Parvatibai Chowgule College of Arts and Science
(Autonomous)
DEPARTMENT OF COMPUTER SCIENCE
COURSE STRUCTURE
Post Graduate Diploma in Computer Applications (PGDCA)

To be Implemented from 2020- 2021

Semester I (20 credits)

Course Code	Course Type	Course Name	Credits	Contact (hrs/week)	
				L	**P**
DCA11A	Core – I	Problem Solving and Introduction to Programming	4	3	1
DCA12	Core – II	DataBase Management Systems	4	3	1
DCA13	Core – III	Client Side Technologies	4	3	1
DCA14	Elective – I	Elective Course I	4	3	1
DCA15	Elective – II	Elective Course II	4	3	1

Semester II (20 credits)

Course Code	Course Type	Course Name	Credits	Contact (hrs/week)	
				L	**P**
DCA21	Core – IV	Computer Networking	4	3	1
DCA22	Core – V	Software Engineering	4	3	1
DCA23	Elective – III	Elective Course III	4	3	1
DCA24	Elective – IV	Elective Course IV	4	3	1
DCA25	Elective – V	Elective Course V	4	3	1

L – Lectures ---> 1 Hour Duration

P – Practicals --->2 Hours Duration

List of Elective Courses

EL1. Multimedia

EL2. E-Learning

EL4. HCI

EL5. E-commerce

EL6. Digital Marketing

EL7. Network Administration

EL8. Software Testing

EL9. Server Side Programming

EL10. Data Structures

EL13. Office Automation Tools

EL14. Assessment and Evaluation for Learning

EL15.Instructional Design

EL16.Content Management System

Course Title: Problem Solving and Introduction to Programming
Course Code: DCA 11A
Marks: 75
Credits: 3
Duration: 45 Hrs

Prerequisite Courses: Nil

Course Objectives:

- ➢ To understand the concept of basic computer algorithm and flowchart and use the algorithm for various problem solving.
- ➢ To implement algorithms using high level programming language.
- ➢ To understand basic principles of programming – example Python.

Course Outcomes:

Upon completion of the course students will be able to:

CO1: Explain problem solving strategies.
CO2: Draw a flowchart for a given problem.
CO3: Write an algorithm for a given problem.
CO4: Implement sorting and searching algorithms.
CO5: Recognize and incorporate programming elements such as loops, decision making, functions, string, list, tuple, dictionary and files in to applications that solve real world problems.

SYLLABUS:

UNIT I: **[10 HRS]**
Introduction to Computer Problem Solving : Algorithm, Flowchart, The Problem-Solving Aspect, General problem-solving strategies, Top-Down Design, Implementation of Algorithms, Efficiency of Algorithms, Recursive algorithms.

Basic Algorithms : Exchanging the values, Summation of a set of numbers, factorial computation, generation of the Fibonacci series, reversing the digits of an integer, base conversion.

Factoring Methods : Finding divisors of an integer, finding the Greatest Common Divisor of two integers, generating prime numbers, computing prime factors of an integers.

Sorting and Searching : Bubble sort, Insertion Sort, Sequential Search and Binary Search.

UNIT II   **[20 HRS]**
Introduction to Python
Motivation, programming paradigms, What Python can do, Python's technical strength, Python interpreter, Program execution, Execution model variations, How to run programs.

Basic Syntax

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

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

Lists

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

Tuple

Introduction, Accessing tuples, Operations, Working, Functions 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. Composition.

Input-Output

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

Exception Handling

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

REFERENCES:

MANDATORY:

1.Mark Lutz,Learning Python, O'Reilly Media, Third Edition, 2008
2.Dromey R.G., How to solve it by computer, Prentice Hall of India, 2nd Edition, 2004.
3.Alex Martelli,Python – A Nutshell, O'Reilly Media, Second Edition, 2006
4.Wes McKinney, Python for Data Analysis, O'Reilly Media, 2012

WEB BASED:
1.https://www.w3schools.com
2.https://www.tutorialspoint.com
3.https://www.javatpoint.com

4.https://www.geeksforgeeks.org
5.https://www.guru99.com

Practicals: Problem Solving and Introduction to Programming
Credit: 01
Marks: 25
Duration: 30 Hrs

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

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Course Title: Data Base Management Systems
Course Code: DCA12
Marks: 75
Credits: 3
Duration : 45 Hrs

Prerequisite Courses: Nil

Course Objectives:

- ➢ To provides basic knowledge of a database management system.
- ➢ To understand importance of ER diagram.
- ➢ To formulate queries in Relation Algebra and SQL for Database Manipulations
- ➢ Develop database systems using RDBMS.

Course outcome:

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

CO1: Explain database concepts and the need for the same.
CO2: Identify different entities and relationship between them.
CO3: Represent the given system diagrammatically using ER diagram.
 CO4: Convert an ER diagram to a schema and effectively represent it using appropriate RDBMS.
CO5: Formulate queries in Relational Algebra, SQL to manipulate the database.
CO6: Analyze the schema to see if they fulfill Normalization criterion

SYLLABUS:

UNIT I
[15HRS]
Overview of database management: Data, information, database, database management system; Managing data; File systems versus a DBMS, advantages of a DBMS; Data abstraction, instances and schemas, data models; Data manipulation language, data definition language; Architecture of a DBMS; Users of a DBMS, database administrator.
Database design: Design phases – conceptual design, logical design, physical design; ER model – entities, attributes, and relationships, mapping cardinalities, keys; ER diagrams – strong entities, weak entities, generalization, specialization, aggregation; Converting ER diagram to relational schemas.

UNIT II
[15HRS]
Relational model: Relation, properties of relational model; Entities, integrity constraints, referential integrity constraints; Relational algebra – select, project, cross product, set operations, rename operation;

Functional dependency and normalization: Atomic domain, nested relation; Key, super key, primary key, candidate key; Functional dependency, axioms, closure of a set of attributes, closure of a set of functional dependencies

UNIT III
[15HRS]
SQL: Basic structure of SQL query – Create, select, where, from, rename operation; Set operations; Aggregate functions; Group by, having clauses; Nested queries; Views; Insert, delete, update.
Introduction to transactions: Transaction concept, Transaction state, ACID properties, Concurrent Transactions, Serializability.

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

SUPPLEMENTARY:

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.

WEB BASED:
1.https://www.tutorialspoint.com/dbms
2.https://beginnersbook.com/2015/04/dbms-tutorial/
3.https://www.guru99.com/dbms
4.https://www.javatpoint.com/dbms

Practicals: Database Management Systems
Credit: 1
Marks: 25
Duration: 30 Hrs

List of Practical

1. ER diagram (1P)
2. ER diagram with specialization/generalization and aggregation.(1P)
3. Converting ERD into Schema.(2P)
4 SQL (2P)
5 Nested Queries (2P)
6Normalization(2P)
7 Report Writing (1P)
8. Mini project (4P)

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Course Title: Client Side Technologies
Paper Code: DCA13
Marks: 75
Credits: 3
Duration : 45 Hrs

Prerequisite Courses: Nil

Course Objective:

➢ To develop a high degree of competence as a web designer.

Course Outcomes:

On completion of the course students will be able to :

CO1: Design Content for a web application
CO2: Style content so as to provide an effective User Interface
CO3: Provide for dynamism in the User Interface to enhance usability
CO4: Develop a static web application

SYLLABUS:

Unit I: The Internet and Content Development [20HRS]
Computer Networks: LAN, MAN, WAN, etc., Layout (Ring, bus, star, etc.), IP address: public, private, static, dynamic, Internet protocols and services: http, https, FTP, SMTP, Telnet, DNS, DHCP, Intranet & Extranet, Internet Infrastructure, Search Engines, Web Browser, Web server.

