Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

Syllabus

S.Y.B.Sc.(Computer Science) Semester -III

For Department of Computer Science

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2022 Pattern)

To be implemented from Academic Year 2022-2023

Programs Outcome For B. Sc. (Computer Science)
(2022 Pattern)

PO1: Apply fundamental principles and methods of Computer Science to a wide range of applications.

PO2: Design, correctly implement and document solutions to significant computational problems.

PO3: Impart an understanding of the basics of our discipline.

PO4: Prepare for continued professional development.

PO5: Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO6: Develop proficiency in the practice of computing.

PO7: Develop the capacity to study and research independently that will help to develop skills for transition to employment in hardware/software companies

Course Structure for S.Y.B.Sc.(Computer Science) (2022 Pattern)

S. Y. B.Sc.(C.S.)

(2019 Pattern)		(2022 Pattern)	
Paper Code	**Paper Title**	**Paper Code**	**Paper Title**
CSCO 2101	Data Structure using C	UCSCO231	Data Structure using C
CSCO 2102	Introduction to Web Technology	UCSCO232	Introduction to Web Technology
CSCO 2103	Lab. Course I : based on UCSCO2101	UCSCO233	Lab. Course I : based on UCSCO231
CSCO 2104	Lab. Course II : based on UCSCO2102	UCSCO234	Lab. Course II : based on UCSCO232

Semester – III (2019 Pattern)			Semester – IV (2022 Pattern)		
Paper Code	**Paper Title**	**Credits**	**Paper Code**	**Paper Title**	**Credits**
CSCO2401	Object Oriented Concepts using Java	3	UCSCO241	Object Oriented Concepts using Java	3
CSCO2402	Software Engineering	3	UCSCO242	Software Engineering Principles and Techniques	3
CSCO2403	Lab Course I: Based On 2401	2	UCSCO243	Lab Course based on UCSCO241	2
CSCO2404	Lab Course II : Based On CSCO2402 with Mini Project	Grade	UCSCO244	Lab Course based on UCSCO242 with Mini Project	2

S.Y.B.Sc.(Computer Science)

Semester-III

Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science	**Paper Code :**UCSCO231
Title of Paper: Data Structures using C	**Paper :** I
Credit : 3 (4 Lectures/Week)	**No. of lectures :**60

Objective:

1. To learn the systematic way of solving problem
2. To understand the different methods of organizing large amount of data
3. To efficiently implement the different data structures and implement solutions for specific problems

Prerequisites:

Knowledge of C Programming Language

Learning Outcomes:

Students will implement different types of algorithms and its comparisons.
Also implement different data structures.

Course outcome :

CO1. Use well-organized data structures in solving various problems.
CO2. Differentiate the usage of various structures in problem solution.
CO3. Understand discrete structures such as sets, relations, and lattices.
CO4. Study the basic operations of Propositional logic and Boolean Algebra.
CO5. Analyse and study various proof techniques.
CO6. Understand basics of Graph theory and how it can be used to visualize and simplify problems.
CO7. To efficiently implement the different data structures.

1. Introduction to data structures [2]

1.1 Concept
1.2 Data
- 1.2.1 Data Type
- 1.2.2 Data Object
- 1.2.3 ADT -Definition, Operation, examples on rational number

1.3 Need of Data Structure
1.4 Types of Data Structure

2. Algorithm analysis [3]

2.1 Algorithm – definition, characteristics
2.2 Space complexity, time complexity
2.3 Asymptotic notation (Big O, Omega Ω, Theta Notation Θ)

3. Linear Data Structures [7]

3.1 Introduction to Arrays - array representation
3.2 Sorting algorithms with efficiency - Bubble sort, Insertion sort, Merge sort, Quick Sort
3.3 Searching techniques –Linear Search, Binary search

4. Linked List [10]

4.1 Introduction to Linked List
4.2 Implementation of Linked List – Static & Dynamic representation,
4.3 Types of Linked List - Singly , Doubly, Circular
4.4 Operations on Linked List - create, display, insert, delete, reverse, search, sort, concatenate& merge

