Course Type: - Major   **Semester**: - 3rd
Paper Title: - **DATA STRUCTURES USING C**   **Paper Code**:- **BCA22C301**
Credit Weightage: - THEORY -04; PRACTICALS- 02   **Batch**: - 2023

Course Objective:

▪ To understand the need and significance of Data structures as a computer Professional.
▪ To teach concept and implementation of linear and nonlinear data structures.
▪ Introduces a variety of data structures such as stack, queue, hash tables, search trees, heaps, graphs.
▪ To introduce various techniques for representation of the data in the real world.
▪ Introduces sorting and pattern matching algorithms.

Course Outcomes:
▪ Ability to select the data structures that efficiently model the information in a problem.
▪ Ability to assess efficiency trade-offs among different data structure implementations or combinations.
▪ Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, heaps, graphs.
▪ Implement and know the application of algorithms for sorting and pattern matching.

UNIT – I   **[16 Hours]**
Introduction to Data Structures, abstract data types (ADT), operations on data structures. Introduction to arrays Operations on arrays: insertion, deletion, searching, sorting. Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list

UNIT – II   **[16 Hours]**
Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations, queue applications. Hash Table Representation: hash functions and collision resolution.

**UNIT – III**   **[16 Hours]**
Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion, Deletion and traversal. Heap and heap sort.

UNIT – IV   **[16 Hours]**
Graphs: Graph Implementation Methods. Graph Traversal Methods. Shortest path algorithms (Dijkstra's algorithm). Pattern Matching: Pattern matching algorithms -Brute force, the Boyer –Moore algorithm.

TEXT & REFERENCES:
1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. Data Structures and Algorithms Made Easy, Narasimha Karumanchi, Career Monk.
3. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
4. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan,Cengage Learning.
5. Websites like VisuAlgo(https://visualgo.net/) and Data Structure Visualizations (www.cs.usfca.edu/~galles/visualization) provide interactive visualizations of various data structures and algorithms.
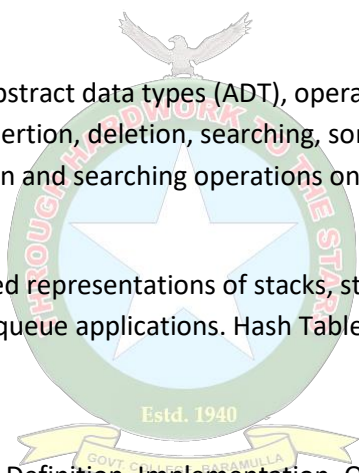
LAB WORK - DATA STRUCTURES (CAPC1322M)

LIST OF DATA STRUCTURE IMPLEMENTATIONS:

1. Write a program that implements stack and its operations using Arrays and Pointers.
2. Write a program that implements queue and its operations using Arrays and Pointers.
3. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a singly linked list.
4. Write a Program to implement various Hash table operations.
5. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a doubly linked list.
6. Write a program that uses functions to perform Creation, Insertion, Deletion and Traversal operations on a circular linked list.
7. Write a program to implement iterative and recursive tree traversal methods (preorder, inorder, postorder).
8. Write a program to implement Binary Search tree, Tree.
9. Write a program to implement BFS/DFS graph traversal methods.
10. Write a Program to implement Pattern matching algorithms.

Course Type: - **Minor**   **Semester**: - **3rd**
Paper Title: - **DIGITAL ELECTRONICS**   **Paper Code**: - BCA22C302
Credit Weightage: - THEORY -04; PRACTICALS- 02   **Batch**: - 2023

Course Objective:

- Familiarize students with different number systems and coding schemes used in digital systems.
- Provide students with a strong foundation in digital logic concepts, including binary representation, Boolean algebra, truth tables, and logic gates.
- Teach students how to manipulate Boolean expressions, perform algebraic manipulations, and simplify logic circuits using algebraic laws and theorems.
- Enable students to analyze and design combinational circuits using various techniques such as Karnaugh maps, Boolean minimization, and multiplexers.
- Teach students how to analyze and design sequential circuits, including flip-flops, counters, and shift registers.
- Provide hands-on experience in simulating digital circuits using software tools.
- Introduce students to digital systems, including memory elements.

Course Outcomes:
- Demonstrate a clear understanding of binary number systems, logic gates, and Boolean algebra.
- Analyze and design combinational logic circuits using various methods like truth tables, Karnaugh maps, and Boolean algebra.
- Apply the principles learned to design basic digital systems to meet specific requirements.
- Understand the principles of sequential logic, including flip-flops and timing considerations.
- Explain the operation of memory devices and programmable logic devices programmable logic Array.