Basic HTML : Introduction, importance, Basic: HTML Tag, HEADER Tag, META Tag, TITLE Tag, BODY Tag, Text Formatting: PRE Tag, FONT Tag, entities, Image: IMG tag, image maps, Hyperlinks: Anchor tag, Lists: Unordered Lists, Ordered Lists, Definition Lists, Table tags: TABLE, TR and TD Tags, Cell Spacing and Cell Padding, Colspan and Rowspan. End user Interaction: FORM and INPUT Tag, Text Box, Radio Button, Checkbox, SELECT Tag and Pull Down Lists, TEXTAREA, Hidden, Submit and Reset, Special Tags : COLGROUP, THREAD, TBODY, TFOOT, blank, self, parent, top, IFRAME, LABEL, Attribute for <SELECT>.

HTML5: The <canvas> element for 2D drawing, The <video> and <audio> elements for media playback, Support for local storage, New content-specific elements, like <article>, <footer>, <header>, <nav>, <section>, New form controls, like calendar, date, time, email, url, search.

UNIT II: Styling UI [15HRS]
CSS: Introduction to CSS, Advantages, Types of style sheets: Inline, Internal, External, Multiple Style sheets and Cascading order, Grouping or nesting, Syntax, ID and Class, Pseudo-class, Pseudo-element, CSS units of measurement, Colors.
 New features in CSS3: Selectors, Box Model, Backgrounds and Borders, Image Values and Replaced Content, Text Effects, 2D/3D Transformations, Animations, Multiple Column Layout, User Interface.

UNITIII: Dynamic UI
[10HRS]
Client side scripting: Introduction to Javascript, HTML DOM, Core Javascript, form validations

REFERENCES:

MANDATORY:

1.DT Editorial Services, **Web Technologies, Black Book, 2018, DreamTech**

WEB BASED:
1.https://www.w3schools.com
2.https://www.tutorialspoint.com/html/index.htm3.https://www.tutorialspoint.com/css/index.htm
4.https://www.tutorialspoint.com/javascript/index.htm
5.https://www.udemy.com/courses/development/web-development/

Practicals: Client Side Technologies
Credit: 1
Marks: 25
Duration: 30 Hrs

HTML: [2 P]
   1.   Text formats.
   2.   Image formats.
   3.   Hyperlink and Listings
   4.   Table formats
   5.   Forms

Cascading Style Sheet: [2 P]
   1.Internal and External style implementations
   2.Creating Dynamic pages using CSS.

Javascript: [4 P]
   1. Implementing functions in javascript (alert( ); confirm( ); prompt( ))
   2. Form Validations using Javascript
   3. Creating Dynamic pages using Javascript. HTML5:

Web site design using HTML5.   [4 P]
   ➢ Implementation of canvas.
   ➢ Embedding Audio and Video in a Webpage.
   ➢ Implementation of additional form controls.

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Course Title: Computer Networks
Course Code: DCA21
Marks: 75
Credits: 3
Duration: 45 Hrs

Prerequisite Courses: Nil

Course Objectives:

- ➢ To understand the basic concepts of Computer Networking.
- ➢ To understand the layered architecture of computer networks.
- ➢ To understand various transmission media used for networking.
- ➢ To understand working of various protocols in different layers.

Course Outcomes:

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

CO1: Appreciate the need for Network and various layers of OSI and TCP/IP reference model.
CO2: Explain various Data Communications media.
CO3: Identify the different types of network topologies and Switching methods.
CO4: Describe various Data link Layer Protocols.
CO5: Identify the different types of network devices and their functions within a network.
CO6: Compare various Classeless and Classfull IP addresses with Subneting concept.
CO7: Analyze and Interpret various Network and Transport Layer protocols
CO8: Explain different application layer protocols

SYLLABUS:

UNIT I : Basics of Computer Networks, Transmission Media and Data communication   [15HRS]
Components
Basics of Computer Networks **:** Networking of Computer - Advantages and disadvantages of computer networking. Types of Networks - LAN, MAN, WAN, Wireless; Network Topology – Star, Ring, Bus, Tree, Complete, Irregular; Reference Models - The OSI reference model, the TCP/IP reference model. Telephone System: Structure of telephone system, the local loops, trunks; Switching - Circuit switching, message switching, Packet Switching.
Transmission Media **:** Transmission media - Magnetic media, twisted pair, co-axial cable (baseband and broadband), fiber optics principle, transmission of light through fiber, fiber cables, fiber optics network, comparison of fiber optic and copper wire. Wireless Transmission (The electromagnetic spectrum, Radio Transmission, Microwave Transmission, Infrared and Millimeter Waves, Light wave Transmission)
Data Communication Components: Modem, Repeaters, Hubs, Bridges, Switches, Routers, Gateways.

UNIT II : Data Link layer and Medium Access Control Sublayer (MAC)   [10HRS]
Data Link Layer Protocols: Asynchronous, Synchronous, Character Oriented and Bit Oriented Protocols. Error Control, Internet.
Medium Access Control Sublayer (MAC):   Multiple Access Protocols, CSMA Protocols, Collision-Free Protocols (Bit Map protocol, Binary countdown), 802.3 Frame Header, Ethernet: Ethernet Cabling, Manchester

Encoding, The Ethernet MAC sublayer protocol, The Binary exponential backoff algorithm, Switched Ethernet, Fast Ethernet, Gigabit Ethernet.

UNIT III : Network Layer, Transport Layer and Application layer   [20HRS]
Network Layer: IP Address class, Network and Host Addressing, Subnet, Subnet Mask. TCP/IP Protocol Suite,Services, Static vs Dynamic address, Shortest Path Routing Algorithm, IP Protocol Header, Address resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP), Internet Control Message Protocol (ICMP).
Transport Layer: User Datagram Protocol (UDP), UDP Header, Transmission Control Protocol (TCP), Segment Header, Connection Establishment and Release.
Application Layer :Telnet (Terminal Network), HTTP, File Transfer Protocol (FTP), Simple Mail Transfer Protocol (SMTP).

REFERENCES:

MANDATORY:
1.Behrouz A. Forouzan B.(2017) Data communication and Networking(5th ed.). McGraw Hill Education
2.Tanenbaum A., W.(2010) Computer Networks (5th ed.) . Pearson
3.Kurose J, K.(2017) Computer Networking – A Top-Down Approach (6th ed.) Pearson Education,

WEB BASED:
https://www.youtube.com/watch?v=tj7f244tubM
https://www.youtube.com/watch?v=vFypCugyFoM
3. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
https://www.cisco.com › training-events › netacad › course_catalog › docs
Slides for the book Behrouz A. Forouzan, "Data communication and Networking", Tata McGraw – Hill,2011, 4th Edition : http://www.mhhe.com/engcs/compsci/forouzan/dcn/index.mhtml

Practicals: Computer Networks
Credit: 1
Marks: 25
Duration: 30 Hrs

1. Installing OS and drivers   (1 P)
2. Cable colour code and crimping, Demonstration of structured cabling   (1 P)
3. Setting up of network (TCP/IP configuration)   (2 P)
4. Sharing resources (files, printer etc.)   (1 P)
5. Study of Network Commands   (2 P)
6. Setting up of wireless network (Adhoc and Infrastructure mode)   (1 P)
7. Network monitoring tool   (1 P)
8. Study of Wire shark Tool   (3P)
9. Network simulator tool1   (3P)

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Course Title: Software Engineering
Course Code:DCA22
Marks: 75
Credits: 3
Duration: 45 Hrs

Prerequisite Courses : 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:

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

CO1: Understand the various Software Development Methodologies
CO2: Apply Estimation techniques to live projects
CO3: Analyze Software Projects.
CO4: Design Software Projects.

SYLLABUS:

UNIT I: **[15 HRS]**
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:

                                                                                    [15 HRS]
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: [15 HRS]
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.
REENGINEERING:Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring,Forward Engineering, The Economics of Reengineering.