4.5 Applications of Linked List – Polynomial Manipulation

4.6 Generalized linked list – Concept and Representation

5. Stacks **[6]**

5.1 Introduction

5.2 Representation - Static & Dynamic

5.3 Operations – Create, Init, Push , Pop & Display

5.4 Application - infix to postfix, infix to prefix, Evaluation of Expression

5.5 Simulating recursion using stack

6. Queues **[4]**

6.1 Introduction

6.2 Representation - Static & Dynamic

6.3 Operations – Create ,Init , Insert , Remove & Display

6.4 Circular queue, priority queue (with implementation)

6.5 Concept of doubly ended queue (Dequeue)

7. Trees

[12]

7.1 Concept & Terminologies

7.2 Binary tree, binary search tree

7.3 Representation – Static and Dynamic

7.4 Operations on BST & Heap Tree – create, Insert, delete, traversals (preorder, inorder, postorder), counting leaf, non-leaf & total nodes, non recursiveinorder traversal

7.5 Application - Heap sort

7.6 Height balanced tree- AVL trees- Rotations, AVL tree examples.

8. Graph **[4]**

8.1 Graph Terminology: Definition,

8.2 Traversals – BFS and DFS

8.3 Spanning Tree

8.4 Applications – AOV network – topological sort, AOE network – critical path

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Note: 48 hours for theory lectures and 12 hours for internal assessment and learning.

References:

T1. Fundamentals of Data Structures ---- By Horowitz Sahani (Galgotia)

T2. Data Structures using C and C++ ---By YedidyahLangsam, Aaron M. Tenenbaum, Moshe J. Augenstein

T3. Introduction to Data Structures using C---By Ashok Kamthane

T4. Data Structures using C --- Bandopadhyay&Dey (Pearson)

T5. Data Structures using C ---By Sriv

Course Outcomes	**Programme Outcomes (POs)**						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	3	2
CO2	3	3	3	3	2	3	2
CO3	2	3	3	2	2	3	2
CO4	1	3	3	2	1	2	1
CO5	2	2	3	1	1	2	1
CO6	3	3	3	3	2	3	2
CO7	3	3	3	3	2	3	2

Mapping of PO1 With All CO's with Justification :

CO1. With PO1: Applying well-organized data structures is a fundamental principle of computer science that directly contributes to solving a wide range of applications.
CO2. With PO1: The ability to differentiate and select appropriate data structures is crucial in applying fundamental principles to solve diverse problems in computer science applications.
CO3. With PO1: Understanding discrete structures is fundamental to applying computer science principles in various applications.
CO4. With PO1: Studying logic and Boolean Algebra is essential for applying fundamental principles in various computational applications.
CO5. With PO1: While proof techniques contribute to applying fundamental principles, their direct application may vary in different applications.
CO6. With PO1: Understanding graph theory contributes directly to visualizing and simplifying problems in various applications of computer science.
CO7. With PO1: Efficient implementation of data structures is crucial in applying fundamental principles to a wide range of practical applications in computer science.

Mapping of PO2 With All CO's with Justification :

CO1. With PO2: Well-organized data structures are integral to designing and correctly implementing solutions to significant computational problems.
CO2. With PO2: The ability to differentiate and select appropriate data structures is crucial in designing and implementing effective solutions to computational problems.
CO3. With PO2: Understanding discrete structures is essential for designing and implementing solutions to significant computational problems.
CO4. With PO2: While logic and Boolean Algebra contribute to problem-solving, their direct impact on the design and implementation of solutions may vary.
CO5. With PO2: Proof techniques may be less directly tied to the practical aspects of designing and implementing solutions to computational problems.
CO6. With PO2: Graph theory directly contributes to visualizing and simplifying problems, enhancing the design and implementation of computational solutions.
CO7. With PO2: Efficient implementation of data structures is crucial in the design and correct implementation of solutions to significant computational problems.