UNIT – I   **[16 Hours]**
BOOLEAN ALGEBRA AND LOGIC GATES: Digital Systems, Binary Numbers, Number base conversions, Octal and Hexadecimal Numbers, complements, Signed binary numbers, Binary codes, Binary Storage and Registers, Binary logic. Basic Definitions, Axiomatic definition of Boolean Algebra, Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, other logic operations, Digital logic gates.

UNIT – II   **[16 Hours]**
GATE – LEVEL MINIMIZATION: The map method, Four-variable map, Sum of products & product of sums simplification Don't-care conditions, NAND and NOR implementation other Two-level implementations and Exclusive OR function.

UNIT – III   **[16 Hours]**
COMBINATIONAL LOGIC: Combinational Circuits, Analysis procedure Design procedure, Binary Adder-Subtractor Decimal Adder, Binary multiplier, magnitude comparator, Decoders, Encoders, Multiplexers, HDL for combinational circuits.

SEQUENTIAL LOGIC: Sequential circuits, latches, Flip-Flops Analysis of clocked sequential circuits, state Reduction and Assignment, Design Procedure. Registers shift Registers, Ripple counters, synchronous counters, other counters.

UNIT – IV   **[16 Hours]**

MEMORIES AND ASYNCHRONOUS SEQUENTIAL LOGIC: Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array & programmable Array logic, Sequential Programmable Devices. Introduction to Integrated Circuits and digital Logic Families.

TEXT BOOKS:

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.

REFERENCES:

2. Digital Fundamentals, Thomas L. Floyd.
3. Digital Logic Circuits, R. P. Jain.
4. Digital Principles and Applications Albert Paul Malvino Donald P. Leach TATA McGraw Hill Edition.
5. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
6. NPTEL Digital Electronics Course @ https://nptel.ac.in/courses/117106086
7. SWAYAM Digital Electronics Course @ https://onlinecourses.swayam2.ac.in/cec20_cs35/preview

LAB WORK - DIGITAL ELECTRONICS (CAPC1123M)

List of Experiments/ Simulations:

1. To verify the truth tables of OR, AND, NOR, NAND, EX-OR, EX-NOR gates.

2. To obtain half adder, full adder and subtractor using gates and verify their truth tables.

3. To verify the truth tables of RS, JK and D flip- flops.

4. To design and study a binary counter.

5. To design and study synchronous counter.

6. To design and study ripple counter.

7. To convert BCD number into excess 3 form

8. To design and study a decade counter.

9. To design and study a sequence detector.

10. To implement a control circuit using a multiplexer.

TEXT BOOKS:

1. Digital Design – Third Edition, M. Morris Mano, Pearson Education/PHI.
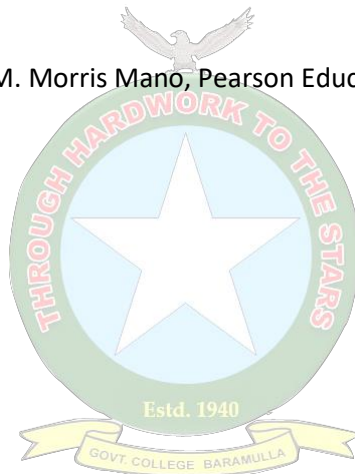
COURSE OUTLINE FOR CERTIFICATE COURSE *"WEB DEVELOPER"*

Name of Certificate Course	Web Developer
NSQF Level	5
Eligibility	Students pursuing undergraduate programme in any Stream
Batch Size	30

TABLE-I (12 CREDITS TO BE OFFERED IN EMBEDDED MODE IN 3RD/4TH, 5TH AND 6TH SEMESTERS)

Course Code/Course Title	Credit Weightage			Duration in Number of Hours
	Theory	*Practical*	*Total*	
WDP-1 *Internet Basics and HTML*	2	2	4	90
WDP-2 *Java Script and CSS Basics*	2	2	4	90
WDP-3 *Introduction to PHP and MYSQL*	2	2	4	90

To facilitate forward linkage of skill courses of 12 credits indicated in Table-I with the earning of UGC/NSQF skill certificate, add-on courses of 18 credits as indicated in Table-II are available on optional basis.

TABLE-II (18 CREDITS ADD-ON COURSES FOR CERTIFICATE COURSE "WEB DEVELOPER")

Course Code/Course Title	Mode of training	Venue of training	Credit Weightage	Duration in Number of Hours	Semester in which to be offered
WDP-4	Three Weeks Industrial Workshop-I	To be decided in consultation with Mentor Institution	6	90	These credits can be covered during winter vacations/ or after semester-end exams depending upon the availability of time
WDP -5	Three Weeks Industrial Workshop-II	To be decided in consultation with Mentor Institution	6	90	
WDP -6	Three Weeks Industrial Internship	To be decided in consultation with Mentor Institution	6	90	

WDP122S: INTERNET BASICS AND HTML

CREDITS: THEORY: 2, PRACTICAL: 2

THEORY (2 CREDITS)

UNIT 1 – INTERNET BASICS (15 LECTURES)

Communication using the Internet: Basic of Computer networks; LAN, WAN, OSI and TCP Network Models, Concept of Internet, Applications of Internet, Connecting to Internet, What is ISP, Knowing the Internet.