REFERENCES:

MANDATORY:
1. Pressman R., (2017) ,Software Engineering: A Practitioners 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 BASED:
1.https://www.tutorialspoint.com/software_engineering
2.https://www.w3schools.in/sdlc-tutorial
3.https://www.geeksforgeeks.org/software-engineering
4.https://www.javatpoint.com/software-engineering-tutorial

Practicals : Software Engineering
Credit : 1
Marks : 25
Duration: 30 Hrs

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]

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ELECTIVES

Course Title: Multimedia
Course Code: DCA-EL1
Marks: 75
Credits: 3
Duration: 45 Hrs

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Prerequisite Courses: Nil

Course Objectives:
- ➢ To learn the basic Multimedia concepts
- ➢ To develop skills and competencies to design graphical images.
- ➢ To develop skills to Capture and Edit Audio and Video, using Software tools.
- ➢ To build a Multimedia product.

Course Outcomes:

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

CO1: Explain the concept of Multimedia – Components, Team members and their roles.
CO2: Identify and describe the function of the general skill sets in the multimedia industry.
CO3: Classify and realize the types of Authoring tools and their functions.
CO4: Analyze the requirements of Multimedia product.
CO5: Perform the editing features for Images, Sound and Video.
CO6: Create animation using basic features.
CO7: Develop a multimedia product using any authoring tools.
CO8: Assemble and deliver multimedia projects.

SYLLABUS:

UNIT I: Multimedia and Architecture: **[15 HRS]**

Introduction: Overview of multimedia, Multimedia building blocks, Digital representation, Interaction techniques and devices, 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 architecture: Introduction to multimedia architectures, User interfaces, Windows multimedia support, Windows API for Multimedia, Multimedia Database Systems, Media streaming, Multimedia authoring tools, Multimedia OS.

UNIT II: Building Blocks I: [15 HRS]

Text: Visual representation of text, Digital representation of text, Text file formats: TXT, DOC, RTF, PDF, ODT Conversion to and from of various text formats, Hypermedia and Hypertext.

Image: Basic Image fundamentals, Importance of graphics in multimedia, Vector and Raster graphics, image capturing methods – scanner, digital camera and its types, etc. various attributes of Images – size, color, depth, resolution, etc, Image data types, image file formats (BMP, JPEG, GIF, TIFF, PNG, DIB, EPS, CIF, PEX, PIC), their features and limitations, graphic file formats conversions.

Sound: Sound and it Attributes, Mono V/s Stereo sound, Sound channels, Sound and its effect in multimedia, Analog V/s Digital sound, Basics of digital sound-Sampling, Frequency, Sound Depth, Creation of Digital Audio files – recording & editing. Overview of various sound file formats on PC – WAV, VOC, AVI, MP3, MP4, Ogg, Verbose etc. Digital audio vs MIDI and MIDI File format, CD and DVD formats.

UNIT III: Building Blocks II: [15 HRS]

Animation: Basics of animation, Principle and use of animation in multimedia, Effect of resolutions, pixel depth, Images size on quality and storage. Overview of 2-D and 3-D animation techniques and software. Animation on the Web – features and limitations, creating simple animations for the Web. Animation file formats.

Video: Analog and Digital Video, Video on PC. Introduction to graphics accelerator cards, Video Broadcast Standards - NTSC, PAL, SECAM, HDTV. Introduction to video capturing, Media & Instrument – Videodisk, DVCAM, Camcorder.

Recording Formats like S-VHA Video, Component (YUV), Component Digital, Composite Digital, and Video Hardware Resolutions.

Video Tips like shooting platforms, Lighting, Chroma Key or Blue Screen.

Data Compression: Types of compression: Lossy & Lossless, Symmetrical & Asymmetrical, Intraframe & Interframe, Hybrid.

Assembling and delivering a project: The four primary navigational structures used in multimedia like linear, hierarchical, non-linear and composite.

REFERENCES:

MANDATORY:
1.Vaughan Tay, (2011), Multimedia: Making it Work, (8th Ed), Tata McGraw-Hill.

SUPPLEMENTARY:
1.Prabhat K.Andleigh/ Kiran Thakrar, (2015), Multimedia Systems Design, (1st Ed), Pearson Education India.
2.Jeffcoate Judith, (2006), Multimedia in Practice, Technology and Applications, (1st Ed) Prentice Hall India.

WEB BASED:
1.https://www.tutorialspoint.com/multimedia/multimedia_introduction.htm
2.https://www.gimp.org

3.https://www.audacityteam.org/
4.https://www.topwin-movie-maker.com/tutorials.html
5.https://www.minitool.com/moviemaker/use-movie-maker.html
6.https://www.coursepath.com/powerpoint-as-e-learning-authoring-tool
7.https://elearningindustry.com/powerpoint-as-an-authoring-tool

Practicals: Multimedia
Credit : 1
Marks: 25
Duration: 30 Hrs

Multimedia Software Tools like GIMP, Audacity, Windows Movie Maker, Blender. iMovie (the numbers in brackets indicate number of practical's):
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. 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) like E-Book Design, Product Design. [2P]

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Course Title: E-Learning
Course Code:DCA-EL2
Marks : 75
Credits : 3
Duration:45 Hours

Prerequisite Courses: Nil

Course Objective:
  ➢ This course is an introduction to ICT (Information Communications Technology) in education.
  ➢ It aims at exploring the Instructional Design principles, developing and applying the various concepts of Instructional Design skills learnt wrt E-Learning and develop E-content in various application areas related to ICT and Education.

Course Outcomes:

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

CO1: Explain the working of an E-learning module.
CO2: Explain the various Instructional Design Principles.
CO3: Develop own course material and upload it using an appropriate LMS.
CO4: Evaluate and apply appropriate Assessment techniques to the E-content
CO5: Differentiate between Summative and Formative assessment.
CO6: Write Learning and Course objectives.

SYLLABUS

UNIT I: Introduction & Course Development   [20HRS]
Scope and form of E-learning, Role of an E-learning project, Phases in an E-learning project.
Instructional Design, The process of Designing Instruction,Developing Materials.(Story Boarding, Content Integration, and SCORM Compliance).Working with L.M.S. (Learning Management System)- Installation and use of the administrator, teacher and student interface. Course Definition, Registration and upload, tracking of results).

UNIT II: E-learning & Pedagogical Approaches   [15HRS]
The Behaviorist School of learning and its implications on E-learning, The Cognitive School of Learning and its Implication on E-learning, The Constructivist School of Learning and its implications on E-learning. Blooms Taxonomy of Educational Objectives, Types of Learning Objectives. Content Analysis (Types- Facts, concepts, process, procedure, principles).The Teaching of concepts, procedure, principles, understanding. Enabling a motivated Learning Environment.

UNIT III: E-learning Strategies & Assessment Design   [10HRS]
E-LEARNING STRATEGIES:
Simulation, Drill, Interactive Learning, Problem Solving, Tutorials.

ASSESSMENT DESIGN:

Online formative and summative assessment, Rubrics for Assessment- Analytic and Holistic Rubrics, Rubrics for Assessment, Security and Authentication.