Mapping of PO3 With All CO's with Justification :

CO1: With PO3: Understanding and using data structures is fundamental to the discipline, and it forms the basis for solving a variety of problems.
CO2: With PO3: Differentiating between various data structures is crucial in selecting the most appropriate one for solving specific problems, reflecting a deep understanding of the discipline.
CO3: With PO3: Discrete structures are foundational concepts in the discipline, and understanding them is essential for a solid grasp of the basics.
CO4: With PO3: Propositional logic and Boolean Algebra are fundamental to computer science, and studying them contributes significantly to understanding the basics of the discipline.

CO5: With PO3: Proof techniques are fundamental to understanding the theoretical aspects of computer science, aligning closely with the goal of imparting a basic understanding of the discipline.
CO6: With PO3: Graph theory is a fundamental part of computer science, and understanding its basics contributes to visualizing and simplifying a wide range of problems.
CO7: With PO3: Efficient implementation of data structures is a practical application of the basics of the discipline, demonstrating a strong connection between understanding and application.

Mapping of PO4 With All CO's with Justification :

CO1. With PO4: Proficiency in utilizing well-organized data structures is crucial for ongoing professional development in the field of computer science.
CO2. With PO4: The ability to differentiate and select appropriate data structures is a skill that contributes significantly to professional development in solving diverse and complex problems.
CO3. With PO4: Understanding discrete structures is valuable for professional development, though its direct impact may vary depending on the specific career path.
CO4. With PO4: While logic and Boolean Algebra are important foundations, their direct impact on professional development may be more evident in specific applications.
CO5. With PO4: While proof techniques contribute to theoretical knowledge, their direct impact on day-to-day professional development may be limited.
CO6. With PO4: Graph theory skills contribute to problem-solving and visualization, enhancing one's capabilities for continued professional development.
CO7. With PO4: Efficient implementation of data structures is a practical skill that directly supports ongoing professional development in various computer science roles.

Mapping of PO5 With All CO's with Justification :

CO1. With PO5: While well-organized data structures contribute to problem-solving, their direct connection to understanding the societal and environmental impact may be less evident.
CO2. With PO5: The ability to differentiate and select appropriate data structures is important for problem-solving but may not directly correlate with understanding societal and environmental impacts.
CO3. With PO5: While understanding discrete structures is valuable, its direct link to societal and environmental contexts may be less immediate.
CO4. With PO5: Logic and Boolean Algebra may have limited direct relevance to societal and environmental impacts.
CO5. With PO5: Analyzing proof techniques may have limited direct application to understanding the societal and environmental impact of IT solutions.
CO6. With PO5: While graph theory contributes to problem-solving, its direct connection to societal and environmental impacts may be less immediate.
CO7. With PO5: Efficient implementation of data structures is essential for problem-solving, but its direct link to societal and environmental impacts may be less direct.

Mapping of PO6 With All CO's with Justification :

CO1. With PO6: Proficiency in using well-organized data structures is a key aspect of developing expertise in the practice of computing.

CO2. With PO6: The ability to differentiate and select appropriate data structures is a skill that directly contributes to proficiency in solving computational problems.
CO3. With PO6: Understanding discrete structures is crucial for developing proficiency in various computational practices.
CO4. With PO6: While logic and Boolean Algebra are important, their direct impact on the practical aspects of computing proficiency may vary.
CO5. With PO6: Analyzing proof techniques contributes to theoretical knowledge, but their direct impact on practical computing proficiency may be less immediate.
CO6. With PO6: Understanding graph theory enhances proficiency by providing tools for visualizing and simplifying computational problems.
CO7. With PO6: Efficient implementation of data structures is a practical skill that is integral to developing proficiency in the practice of computing.