WWW and Web Browsers: World Wide Web, Web Browsing Software's, Search Engines, Understanding URL, Domain name, IP Address, Using e-Governance Website.

Communications and collaboration: Basics of Electronic Mail, Getting an Email Account, Sending and Receiving Emails, Accessing Sent Emails, Using Emails, Document Collaboration, Instant Messaging, Netiquettes.

UNIT 2 – HTML (15 LECTURES)

Introduction to Hyper Text Markup Language. Key components of HTML Document, HTML Elements, Tags and Attributes , Headers, HTML Basic Tags, Formatting Tags, Ordered List, Unordered List, Definition Lists, Nesting of Lists, Hyperlinks, Tables, Images, Images as Hyperlink, Forms, Frames, Div and Span Tags for Grouping, Using Object Tag to embed Multimedia Elements.

REFERENCE BOOKS:
1. Internet Basics E Douglas Commer PHI
2. Mastering HTML BPB Publications

PRACTICAL (2 CREDITS)
LAB SHEET- INTERNET BASICS AND HTML

1. Create an Email ID to
   a) Send an email
   b) Send an email to multiple participants
   c) Delete an email
   d) Email a picture
   e) Email a document
2. Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.
3. Design a webpage that displays your information (Bio-data) using basic HTML Tags
4. Create HTML document and demonstrate Inserting Images, Internal and External linking
5. Create a table with the following data

Roll Number	Practical Marks		Total
	Internal	External	
4801	25	26	51
4802	24	25	49
4803	20	24	44

6. Design a webpage to print the following:
   A. Courses
      a. BCA
      b. BBA
      c. BSC IT
      d. BA
      e. BSC
      f. BMMMC
   B. Semester
      • First Semester
      • Second Semester
      • Third Semester
      • Fourth Semester
      • Fifth Semester
      • Sixth Semester
   C. Batch
      I. 2018
      II. 2019
      III. 2020
      IV. 2021

7. Write HTML code to demonstrate use of frames in a web page.
8. Write an HTML code to generate the following output

Registration Form

Username: [   ]

Password: [   ]

Confirm Password: [   ]

First Name: [   ]

Last Name: [   ]

Email: [   ]

Phone Number: [   ]

Gender: [   ]   Female

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WDP222S: JAVA SCRIPT AND CSS BASICS

                                                                          CREDITS: THEORY: 2, PRACTICAL: 2

THEORY (2 CREDITS)

UNIT 1 – JAVA SCRIPT (15 LECTURES)

Introduction, Script Tag, Data Types, Variables, Literals, Expressions, Operators, Conditional Statements (if, if-else, if-else-if-else), switch-case, Looping Statements (while, for, do-while), Array, Associative Arrays, Functions, Event Handling, Javascript Objects (Browser, Document, Window etc.)

UNIT 2 – CSS (15 LECTURES)

DHTML introduction, Style Sheets-Embedded Styles, Inline Styles, External Style Sheets, Using Classes, Style Sheet Properties- Fonts Properties, Background and Colour Properties, Text Properties, Box Properties, Classification Properties-Display Property, Whitespace Property, , CSS Units, URL's , DIV and SPAN Tags, Dynamic Positioning, Layering, DHTML Events.

REFERENCE BOOKS:
1. Java Script Bible Wrox Publications
2. DHTML BPB Publications

PRACTICAL (2 CREDITS)
LAB SHEET- JAVA SCRIPT AND CSS BASICS
1. Write a JavaScript program to display the current day and time in the following format
2. Write a JavaScript program to get the current date
3. Write a JavaScript program that accept two integers and display the larger
4. Write a JavaScript conditional statement to sort three numbers. Display an alert box to show the result
5. Write JavaScript to demonstrate loops: while, for, do-while
6. Write a JavaScript for loop that will iterate from 0 to 15. For each iteration, it will check if the current number is odd or even, and display a message to the screen
7. Write a JavaScript function to check whether an `input` is an array or not
8. Write a JavaScript program to sort the items of an array
9. WAP to show blinking effect on a web page using JavaScript.
10. Write CSS for *Fonts, Background, Color, Text*
11. Design a digital clock using JavaScript and CSS.
12. Design a calculator using HTML & JavaScript.
13. Write a JavaScript program to demonstrate Event Handling.
14. WAP to validate Email Address in JavaScript.
15. Write a program to demonstrate exception handling in JS.