REFERENCES:

MANDATORY:
1.Shelly Cashman Gunter.(2011).Teachers Discovering Computers: Integrating Technology in the Classroom,(7th ed.).Wadsworth Publishing Co Inc.
SUPPLEMENTARY:
1.Smith, P. L. & Ragan, T. J.(2008). Instructional design(4rth ed.). New York: John Wiley & Sons. ISBN:0471393533
2.M.D. Roblyer, Aaron H. Doering(2018). Integrating Educational Technology into Teaching: Student Value Edition (8th ed.). Publisher: Pearson ISBN-10: 013289680X, ISBN-13:978-0132896801.
3.Dick, W., Carey, L., & Carey, J. O.(2014). The systematic design of instruction (8th ed.). Boston: Allyn and Bacon.
4.Wiggins, G. P., & McTighe, J.(2005). Understanding by design (2nd ed.). Assn. for Supervision & Curriculum Development;
5.Alexandria, VA: Association for Supervision and Curriculum Development.
6.Christensen, C. M., Horn, M. B., & Johnson, C. W.(2016). Disrupting class: How disruptive innovation will change the way the world learns(2nd ed.). New York: McGraw- Hill.

WEB BASED:
1.https://www.udemy.com/course/instructional-design-for-elearning/
2.https://nptel.ac.in/courses/127101013/
3. https://nptel.ac.in/courses/121105010/
4. Better learning (Bloom's Taxonomy):   https://www.plesyoutube.com/watchv=0flnAoX9QEw
5.Assessment:https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/121106012/lec13.pdf

Practicals: E-Learning
Credit: 01
Marks: 25
Duration: 30 Hrs

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

(1) Installing, Creating and Running a complete course using LMS   **[3P]**
Course Administration: Creation and using Resources and Planning Activities
Case Study: Create a complete course and work on all the resources and activities. Also the various grade book options etc.

(2) Creating Storyboards (using Movie Maker/PPT or similar FOSS)   **[1P]**

(3) Construct a Mindmap (using Freemind or any other FOSS)   **[1P]**

(4) Prepare a 10-minute Video tutorial on some system (e.g. how to search for free images in Google) using screen cast. Example tool that can be used: screencast-o-matic). **[2P]**

(5) Study a virtual world system like Whyville, and make a 10 slide presentation (using PPT or FOSS on it).   **[2P]**

(6) Create a fully tagged 10-question QB on a topic and load onto Moodle. **[2P]**

(7) Build a course using WISE **[2P]**

(8) Design Rubrics (for a given scenario) **[2P]**

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Course Title: Human Computer Interface
Course Code: DCA-EL4
Marks: 75
Credits: 3
Duration: 45 Hours

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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 and requirements.
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: Classify human users based on their abilities, personalities.
CO5: Designing prototypes. Evaluate the design of user interfaces. Compare the interfaces different products.

SYLLABUS:

UNIT I: [10 HRS]
Introduction to Human Computer Interaction
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.
Importance of: Human characteristics, Human consideration, Human interaction speeds, Understanding business functions. User centered design- Need-finding: Participant Observation, Interviewing, Additional Need finding, contextual inquiry & persona.

[20 HRS]

Rapid Prototyping and Graphical Interface Design
Rapid Prototyping: Story boarding. Paper Prototyping and Mockup, Video Prototyping, Creating and Comparing Alternatives.
Direct Manipulation. Mental Models. Heuristics (guidelines) for design.

Graphical Interface Design: 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.

UNIT III: [15 HRS]
Heuristic Evaluation and Visualization
Web user interface design – Jessy James Garette five layers of user experience.
Heuristic Evaluation: Heuristic Evaluation — Why and How?

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

REFERENCES:

MANDATORY:
1. Alan.C, Robert.R. About Face 2.0: The Essentials of Interaction Design, Wiley(3rd ed.). Wiley.
 2. Alan.D, Janet.F, Gregory D. and Russell,B. Human-Computer Interaction,(3rd ed.). Prentice Hall.
Supplementary:
1. Ben.S,Catherine.P. Designing the User Interface: Strategies for Effective Human-Computer Interaction(5th ed.). Pearson.
2. Donald.A.N. The Design of Everyday Things (3rd ed.). Basic Books.

WEB BASED:
1.http://hcibib.org/
2.https://www.tutorialspoint.com/human_computer_interface/index.htm
3.https://www.academia.edu/4955516/Wiley_The_Essential_Guide_to_User_Interface_Design_3rd_Edition_Apr_2007?auto=download
4.https://www.slideshare.net/busaco/hci-2015-110-humancomputer-interaction-overview?qid=1c116f30-ec87-4eb4-a375-49b2bbe65d75&v=&b=&from_search=2

Practicals: Human Computer Interface
Credit: 1
Marks: 25
Duration: 30 Hours

Suggested list of practical (Numbers in brackets indicate number of practical's)

1. Paper Prototyping using templates (1P)
2. Conducting survey interview and summarizing the result (1P)
3. Persona- conducting contextual interview and developing persona (1P)
4. GUI design- form design, menu design, help, error messages (2P)
5. Web UI design- pages, navigation, controls, Page submission – Asynchronous (2P)
6. Report designs (2P)
7. Visualization and info graphics (1P)
8. Heuristic evaluation (2P)
9. Story boarding (1P)

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Course Title: E-Commerce
Course Code: DCA-EL5
Marks: 75
Credits: 3
Duration: 45Hrs

Prerequisites: Nil

Course Objectives:

- ➢ To learn the working of E-Commerce website and the various background processes involved to 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:

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

CO1: Explain the various E-Commerce Strategies.
CO2: Explain the working of an E-Commerce Website.
CO3: Evaluate the various Payment Mechanisms.
CO4: Develop an E-Commerce Website.
CO5: Create an online store.
CO6: Recognize and discuss global E-commerce issues
CO7: Analyze the impact of E-commerce on business models.

UNIT I: Introduction to Electronic Commerce, Vailue Chain, Business Strategy & Electronic Data Interchange
[10HRS]
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.
The Value Chain: Supply Chains, Porter's Value Chain Model,Inter Organizational Value Chains Competitive Advantage, Porter'sModel, First Mover Advantage, Sustainable Competitive, Competitive Advantage using e-commerce
Business Strategy:
Michael Porter's 5 force,analysis. EDI: EDIDefinition, EDITechnology, EDIStandards, EDICommunications.

Unit 2:Electronic payment systems & E-business   [20HRS]
Overview of the electronic payment technology; limitations of traditional payment instruments;Electronic or Digital Cash-Properties of Electronic Cash, Digital Cash inaction;Electronic Checks-benefits of electronic checks, electronic checks in action, Net Check: 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
E-business: 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, sharedealing; 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.

UNIT III: Firewalls and Transaction Security & M-Commerce   [15HRS]

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.CONSUMERE-COMMERCE:Consumer trade transaction, Internet, Page on the Web, M-COMMERCE:Basic concept and applications, difference with E-Commerce, benefits of integration with ERPs.

REFERENCES:

MANDATORY:
1.David Whiteley.(2014).E-Commerce Strategy Technologies and Applications. TataMcGraw Hill

SUPPLEMENTARY:

1.Ravi Kalakota and Andrew B. Whinston.(2014).Electronic Commerce A Manager's Guide.PearsonEducation.

2.Kamlesh K Bajaj and Debjani Nag.(2005).E-Commerce The Cutting Edge of Business(2nd ed.). Tata McGraw Hill

WEB BASED:
1)https://nptel.ac.in/content/storage2/courses/106108103/pdf/PPTs/mod13.pdf
2)http://assets.vmou.ac.in/MCA23.pdf
3)https://www.tutorialspoint.com/e_commerce/e_commerce_tutorial.pdf
4)http://164.100.133.129:81/econtent/Uploads/Session%206%20-%20e-Business%20and%20e-commerce.pdf
5)https://www.tutorialspoint.com/mobile_marketing/m_commerce.htm
6) https://www.tutorialspoint.com/internet_technologies/firewall_security.htm

Practicals: E-COMMERCE
Credit: 01
Marks: 25
Duration: 30 Hrs

List of suggested practical's(the numbers in brackets indicate number of practical's):

ECOMMERCE PLATFORMS: **(10P)**

WORDPRESS: Primarily designed for creating blogs but can be used to create online store by adding appropriate themes & plugins. Basic Programming Knowledge in PHP may be required in later stages. (http://www.wordpress.com).