Mapping of PO7 With All CO's with Justification :

CO1. With PO7: Proficiency in using well-organized data structures contributes to problem-solving skills, which are important for independent study and research.
CO2. With PO7: The ability to differentiate and select appropriate data structures supports problem-solving skills necessary for independent study and research.
CO3. With PO7: Understanding discrete structures is valuable for independent study and research, providing a theoretical foundation for various applications.
CO4. With PO7: While logic and Boolean Algebra are important, their direct relevance to transitioning to employment may be limited.
CO5. With PO7: Analyzing proof techniques may contribute to theoretical knowledge but may have limited direct impact on transitioning to employment.
CO6. With PO7: Understanding graph theory enhances problem-solving skills, contributing to the capacity for independent study and research.
CO7. With PO7: Efficient implementation of data structures is a practical skill that can enhance the ability to transition to employment in hardware/software companies through hands-on experience

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Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science | **Paper Code** :UCSCO233

Title of Paper: Lab Course-I Based on UCSCO231 | **Paper** : III

Credit :2 (4 Lectures/Week) | **No. of Practical's :**13

Learning Objectives:

1. To learn the systematic way of solving problem
2. To efficiently implement the different data structures and implement solutions for specific problems

Prerequisites:

Knowledge of C Programming Language

Course Outcome :

CO1.To understand different Data structure.

CO2. Be able to design and analyze the time and space efficiency of the data structure

CO3.Be capable to identity the appropriate data structure for given problem • 4.Have practical knowledge on the applications of data structures.

CO5.Ability to understand a systematic approach to organizing, writing and debugging C programs

CO6.Ability to implement linear and non-linear data structure operations using C programs

CO7.Ability to solve problems implementing appropriate data structures

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- Assignment 1 – Sorting Algorithms
  - ✓ Bubble Sort
  - ✓ Insertion Sort
  - ✓ Quick Sort
  - ✓ Merger Sort
- Assignment 2 - Recursive Sorting Algorithms
  - ✓ Quick sort,
  - ✓ Merge Sort
- Assignment 3 - Searching Method
  - ✓ Linear search,
  - ✓ Binary search
- Assignment 4 Linked List –
  - ✓ Dynamic Implementation of Singly Linked List
  - ✓ Dynamic Implementation of Doubly Linked List
  - ✓ Dynamic Implementation of Circular Linked List.
- Assignment 5 - Stack
  - ✓ Static Stack Implementation
  - ✓ Dynamic Stack Implementation
- Assignment 6 Queue
  - ✓ Static and Dynamic Implementation
  - ✓ Linear Queue,
  - ✓ Circular queue
- Assignment 7 Tree –
  - ✓ Binary Search Tree Traversal: Create, add, delete, and display nodes.
- Assignment 8 Graph –
  - ✓ Adjacency matrix to adjacency list conversion, in degree, out degree

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Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	3	2
CO2	3	3	2	2	1	2	2
CO3	3	3	3	2	2	3	3
CO4	3	3	2	3	2	3	2
CO5	2	2	2	3	1	3	2
CO6	3	3	2	3	2	3	3
CO7	3	3	3	3	2	3	3

Mapping of PO1 With All CO's with Justification :

- CO1. With PO1: Understanding various data structures is fundamental to applying computer science principles to a wide range of applications.
- CO2. With PO1: Designing and analyzing the efficiency of data structures directly contribute to applying fundamental principles to various applications in computer science.
- CO3. With PO1: The ability to identify the appropriate data structure is crucial in applying fundamental principles to solve diverse problems in computer science applications.
- CO4. With PO1: Strongly Related. Practical knowledge of data structure applications directly supports the application of fundamental principles in various computer science contexts.
- CO5. With PO1: While understanding programming is essential, its direct link to applying principles in various applications may vary.
- CO6. With PO1: Implementing data structure operations using C programs directly aligns with applying fundamental principles to solve a wide range of problems.
- CO7. With PO1: Solving problems by implementing appropriate data structures is a direct application of fundamental principles to address various challenges in computer science applications.

Mapping of PO2 With All CO's with Justification :

- CO1. With PO2: Understanding various data structures is foundational for designing and implementing solutions to significant computational problems.
- CO2. With PO2: Designing and analyzing the efficiency of data structures is integral to creating solutions for significant computational problems.
- CO3. With PO2: The ability to identify the appropriate data structure is crucial in the design and implementation of solutions to significant computational problems.
- CO4. With PO2: Practical knowledge of data structure applications is essential for designing and implementing solutions to significant computational problems.
- CO5. With PO2: While understanding programming is crucial, its direct link to designing and implementing solutions may vary.
- CO6. With PO2: Implementing data structure operations using C programs is directly related to designing and implementing solutions to significant computational problems.