WDP322S: INTRODUCTION TO PHP AND MYSQL

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CREDITS: THEORY: 2, PRACTICAL: 2

</div>

THEORY (2 CREDITS)

UNIT 1 – INTRODUCTION TO PHP (20 LECTURES)

Essential PHP. Creating a simple PHP program. PHP Building Blocks- Variables, Data Types, Operators and Expressions. Switching Flow, Loops , Functions- Calling, Defining Returning Values, Variable Scope Static Functions , Arrays, Array related Functions. Working with Objects- String, Date and Time

Working with Forms. Working with Cookies and User Sessions. Working with Files and Directories

UNIT 2 – PHP AND MYSQL (10 LECTURES)
Basic SQL Commands, Transactions and Stored Procedures.
Interacting with MYSQL using PHP- Creating Databases and Tables with PHP

REFERENCE BOOKS:

1. Steven Holzner, "PHP: The Complete Reference Paperback", McGraw Hill Education (India), 2007.
2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
3. Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition Paperback,O'reilly, 2014.

PRACTICAL (2 CREDITS)
LAB SHEET- INTRODUCTION TO PHP AND MYSQL

1. Create a PHP page using functions for comparing three integers and print the largest number.
2. Write a function to calculate the factorial of a number (non-negative integer). The function should accept the number as an argument.
3. Write a program to check whether the given number is prime or not.
4. Create a PHP page which accepts string from user. After submission that page displays the reverse of provided string.
5. Write a PHP function that checks if a string is all lower case.
6. WAP to sort an array.
7. WAP in PHP to create Login and Logout using sessions.
8. WAP in PHP to parse a sentence and calculate no. of words and punctuation marks.
9. Program to set, retrieve and delete a cookie
10. WAP in PHP to open a new connection to the MySQL server.
11. WAP to create, open, read, write, append, delete and close files.
12. Develop a PHP MySQL Login System.

MULTI-DISCIPLINARY COURSE
CAP022I COMPUTER APPLICATIONS (INTRODUCTION TO COMPUTERS)

CREDITS: 3

COURSE OBJECTIVES

1. *To introduce the fundamentals of computing devices and reinforce computer vocabulary, particularly with respect to personal use of computer hardware and software, the Internet, networking and mobile computing.*
2. *To provide hands-on use of Microsoft Office 2013 applications Word, Excel, Access and PowerPoint. Completion of the assignments will result in MS Office applications knowledge and skills.*
3. *To describe the organization and operation of a computer processor, primary and secondary memory, peripheral devices and to give computer specifications*

UNIT – I: COMPUTER BASICS

Introduction: Characteristics of Computer, Classification of Computers, Architecture and Chronology, Applications of Computer. Block Diagram of Computer.
Commonly used Terms: Hardware, Software, Firmware, Units of Measurement of Storage, Input/ Output Devices, Types of Memory, Generation of Computer Languages, and Introduction to Internet & E-Mail.

UNIT – II: OPERATING SYSTEM BASICS & GUI USING MS-WINDOWS.

Application Software and System Software, Open-Source Software and Proprietary Software.
Computer Languages and its types (Machine Language, Assembly Language, High Level Language) Translators, Compiler, Interpreter. Operating System and its functions.

UNIT –III: INTRODUCTION TO MS OFFICE

MS Word Basics: Basics of Word Processing, Text Selection, Opening Documents and Creating Documents, Saving Documents/Quitting Documents, Printing Documents. Using the Interface (Menu Toolbars), Editing Text (Copy, Delete, Move Etc.). Finding and replacing text. Special check Feature/ Auto correct Feature, Grammar check Facility, Formatting and Editing. Mail Merge, Bullets & Numbering, Borders and Shadings.

MS EXCEL   BASIC:
Worksheet   Workbook, Workspace Basics, Data Entry in cell, Entry of Numbers, Text and Formulate, Moving Data in the Worksheet, Selecting Data Range, Using the Interface (Toolbars, Menus), Editing basics, working with Workbooks Saving and Quitting, Cell Reference, Formatting, Editing.

MS POWER POINT BASICS:
Use of existing templates, fonts and drawing. Hands of MS PowerPoint, Creation of animated slides.

REFERENCE BOOKS:

1. Computer today, Donald H. Sanders, McGraw Hill Publishing Company.
2. Microcomputers Software and Applications, Dennis P. Curtin and Leslie R. Portel, PHI.
3. Data Processing: An Introduction, Donald P. Spencer and Charles R. Merril Pub. And Co.
4. Computers and Their Applications, Larry Joel Goldestein, PHI.
5. Windows-2000, kethy, Tata McGraw Hill Publishing Company.