WIX: Wix is a drag & drop website builder which can also be used to build an ecommerce website without any programming experience. (http://www.wix.com).

SHOPIFY: Made specially to create online stores, add products, categories & handle payments all without Any Programming knowledge required. (http://www.shopify.com).

BLOGGER : Similar to WordPress but a blogging service provided by google which again can be customized to create an online store. (http://www.blogger.com).

TOOLS USED TO FACILITATE ECOMMERCE   **(5P)**

GOOGLE ANAYLITICS: Present in most ecommerce platforms and can be integrated in almost any application, giving the owner insights of the customer base visiting the website. Can also be fine-tuned to give more detailed analysis like how many visits actually got converted into leads etc.
(https://www.google.co.in/analytics).

MAIL CHIMP: A service to send emails to customers. Useful in marketing.
(http://www.mailchimp.com).

ZENDESK : Zendesk is used to setup a support centre for your application users . Users can open a ticket and get their issues resolved. Useful in issue tracking and management.   (https://www.zendesk.com/).

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

UNBOUNCE : Used to create landing pages for an application . A good landing page sometimes defines whether a user will visit the site or turn away. (http://www.unbounce.com/).

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Course Title: Digital Marketing
Course Code: DCA-EL6
Marks: 75
Credits: 3
Duration: 45 Hours

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Prerequisite Course: Client Side Technologies

Course Objectives:

- ➢ To build Optimized and Accessible Websites 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 products/services/facilities using Search Engine.
CO3: Market the products/services/facilities using Social Media.
CO4: Market the products/services/facilities using Email.
CO5: Analyze the Web for improving the marketing strategy.
CO6: Understand the concept of Marketing Automation.
CO7: Use various software tools to implement Digital Marketing.

UNIT 1: Search Engine Optimisation and Marketing (SEO & SEM) **[15 HRS]**
SEO: 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.
SEM: Introduction to Internet and Search Engine Marketing; Google Adwords; Adwords Account Structure; Navigating in Google Adwords; Working with Keywords; Creating Ads in Google Adwords; Creating and Managing your First Ad Campaign; Adwords Reporting and Account Performance Reports.

UNIT 2: Social Media and Email Marketing (SMM & EM) **[15 HRS]**
SMM: 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.
EM: Importance of Email marketing; Email Marketing Software's; Subscriber List; Email Marketing Campaign; Newsletters; Measuring the results.

UNIT 3: WEB Analytics and Marketing Automation **[15 HRS]**
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.
Marketing Automation: Introduction to Marketing Automation; Advantages of using Marketing Automation Software; Issues with Marketing Automation.

REFERENCES:

MANDATORY:
1. Damian Ryan, (2014), Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, (3rd ed.), Kogan Page Publisher.

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

WEB BASED:
https://www.tutorialspoint.com/digital_marketing/index.htm
www.iab.net/resources/ad_revenue.asp
www.searchenginestrategies.com/sew/winter06/index.html
https://developers.google.com/products/
www.freewebsubmission.com
https://www.semrush.com/analytics/seomagic/lists
https://neilpatel.com/ubersuggest/
https://adwords.google.com/home
https://hootsuite.com/
www.googleanalytics.com

Practicals: Digital Marketing
Credit: 1
Marks: 25
Duration: 30 Hours

1. Using Search Engine Optimization tools (like google & bing search console, hubspot, webceo, google page speed)   (3P)
2. Using Search Engine Marketing tools (like google adwords, google adwords certifications, search, display, remarketing formats, facebook marketing, linkedin advertising)   (2P)
3. Using Social Media Marketing tools (like hootsuite, buffer, sproutsocial, klear, twitonomy, socialmention, google alerts, mention)   (2P)
4. Using Email Marketing tools (like mailchimp, campaign monitor, mailgun, mandrill, phplist, amazon ses   (1P)
5. Using Web Analytics tools (like google analytics, compete.com, crazyegg, facebook insights, twitter insights)   (2P)

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Course Title: Network Administration
Course Code: DCA-EL7
Marks: 75
Credits: 3
Duration: 45Hrs

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Prerequisite Courses: Nil

Course Objective:

➢ To be able to understand the working principles of network and setting up of network.
➢ Configuring network and administration of network.

Course outcomes:

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

CO1: Understand the basic working of reference model of communication to provide end to end services for the various applications.
CO2: Analyse the various behaviour of network protocols using the networking tools.
CO3: Understand the basics of IP.
CO4: Design the basic computer network and maintain the network.
CO5: Create and manage users and groups.
CO6: Configure routers and basic network application.

SYLLABUS:

UNIT I. Introduction: **[15HRS]**
Basics of TCP/IP, IP address (IPv4 and IPv6), Internet Architecture, peer to peer and client server networks, subnetting, supernetting , and basic Network commands.

UNIT II. Administration & Routing: **[15HRS]**
Administration - Managing users and Groups, adding/removing software/hard ware, display settings, folder options, setting up mail client, Device manager, Resource sharing. Basic Data recovery concepts: Disk repair tools, recovering files and directories, correcting errors reported by Scandisk.

Routing - Overview of routing, static and dynamic routing, adding and deleting static routes, routing protocols, RIP, OSPF and IGP.

UNIT III. Application Layer, VLAN & Firewall: **[15HRS]**
Application - DHCP (Dynamic host control protocol): Overview of DHCP , DHCP protocol, features of DHCP, Monitoring and troubleshooting, using DHCP in non routed and routed network. DNS (Domain Name Service): Overview of DNS protocol, DNS name space, Zone of authority and name resolutions, features of DNS server, Reverse lookup, Placement of DNS server, Installation and Configuring of DNS server and client. WWW: Architectural overview: server side and client side technology. Mail server: Electronic mail, architecture and services, user agent, message transfer, Final delivery

VLAN - Introduction, basics of VLAN, uses of LANs, working principle, types of VLANs, frame processing

Firewall - Overview of firewall, types of firewall, working principles of firewall, filters.

REFERENCES:
1. Craig Hunt, "TCP/IP Network Administration", O'Reilly; 3rd edition, 2002

SUPPLEMENTARY:
 1.Man pages of linux
    2.Andrew S. Tanenbaum, Computer Networks, Prentice Hall of India, 4th Edition, 2002.

WEB BASED:
1. https://support.microsoft.com/en-in/help/15089/windows-change-tcp-ip-settings
2. TCP/IP Guide, Charles M. Kozierok, Available Online - http://www.tcpipguide.com/
3. https://www.tutorialspoint.com/The-TCP-IP-Reference-Model
4.https://www.computernetworkingnotes.com/rhce-study-guide/how-to-configure-dns-server-in-linux.html
5. https://www.geeksforgeeks.org/virtual-lan-vlan/

Practicals: Network Administration
Credit: 1
Marks: 25
Duration: 30 Hours

A Mini Project [incorporate at least 6 below features] / [ANY 6 practical's]

  1.Managing users: creating/Deleting groups, users, setting passwords, setting permissions to groups and users, Device Manager[2p]
  2.Setting up client server network[2P]
  3.Configuring Telnet and ftp server
  4.Remote desktop connection
  5.Router configuration.
  6.DHCP Server Configuration
  7.Web Server Installation
  8.DNS server Configuration
  9.VLAN configuration
  10.FIREWALL

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Course Title: Software Testing
Course Code: DCA-EL8
Marks: 75
Credits: 3
Duration:45 Hrs.

Prerequisite courses: Introduction to Programming

Course Objectives:

- ➢ To understand the fundamental concepts in software testing
- ➢ To study the various software testing strategies
- ➢ To learn how to design test cases and execute them.