- CO7. With PO2: Solving problems by implementing appropriate data structures is a direct application of designing and implementing solutions to significant computational problems.

Mapping of PO3 With All CO's with Justification :

- CO1. With PO3: Understanding various data structures is fundamental to imparting a basic understanding of the discipline.
- CO2. With PO3: While design and analysis contribute to the understanding of the basics, their direct relationship may vary.
- CO3. With PO3: The ability to identify the appropriate data structure is crucial in imparting a basic understanding of the discipline.
- CO4. With PO3: Practical knowledge of data structure applications contributes to the practical understanding of the discipline.
- CO5. With PO3: Understanding programming approaches is important in imparting a basic understanding of the discipline.
- CO6. With PO3: Implementing data structure operations is relevant to understanding the basics, but its direct relationship may vary.
- CO7. With PO3: Solving problems through the implementation of appropriate data structures directly contributes to imparting a basic understanding of the discipline.

Mapping of PO4 With All CO's with Justification :

- CO1. With PO4: Understanding various data structures is important for professional development, though its direct connection may vary.
- CO2. With PO4: Design and analysis contribute to professional development, but their direct impact on preparation for continued development may vary.
- CO3. With PO4: The ability to identify the appropriate data structure is valuable for continued professional development but may not be the sole factor.
- CO4. With PO4: Practical knowledge of data structure applications is directly tied to preparing for continued professional development.
- CO5. With PO4: Understanding a systematic approach to programming is crucial for continued professional development.
- CO6. With PO4: Implementing data structure operations using C programs is directly related to preparing for continued professional development.
- CO7. With PO4: Solving problems through the implementation of appropriate data structures is directly tied to preparing for continued professional development.

Mapping of PO5 With All CO's with Justification :

- CO1. With PO5: Understanding data structures is important, but its direct connection to societal and environmental impacts may vary.
- CO2. With PO5: Design and analysis contribute more directly to technical aspects, and their connection to societal impacts may be less evident.
- CO3. With PO5: Identifying appropriate data structures is relevant to solving real-world problems but may not directly address societal and environmental impacts.
- CO4. With PO5: Practical knowledge of data structures applications contributes to understanding real-world scenarios, but the direct link to societal and environmental contexts may vary.
- CO5. With PO5: Understanding a systematic approach to programming is more directly tied to technical aspects than societal and environmental impacts.

- CO6. With PO5: Implementing data structures in C programs contributes more directly to technical skills, and its connection to societal and environmental impacts may be less immediate.
- CO7. With PO5: Solving problems with data structures is essential, but the direct link to societal and environmental contexts may vary.

Mapping of PO6 With All CO's with Justification :

- CO1. With PO6: Understanding various data structures is fundamental to developing proficiency in the practice of computing.
- CO2. With PO6: Designing and analyzing the efficiency of data structures contributes to developing proficiency in the practical aspects of computing.
- CO3. With PO6: The ability to identify the appropriate data structure is crucial for developing proficiency in the practice of computing.
- CO4. With PO6: Practical knowledge of data structure applications is directly tied to developing proficiency in the practice of computing.
- CO5. With PO6: Understanding a systematic approach to programming is fundamental to developing proficiency in the practical aspects of computing.
- CO6. With PO6: Implementing data structure operations using C programs is directly related to developing proficiency in the practice of computing.
- CO7. With PO6: Solving problems through the implementation of appropriate data structures is crucial for developing proficiency in the practice of computing.

