Views, Changing Your Site's Theme, Installing New Add-on Modules, Working with the Drupal Docroot Directory, Creating a Basic Drupal Module, Adding JavaScript to Your Drupal Module.

Moodle

Course categories – an overview, Creating courses, Course requests, Managing courses in bulk, Forms of enrolment, User profiles, Standard user actions, Manual accounts, User authentication, Assigning roles, roles Capabilities, Customizing your front page, The Moodle editor, Module plugins,

REFERENCE

Mandatory Reading:

1. Douglass, R. T., Little, M., & Smith, J. W. (2006). *Building online communities with Drupal, phpBB, and WordPress*. Apress.

Supplementary Reading:

1. Ravensbergen, R. (2015). *Building E-Commerce Solutions with WooCommerce*. Packt Publishing Ltd.

2. Barnett, J. (2015). *Drupal 8 for Absolute Beginners*. Apress.

3. Büchner, A. (2016). *Moodle 3 administration*. Packt Publishing Ltd.

Web References:

1. <https://www.tutorialspoint.com/wordpress/index.htm>
2. https://docs.moodle.org/22/en/Moodle_video_tutorials
3. <https://www.tutorialspoint.com/drupal/index.htm>
4. <https://www.tutorialspoint.com/joomla/index.htm>

Course Title: Lab Content Management System

Course Code: COM- III.SD-SK9

Marks: 25

Credits: 03

1. Installing and creating a wordpress website [1P]
2. Installing themes and working with a wordpress editor [1P]
3. Plugins - Contact form and SEO [1P]
4. Creating a blog website using wordpress [1P]
5. Installing woocommerce plugin, add products to the site [1P]
6. Customizing products by setting the product attributes [1P]
7. Develop an ecommerce website [2P]
8. Installing drupal and building a website using a template [1P]
9. User management [1P]

10. Develop website using drupal [1P]
11. Installing moodle and setting up the home page [1P]
12. Managing courses in moodle [1P]
13. User management in moodle [1P]
14. Creating a website using moodle [1P]

Course Title: Network Security

Course Code: CSD-SK15

Marks: 75

Credits: 3

Prerequisite Course: Nil

Course Objectives:

- To understand the theory and concepts of Network Security.

Course outcome:

At the end of the course students will be able to :

C01: Gain Knowledge of the threats, vulnerabilities and system risks.

CO2: Understand cryptography, ciphers and encryption algorithms.

CO3 : Compare and contrast symmetric and asymmetric encryption systems.

CO4: Know about viruses, Trojan horses, worms, program flaws and the defenses against them.

Syllabus :

UNIT I

[15HRS]

Concepts of Security & Classical Encryption Techniques

Introduction, The need for security, Security Approaches, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Classical Encryption Techniques : Substitution techniques, Transposition techniques, Steganography.

Design Principle of Block Cipher [

Block Cipher Operation: Electronic Code Book, Cipher Block Chaining, Cipher Feedback, Output Feedback, Counter, Feistel Cipher, The Data Encryption Standard.

Cryptography

i. Mathematical Tools

[3HRS]

Introduction to Number Theory, Modular Arithmetic, Prime Numbers, Euler's Totient Function.

UNIT II

[15HRS]

Public Key Cryptography

Principles of Public Key Cryptosystems, The RSA Algorithm, Other Public key cryptosystems, Diffie Hellman Key Exchange.

Cryptographic Hash Functions

Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Hash Functions Based on Cipher Block Chaining, MD5 Message Digest Algorithm, Secure Hash Algorithm SHA 512.

Message Authentication Codes and Digital Signatures

Message Authentication Requirements – Message Authentication Functions –Requirements for Security of MACs,MACs Based on Hash Functions, HMAC, MACs Based on Block Ciphers, Data Authentication Algorithm. Digital Signatures, Digital Signature Standard.

UNIT III

[15HRS]

Key Management & Distribution And User Authentication

Introduction, Digital Certificate, Private key Management, The PKIX Model, Public key cryptographic standards ,XML, PKI and security.

Program Security

Flaws, Malicious code: viruses, Trojan horses, worms, Program flaws: buffer overflows, time-of-check to time-of-use flaws, incomplete mediation.

Firewall and Virtual Private Network

Introduction to network security techniques: IP Security, firewalls, virtual private networks.

Mandatory Reading :

1. William Stallings, –Cryptography and Network Security – Principles and Practices,, Prentice Hall of India, Fifth Edition.

Supplimentary Reading

1. KahateAtul, –Cryptography and Network Security|| Tata McGraw-Hill.

Web References:

<https://www.tutorialspoint.com/cryptography/index.htm>

https://www.tutorialspoint.com/internet_technologies/firewall_security.htm

https://www.tutorialspoint.com/webservices/web_services_security.htm

Lab : Network SecurityCredits : 3

Marks : 75

List of Practicals

1. Implementation of Caesar Cipher (1P)
2. Implementation of One-Time Pad (1P)
3. Implementation of Playfair Cipher (1P)
4. Implementation of Vignere Cipher (1P)
5. Implementation of Hill Cipher (1P)

6. Implementation of Data Encryption Standard Algorithm (2P)
7. Implementation of Image Steganography (1P)
8. Implementation of RSA Algorithm (1P)
9. Implementation of Digital Signatures using RSA Algorithm (1P)
10. Mini Project/ Case Study (3P)