Course Outcomes:

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

CO1 : Understand the different software testing strategies.
CO2 : Apply testing strategies to live projects.
CO3 : Design test cases
CO4: Execute test cases using software testing tools .

SYLLABUS:

UNIT I: **[15HRS]**

Software testing principles - Software Testing- Need for testing, Psychology of testing,Testing economics, SDLC and Testing, Verification & Validation. Quality Assurance, Quality Control
Testing strategies and types - White box testing techniques - Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage , Multiple condition coverage,Dataflow coverage, Automated code coverage analysis, Inspections, Walkthroughs Code Review Black box testing techniques - Boundary value analysis, Robustness testing ,Equivalence partitioning, Syntax testing, Finite state testing, Levels of testing, Unit, Integration and System Testing, Compatibility Testing, Domain Testing, Adhoc Testing ,Use of Requirement,Traceability Matrix.

UNIT II: **[20HRS]**

Integration Testing Waterfall - Top-down ,Bottom up ,Big bang, Sandwich System and Performance Testing - Types of system testing ,Functional and non-functional testing Acceptance Testing ,Setting entry and exit criteria for phases and typical product releasescenarios ,Basic factors governing performance testing, Methodology for performance testing,Tools for performance testing.

Regression Testing - Purpose ,Timing, Choice of tests ,Smoke tests ,Best practices Internationalization and Localization testing - Preliminary concepts,Adhoctesting,Pair testing,Extreme testing, Agile testing, Exploratory testing,Defect seeding.Usability Testing - Factors in usability   testing, Aesthetic testing, Accessibility testing ,Tools for usability testing.

Testing object oriented software - Definitions and Challenge differences from testing non-OO Software, Class testing strategies Class Modality, State-based Testing, Message Sequence Specification.

UNIT III: [10HRS]

People and organizational issues in testing - Common people issues and myths in testing,Providing career paths in testing, Organizational structures for testing teams, Geographicallydistributed testing teams and success factors. Test Management and Automation-Test Planning,Test Management,Test Process,Test Reporting,Test Automation,Factors to consider in automation, Challenges in test automation, Test Metrics, Product Metrics, Process Metrics,Progress Metrics. Use of metrics in ascertaining product release.

REFERENCES:

MANDATORY:

1. Srinivasan D. ,Gopalaswamy R.;(2009)Software Testing- Principles and Practices , 4th Edition: Pearson

Publication

SUPPLEMENTARY:

1. Jalote P., (2010)An Integrated Approach to Software Engineering, 3rd Edition :Narosa Publishing House
2. Pressman R., (2017) ,Software Engineering: A Practitioners Approach, 6th Edition:McGraw Hill Publication

WEB BASED:

1. https://www.guru99.com

Practicals: Software Testing
Credit: 01
Marks: 25
Duration: 30 Hours

1. Planning Test Cases

2. Generating Test Cases/Test Suite

3. Enhancing Tests

4. Debugging Tests

5. Running Tests

6. Analyzing Results

7.Reporting Defects

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Course Title: Server Side Programming
Course Code: DCA-EL9
Marks: 75
Credits: 3
Duration: 45 Hrs

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Prerequisite Courses: Client Side Technologies

Course Objective:

➢ To give an understanding the web software development: how it is different, issues involved in

   it.

Course Outcomes:

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

CO1 : Get hands-on programming experience using open -source software, PHP and MySQL to build
professional-quality, database-driven websites.
CO2 : Develop the skills to build interactive web sites with authentication and security by integrating PHP with
HTML and CSS.
CO3 : Apply basic and advanced object-oriented programming techniques, use libraries, frameworks and
advanced database connectivity techniques, and integrate PHP with other web technologies to build secure e-
commerce applications.
CO4 : Customize an application to meet the specific needs of a client use case as would be done in a real-world
application.

SYLLABUS

UNIT I [15 HRS]
Principles of OOP:
OOP: major principles - encapsulation, abstraction, inheritance, polymorphism. Benefits of OOP,

Applications of OOP.

Web Technologies:

Introduction to Web technology, Web pages and Browsing, Dynamic Web Pages, Java script, Dynamic
web document technologies - PHP, JSP, ASP, Active web pages and Active Web technologies.

Tags, Escaping from HTML, Types:
 Resources, NULL, Callbacks, Type juggling.

Variables:

Basics, Predefined variables and Scope, Constants: Syntax, Magic constants, Expressions.

UNIT II   **[15 HRS]**
Operators, Control structures, Functions, Predefined exceptions.

Security:

Introduction, General considerations, Installed as CGI binary, Installed as an Apache
module, File system Security, Database Security, Error Reporting, Using Register Globals, User Submitted
Data, Hiding PHP.

UNIT III   **[15 HRS]**
Features:

HTTP authentication with PHP, Cookies, Sessions, Handling file uploads, Connection handling,
Persistent Database Connections, DTrace Dynamic Tracing.

Ajax :

Request objects creation, forwarding the request, accepting response object and display on webpage.

REFERENCES:

MANDATORY:

1. Steven Holzner, ‒PHP: The Complete Reference‖, Tata Mcgraw Hill
2. Timothy Boronczyk, Martin E. Psinas, ‒PHP and MYSQL: Create - Modify – Reuse‖, Wiley
   India Private Limited
3. Tim Converse, ‒PHP 5 and MySQL Bible‖, Wiley India Private Limited
4. Meloni J.C., ‒Teach yourself PHP, MySQL and Apache all in one‖, Pearson Education
5. Stephen J. Schrader, ‒AJAX‖, imported edition.

<u>**WEB BASED:**</u>

1. http://in1.php.net/manual/en/index.php for PHP v 5.5 and above
2. https://www.w3schools.com/php/
3. https://www.tutorialspoint.com/php/index.htm
4. https://www.javatpoint.com/php-tutorial
5. https://www.phptpoint.com/php-tutorial/
6. https://www.guru99.com/php-tutorials.html
7. https://www.geeksforgeeks.org/php/

Practicals : Server Side Programming
Credit : 1
Marks : 25
Duration: 30 Hours

Suggested list of practical (Numbers in brackets indicate number of practical's)

1. Creating dynamic web pages with PHP   (3P)

2. Authentication, Cookies, Session management   (1 P)

3. Error handling   (1 P)

4. Database connectivity   (3 P)

5. Using framework like CodeIgniter   (1 P)

6. Ajax implementation   (1 P)

7. File uploading   (1 P)

8. Uploading and images to and from server   (1 P)

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Course Title : Data Structures
Course Code : DCA-EL10
Marks : 75
Credits: 3
Duration:45 Hrs.

Prerequisite Courses: Problem Solving and Introduction to Programming

Course Objectives:

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

Course outcome:

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

CO1 : Define relevant standard algorithms for various data structures. Learn various applications of data structures.
CO2 : Implementation of data structures.
CO3 : Use various data structures for sorting and searching.
CO4 : Analyze and compare algorithms for efficiency using Big-O notation.
CO5 : Formulate new solutions for programming problems.

SYLLABUS:

UNIT I   **[15HRS]**
Introduction to data structures:
Concept, Data type, Data object, ADT, Need of Data Structure, Types of Data Structure.

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

Linked List:
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:
Introduction, Representation-static & dynamic, Operations

UNIT II   **[15HRS]**

Stack Applications :
Application - infix to postfix& prefix, postfix evaluation, Simulating recursion using stack.

Queues:

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

Trees:
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 in order traversal, Expression Tree. Introduction to AVL Trees.

UNIT III   **[15HRS]**
M-Way Search Trees : Introduction, B Tree, B+ Tree.

Searching and Sorting :
Use of various data structures for searching and sorting, selection sort, merge sort, quick sort, heap sort and hashing.