Mapping of PO7 With All CO's with Justification :

- CO1. With PO7: Understanding various data structures contributes to the capacity for independent study and research, but it may not be the sole factor.
- CO2. With PO7: Design and analysis contribute to independent study and research skills, but their direct impact may vary.
- CO3. With PO7: The ability to identify the appropriate data structure is crucial for independent study and research, contributing to skills needed for transitioning to employment.
- CO4. With PO7: Practical knowledge of data structure applications contributes to the practical understanding needed for independent study and research.
- CO5. With PO7: Understanding a systematic approach to programming is important for independent study and research but may not be the sole factor.
- CO6. With PO7: Implementing data structure operations is directly related to independent study and research skills, contributing to transitioning to employment.
- CO7. With PO7: Solving problems through the implementation of appropriate data structures is crucial for developing the capacity for independent study and research, supporting transitioning to employment.

Class: S.Y. B. Sc. (Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science **Paper Code :**UCSCO232
Title of Paper: Introduction to Web Technology **Paper :** II
Credit : 3 (4 Lectures/Week) **No. of lectures :** 60

Prerequisites:

- Basic knowledge of Computers and its concepts.

Course Objectives:

1: To learn technologies like HTML5, CSS, JavaScript and Bootstrap.
2: To Apply HTML5 technologies to design dynamic, interactive and elegant Web Sites.
3: To Analyze a web page and identify its elements and attributes.
4: To create web pages using Cascading Style Sheets.
5: To build dynamic web pages using JavaScript (Client-side programming).
6:To apply Bootstrap technologies to design dynamic, interactive and elegant Web Sites.
7: To design dynamic, interactive and elegant Web sites.

Course Outcomes:

CO1: Students will able to Design web pages using HTML5, CSS, JavaScript and Bootstrap.
CO2: Students will able to Design dynamic, interactive and elegant Web sites.
CO3: Students will be able to write a server side applications to catch form data sent from client and store it on database.
CO4: Students will able to Analyze a web page and identify its elements and attributes.
CO5: Students will able to Create web pages using Cascading Style Sheets. Build dynamic web pages using JavaScript (Client side programming).
CO6: Students will able to Build dynamic web pages using JavaScript (Client side programming).
CO7: Students will able to Acquiring the basic concepts of the Web with reference to its architectur

Unit	Title and Contents	No. of Lectures
Unit 1	**Basics of Web Design** **1.1** History of the Internet **1.2** World Wide Web Consortium (W3C) **1.3** Personal, Distributed and Client/Server Computing **1.4** Software Technologies **1.5** Client Server Architecture andits Types	02
Unit 2	**Introduction to HTML5** **2.1** Difference between HTML & HTML5 **2.2** HTML Document and Basic Structure	10

	2.3 Working with HTML Text, Heading, Paragraph, Formatting, Styles **2.4** HTML Color, Hyperlink, Image **2.5** HTML Lists, Tables and I frames **2.6** Block Level Elements and Inline Elements	
Unit 3	**Specific Elements of HTML5** **3.1** HTML Layout : Header & Footer, Navigation Section, Article & Aside **3.2** The Meter Element **3.3** Working with Multimedia **3.4** Working with Forms and controls **3.5** Image Mapping **3.6** Web Storage: Local storage and session storage	09
Unit 4	**Basics of CSS** **4.1** Introduction of CSS **4.2** CSS Rules and Selectors **4.3** Ways to add Selectors **4.4** CSS Color, Box Model, Fonts, Tables, Border, Background **4.5** CSS Margins, Padding, Height, Width, Outline, Text **4.6** CSS Links, Lists, Display, Forms	16
Unit 5	**JavaScript** **5.1** Introduction to JavaScript **5.2** JavaScript Basics – Data Types, Control Structure **5.3** JavaScript Functions **5.4** Working with events **5.5** JS Popup boxes **5.6** JavaScript Objects	06
Unit 6	**Basics of Bootstrap** **6.1** Introduction to Bootstrap **6.2** Use and Advantages of Bootstrap **6.3** How to get Bootstrap **6.4** Bootstrap Containers, Grids, Carousel, Navbar **6.5** Bootstrap Forms, Radio Button, Checkbox, Dropdowns	05

Note: 48 hours for theory lectures and 12 hours for internal assessment and learning.

References:

1. Html & CSS: The Complete Reference, Fifth Edition by Thomas A. Powell and published by McGraw Hill.
2. HTML 5 in simple steps by Kogent Learning Solutions Inc., Publisher Dreamtech Press
3. Head First HTML with CSS & XHTML Book by Elisabeth Freeman and Eric Freeman.
4. The Essential Guide to CSS and HTML Web Design Book by Craig Grannell.

5. JavaScript: The Definitive Guide, Publisher – O'Reilly
6. JavaScript & JQuery: Interactive Front-End Web Development, Publisher – Wiley
7. Bootstrap 5 Foundations, by Daniel Foreman
8. Bootstrap, by Jake Spurlock, Publisher(s): O'Reilly Media, Inc.

Mapping of this course with Programme Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	2	2	1	2	2	2
CO2	3	3	2	1	2	2	2
CO3	3	3	3	1	3	3	2
CO4	2	1	1	1	1	2	1
CO5	3	2	2	1	2	2	2
CO6	3	3	2	1	2	2	2
CO7	2	1	1	1	1	1	1

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Mapping of PO1 with All CO'S

CO1: PO1- This outcome directly applies mathematical and computer fundamentals to design web pages by utilizing HTML5, CSS, JavaScript, and Bootstrap.

CO2: PO1: - This outcome requires the application of mathematics, statistics, and computer fundamentals to design dynamic and interactive websites.

CO3: PO1: - This outcome involves applying computer fundamentals and knowledge of Java script programming to develop server-side applications for handling form data.

CO4: PO1: - This outcome involves applying knowledge of computer fundamentals and HTML to analyze web pages, with a slightly lower emphasis on mathematics and statistics.

CO5: PO1: - This outcome directly applies computer fundamentals to create web pages using Cascading Style Sheets (CSS) and dynamic web pages using JavaScript.

CO6: PO1: - This outcome involves applying computer fundamentals to build dynamic web pages through client-side programming using JavaScript.

CO7: PO1: - This outcome involves understanding the basic concepts of the web and its architecture, with a focus on computer fundamentals.

Mapping of PO2 with All CO'S

CO1: PO2: - Designing web pages involves the use of the latest technologies (HTML5, CSS, JavaScript, Bootstrap) but may not necessarily require in-depth knowledge of various languages.

CO2: PO2: - Designing dynamic and interactive websites requires the use of the latest technologies and languages for effective implementation.

CO3: PO2: - Writing server-side applications using JSP both designing and implementing solutions using the latest technologies and languages.

CO4: PO2: - Analysing web pages is more focused on understanding the structure and content rather than actively designing solutions using various languages.

CO5: PO2: - Creating web pages with CSS and building dynamic pages with JavaScript require knowledge of the latest technologies but may not cover a broad range of languages.
CO6: PO2: - Building dynamic web pages with client-side programming emphasizes the use of the latest technologies and languages for effective implementation.
CO7: PO2: - Acquiring basic concepts of the web and its architecture involves understanding principles rather than actively designing solutions with various languages.

Mapping of PO3 with All CO'S

CO1: PO3: - Designing web pages involves the use of modern engineering and IT tools (HTML5, CSS, JavaScript, Bootstrap) but may not explicitly emphasize modeling and prediction techniques.
CO2: PO3: - Designing dynamic and interactive websites requires the use of modern tools, but the emphasis may not be on explicit prediction and modeling techniques.
CO3: PO3: - Writing server-side applications involves the use of modern engineering and IT tools, especially for database interactions.
CO4: PO3: - Analyzing a web page may involve modern tools, but it may not explicitly include prediction and modeling techniques.
CO5: PO3: - Creating web pages with CSS and building dynamic pages with JavaScript involves using modern tools, but the focus may not be on explicit prediction and modeling techniques.
CO6: PO3: - Building dynamic web pages with client-side programming involves modern tools, but may not explicitly include prediction and modeling techniques.
CO7: PO3: - Acquiring basic concepts of the web and its architecture may involve modern tools, but may not explicitly include prediction and modeling techniques.