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

REFERENCES:

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

SUPPLEMENTARY:
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 Approch with C++, Cengage Learning, Second Edition

WEB BASED:
1.https://www.tutorialspoint.com/python_data_structure/python_data_structure_introduction.htm
2. https://runestone.academy/runestone/books/published/pythonds/index.html
3. https://www.w3schools.in/data-structures-tutorial
4. https://www.datacamp.com/community/tutorials/data-structures-python
5.https://www.programiz.com/dsa
6. https://www.geeksforgeeks.org/data-structures/
7. https://www.javatpoint.com/data-structure-tutorial

Practical: Data Structures
Credit: 1
Marks: 25
Duration: 30 Hours

Programs using a Programming Language that covers the following concepts:

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

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Course Title: Office Automation Tools
Course Code: DCA-EL13
Marks: 75
Credits: 3
Duration: 45 Hrs

Course Prerequisites: Nil

Course Objectives:
   - ➢ To explore the features of a few automation tools used in office work.
   - ➢ Study and implement the features of spreadsheets, LATEX and Image/Graphic design tools.

Course Outcomes:

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

CO1: Understand basic Spreadsheet features.
CO2: Work with different worksheets.
CO3: Analyze the data using various graphs.
CO4: Analyze data using various spreadsheet features such as lookup tables, Pivot tables, and other statistical features.
CO5: Use different features of DTP software.
CO6: Develop a desktop Publishing Application using given software.

SYLLABUS:

UNIT I: Spreadsheets: [**15HRS**]

Spread Sheet & its Applications, Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys. Entering & Deleting Data- Entering data filling. 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: (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulae. Formatting Spreadsheets- Labeling columns & rows, Formatting- Cell, row, column & Working with sheets – Sorting, Filtering, Validation, Consolidation, and Subtotal. Using Tools – Error checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

UNIT II: Presentation Software and ADOBE InDesign   [15 HRS]

Introduction & area of use; Creating a New Presentation; Working with Presentation; Using Wizards; Slides & it's different views; Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists; Adding Graphics, Sounds and Movies to a Slide; Working with Objects; Designing &Presentation of a Slide Show; Printing Presentations, Notes, Handouts with print options.

Adobe InDesign: Introduction, Introducing the Workspace, Getting to Know InDesign, setting up a Document and Working with Pages; Learning all the primary Tools: Working with Frames, Importing and linking Graphics, introduction to masterpages, Importing and Editing text, Working with typography; Constructing a publication: setting up pages, using master pages, creating and adjusting layouts for newspapers, brochures etc., numbering pages.

UNIT III: Corel Draw: - Graphic design: -   [15HRS]

Introduction: Introduction to Corel Draw, Features of Corel Draw Corel Draw Interface, learning about Raster and Vector Graphics.
Basic Drawing Skills: Selecting and Manipulating Objects, Drawing and Shaping Objects, Arranging Objects, learning about raster and vector graphics.
Mastering Different Tools: Using Text and Color, Working with Color Pallette, Text Special Text Effects, align and distribute, transformation tools, Shaping etc.
Applying Special Effects: Learning Blending options, Distortion, Contour Effects, Envelope effect, Transparency Power Clip.
Working with Images: Working with images, applying special effects, editing bitmap.
Saving, Exporting and printing: Different Saving options, exporting your designs into different formats for printing, Creating layouts and finalizing content for printing.

REFERENCES:

MANDATORY:
1. Mark Moore, (2015), Mastering Excel: Building Dashboards, (1stEd.), CreateSpace Independent Publishing Platform
2. R. Shamms, Mortier & Rick Wallacl (1997), PageMaker-Complete, (Ed.) Techmedia
3. Dinesh Maidasani, (2008), *Straight to the Point – MS Office 2003,* (1stEd.), Firewall Publications

SUPPLEMENTARY:
1. Ramesh Bangia, (2017), Learning PageMaker 7, (Ed), Khanna Book Publishing Co Pvt Ltd.
2. Michael S. Toot, (2017), *Master Visually Microsoft Office 2003,* (Ed), Visual Publishers.
3. Mansfield, (2017), *Mastering WORD 6 for Windows*, (Ed), BPB
4. Townsend, (2017), *Mastering EXCEL 4 for Windows*, (Ed), BPB

WEB BASED:
1.https://www.guru99.com/excel-tutorials.html
2.https://learn.corel.com/tutorials/how-to-use-the-objects-docker-in-coreldraw/
3.https://www.tutorialspoint.com/adobe_indesign_cc/index.htm
4.https://www.coreldraw.com/en/pages/tutorials/?topNav=en
5.https://www.latex-tutorial.com/tutorials/
6.https://www.youtube.com/watch?v=SoDv0qhyysQ – Latex tutorials

Practicals : Office Automation Tools
Credit : 01
Marks: 25
Duration: 30 Hours
List of practical (Any Ten):

PART-I   (6P)

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.

6. Working on presentation (any open source presentation software such as impress or equivalent).

PART-II
CorelDraw/Page Maker   (9P)
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.

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Course Title: : Assessment and Evaluation for Learning
Course Code: DCA-EL14
Marks: 75
Credits: 3
Duration: 45 Hours

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Prerequisite Courses: Nil

Course Objectives:
➢   To make students aware of importance of evaluation. They will know how to design effective evaluation methods.

Course Outcomes:
At the end of the course students will be able to:
CO1: Understand the process of evaluation.
CO2: Develop the skill in preparing, administering and interpreting the achievement test.
CO3: Understand and use different techniques and tools of evaluation for learning.
CO4: Comprehend the process of assessment for learning
CO5: Develop skills necessary to compute basic statistical measures to assess the learning.

SYLLABUS:
UNIT I: Process of Evaluation   **[15 HRS]**
Measurement, Assessment and Evaluation in Education – Concept & Relationship.
Taxonomy of instructional objectives (Revised Blooms Taxonomy and R.H. Dave) and its importance.
Principles of Evaluation.
Educational objectives and learning outcomes.
Criteria for selection of a good learning experiences and Types.
Relationship between educational objectives, learning experiences, content and evaluation.

UNIT II: Tools and Techniques of Evaluation   **[15 HRS]**
Characteristics of measuring tools: Validity, Reliability, Objectivity,Usability, Adequacy and Discrimination Power (Concepts and Factors Affecting them).
Evaluation Techniques and Tools:
 a) Observation Technique: Rating Scale and Check List
 b) Self Reporting Technique: Interview and Questionnaire
 c) Projective Technique: Thematic Apperception Test (TAT) and Sentence Completion Test
 d) Sociometric Technique: Sociogram and Guess Who?
Quantitative Tools of Evaluation
a) Construction of achievement test with special reference to Content area,Objectives and Types of Questions (Blue Print).
b) Diagnostic Test.
c) Performance Test: Jigsaw and Puzzle.
d) Oral Test and Practical Test.

UNIT III : Assessment for Learning & Interpreting Test Scores   **[15 HRS]**
Significance of assessment for learning:Self assessment and peer assessment
Records used in Assessment:

a) Profiles: Meaning, Steps involved and criteria for developing and maintaining a comprehensive learner profile.
b) Evaluation rubric: Meaning , Construction and Uses.
c) Cumulative records : Meaning, Significance.

Ethical Principles of Assessment:Examination Reforms
a. Continuous and Comprehensive Evaluation (CCE).
b. Choice Based Credit System (CBCS).
c. Open Book Examination.

Feedback in Assessment
a) Importance of Feedback in learning.
b) Types of Feedback : Constructive feedback, Oral and Written,Individual & Group.

Statistical measures to interpret the test scores (Meaning, Characteristics, and Uses: Concepts only).
Measures of Central Tendency : Mean, Median, Mode.
Measures of Variability : Quartile Deviation, Standard Deviation.
Percentile and Percentile Rank.
Co-efficient of correlation by Spearman's Rank Difference method.
Standard Scores: Z and T (Concept Only).
Graphical representation of data

REFERENCES:

MANDATORY:

1.Assessment and Evaluation for Learning Dandekar, W.N. (2007).Evaluation in Schools,Pune: Shreevidy Aprakashan.
2.Measurement evaluation and assessment in education paperback – 2016 By Bipin Asthana(author).

SUPPLEMENTARY:

1.Garrett, H.E. (2008). Statistics in Psychology and Education. Delhi: Surjeet Publication.
2.Patel, R.N. (2011). Educational Evaluation Theory and Practice. Mumbai: Himalaya
Publishing House Pvt. Ltd.
3.Rani, P. (2004).Educational Measurement and Evaluation. New Delhi: Discovery Publishers.

Practicals: Assessment and Evaluation for Learning
Credit: 1
Marks: 25
Duration: 30 Hours

1. Developing an achievement test with its Blue Print
2. Developing an achievement test with its Answer Key and Marks Distribution.
3. Developing an achievement test with its Blue Print, Answer Key and Marks Distribution.
4. Developing a Portfolio
5. Developing a Profile
6. Developing a Portfolio & Profile

7. Preparation of an Evaluation Rubric
8. Preparation of an Evaluation Rubric
9. Designing Questionnaire & Interview Schedule on a given topic
10. Designing Questionnaire & Interview Schedule on a given topic
11. Evaluation of available Unit test and reformation of the same.
12. Evaluation of available Unit test and reformation of the same.
13. Preparing any four evaluation tools for Formative Assessment.
14. Interpreting Test Scores (Data entry and calculation via spreadsheets)
15. Interpreting Test Scores (Visual)

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Course Title: : Instructional Design
Course Code: DCA-EL15
Marks:75
Credits:3
Duration: 45   Hours

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Prerequisite Courses: Nil

Course Objectives:
  ➢ Provides the basic knowledge and application of the skills and techniques required for the process of addressing learning settings.
  ➢ Focus on instructional systems design and instructional strategies at the curricular and the classroom level.
  ➢ Provide the background and skills needed to prepare and use a wide range of effective instructional materials.
  ➢ Distinguish basic advantages and disadvantages of the main instructional media and materials.
  ➢ Provide practice to assure effective preparation and the use of instructional materials.

Course Outcomes:
At the end of the course students will be able to:
CO1: Provide rationales for using a systematic approach to instructional design.
CO2: Identify and summarize the steps and methods of the instructional design process.
CO3: Function independently and cooperatively in team work.
CO4: Compare and contrast various instructional design perspectives.
CO5: Demonstrate various instructional design competencies.

SYLLABUS:

UNIT I: **[15 HRS]**

  ➢ Instructional and Material Design: Historical Perspective.
  ➢ Instructional Design: Meaning,
  ➢ Concept and Principle Instructional Design Process - steps
  ➢ System Approach to Instructional Design
  ➢ Theories on Instructional Design
  ➢ Information Processing
  ➢ Components of Instructional Design
  ➢ Instructional Objectives & Instructional Design,
  ➢ Learning and Teaching Styles in Instructional Design
  ➢ Instructional Method, Strategy and Models
  ➢ Modes of Instructional Design
  ➢ Computer Assisted Instruction
  ➢ Principles and Characteristics of Instructional and Material Design
  ➢ Learning Material Design : Designing and Development

➢ Designing e - Content and Materials

UNIT II: **[15 HRS]**

➢ Learning Environment – Design.
➢ Content Structuring.
➢ Niceities of Language Writing & Writing Style.
➢ Writing Styles.
➢ Communication.
➢ Computer Mediated Communication.
➢ Hand - held Technologies.
➢ Communication tools for e – Learning.
➢ Class Management and Instructional Design.
➢ Assessment and Assessment Practices.
➢ Feedback and Instructional Design.
➢ Planning a Design.
➢ e - Learning and Instructional Design.
➢ Approaches and components of e – learning.
➢ Types of e - Learning : Synchronous and Asynchronous.

UNIT III: **[15 HRS]**
➢ Pedagogical Design for e - Learning,
➢ Interactive e - Lesson & Interactive Multimedia in instructional design
➢ Models of Instructional Design,
➢ Design and development of Course or unit
➢ Teaching as Design: Historical Perspective,
➢ Interpreting teaching as Design,
➢ Pedagogical Design Capacity
➢ Instructional Design for Humanities and Science Teaching,
➢ Ethical issues in Instructional Design
➢ Teacher Vs Technology

REFERENCES:

MANDATORY:

1.Instructional Design for elearning: Essential guide to creating successful elearning courses (Marina Arshavskiy).
2. ISD From the Ground Up: A No-Nonsense Approach to Instructional Design(Chuck Hodell).

Practicals: Instructional Design
Credit: 1
Marks: 25
Duration: 30 Hours

1. Develop Professional & Organizational Profile   **[2 P]**
Information for the Professional Profile must be collected via face-to-face, email, or phone interview.
• Clearly describe the professional's educational background/path
• Clearly describe the professional's career path and experience
• Clearly describe the professional's current job description
• Detail the professional's individual and team duties and responsibilities
• Offer the professional's advice regarding a career in instructional design
Information for the Organizational Profile must be collected via face-to-face, email, or phone interview. The organization profile requires attending and/or participating in a meeting, conference, or workshop (live, via webcast, etc.).
• Clearly describe the organization's goal, purpose, and/or mission
• Clearly describe the organization's target audience
• Describe a typical meeting of the organization
• List any relevant publications and conferences
• Lists benefits of membership

2. Develop a Design Document   **[5 P]**
(The Design Document explains the approach and details the plan to developing a prototype of an instructional module. The purpose of this activity is to have students demonstrate the understanding of key concepts in instructional design and application to developing instructional modules).

3. Prototype Instructional Module   **[6 P]**
Develop a prototype of an instructional module from audience analysis to formative evaluation.
The student will apply the instructional design process (from audience analysis to formative evaluation) to the prototype. The team will design and develop the segment of the prototype based on information (regarding audience, content area, instructional approach, etc.) stated in the Design Document. Teams can use any appropriate medium (computer, paper, web, video, audio, etc.) to construct and deliver the prototype.

4. Conduct Peer Reviews   **[2 P]**
Each student will be asked to provide constructive, evaluative feedback to other groups at specific points in the instructional design process as dictated by the class schedule each of the following assignments: instructional goal, needs assessment plan, objectives, instructional approach, and evaluation plan.

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Course Title: Content Management System
Course Code:DCA-EL16
Marks: 75
Credits: 3

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Course Prerequisite: Nil

Course Objectives:
1. Use and manage different content management system.
2. Design and deploy websites developed using a content management system.

Course Outcomes:

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

CO1: Install and maintain content management systems.
CO2: Develop website using different content management systems.
CO3: Make use of plugins to add more functionality.
CO4: Create users and manage them.

UNIT I: **[15 HRS]**
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.

Woocommerse
Introduction to Woocommerc, 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   **[15 HRS]**
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 template Details.xml File using tmpl_builder, Linking CSS, Linking Javascrpt, Understanding include, Displaying content in XHTML, Creating template, installation package, Creating Custom Forms, Changing the Form appearance using CSS.

UNIT III: [15 HRS]
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:
1. Douglass, R. T., Little, M., & Smith, J. W. (2006). Building online communities with Drupal, phpBB, and WordPress. Apress.

SUPPLEMENTARY:
1. Ravensbergen, R. (2015). Building E-Commerce Solutions with WooCommerce. Packt Publishing Ltd.
2. Barnett, J. (2015). Drupal 8 for Absolute Beginners. Apress.
3. Buchner, A. (2016). Moodle 3 administration. Packt Publishing Ltd.

WEB REFERENCES:
1. https://www.tutorialspoint.c om/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]

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