Mapping of PO4 with All CO'S

CO1: PO4: - Designing web pages with HTML5, CSS, JavaScript, and Bootstrap may not directly address the societal and environmental impact of IT solutions.
CO2: PO4: - Designing dynamic and interactive websites may not explicitly consider the societal and environmental impact of IT solutions.
CO3: PO4: - Writing server-side applications may not explicitly consider the societal and environmental impact of IT solutions.
CO4: PO4: - Analyzing a web page may not directly address the societal and environmental impact of IT solutions.
CO5: PO4: - Creating web pages with CSS and building dynamic pages with JavaScript may not explicitly consider the societal and environmental impact of IT solutions.
CO6: PO4: - Building dynamic web pages with client-side programming may not directly address the societal and environmental impact of IT solutions.
CO7: PO4: - Acquiring basic concepts of the web and its architecture may not explicitly consider the societal and environmental impact of IT solutions.

Mapping of PO5 with All CO'S

CO1: PO5:- Designing web pages involves ethical considerations related to user experience, accessibility, and information presentation, but may not explicitly address broader professional ethics and responsibilities.
CO2: PO5: - Designing dynamic and interactive websites involves ethical considerations, such as user privacy and security, but may not explicitly address broader professional ethics.
CO3: PO5: - Writing server-side applications involves considerations of professional ethics and responsibilities, especially when dealing with sensitive form data and database interactions.
CO4: PO5: - Analyzing a web page may not explicitly address broader professional ethics and responsibilities, but ethical considerations may arise in data handling.
CO5: PO5: - Creating web pages with CSS and building dynamic pages with JavaScript involves ethical considerations related to user experience and functionality but may not explicitly address broader professional ethics.
CO6: PO5: - Building dynamic web pages with client-side programming involves ethical considerations related to user interactions, security, and privacy but may not explicitly address broader professional ethics.
CO7: PO5: - Acquiring basic concepts of the web and its architecture may not explicitly address broader professional ethics, but ethical considerations may arise in discussions of data transmission and system design.

Mapping of PO6 with All CO'S

CO1: PO6: - Designing web pages may involve both individual work and collaboration in a team, but the emphasis is on individual skills in web design technologies.
CO2: PO6: - Designing dynamic and interactive websites may involve both individual and collaborative efforts, emphasizing skills in web design technologies and teamwork.
CO3: PO6: - Writing server-side applications involves individual and team work, as it requires collaboration in designing and implementing the application.
CO4: PO6: - Analyzing a web page may involve both individual and collaborative efforts, as it requires understanding the structure and attributes of a web page.
CO5: PO6: - Creating and building web pages involve both individual and team work, emphasizing skills in web design technologies and potential collaboration in implementing dynamic features.
CO6: PO6: - Building dynamic web pages with client-side programming may involve both individual and collaborative efforts, emphasizing skills in JavaScript and teamwork.
CO7: PO6: - Acquiring basic concepts of the web and its architecture may not explicitly emphasize teamwork but could involve collaborative discussions.

Mapping of PO7 with All CO'S

CO1: PO7: - Designing web pages may contribute to innovation, employability, and entrepreneurial skills by creating opportunities for value creation, but the direct link to entrepreneurship may be moderate.
CO2: PO7: - Designing dynamic and interactive websites may contribute to innovation and employability, but the direct link to entrepreneurial skills may be moderate.
CO3: PO7: - Writing server-side applications may contribute to innovation, employability, and entrepreneurial skills, but the direct link to entrepreneurship may be moderate.

CO4: PO7: - Analyzing a web page may not directly contribute to innovation and entrepreneurial skills, but it may indirectly support employability.
CO5: PO7: - Creating and building web pages may contribute to innovation and employability, but the direct link to entrepreneurial skills may be moderate.
CO6: PO7: - Building dynamic web pages with client-side programming may contribute to innovation and employability, but the direct link to entrepreneurial skills may be moderate.
CO7: PO7: - Acquiring basic concepts of the web and its architecture may not directly contribute to innovation and entrepreneurial skills, but it may support employability.

Class: S.Y. B. Sc.(Computer Science) (Semester- III)
(2022 Pattern)

Subject : Computer Science **Paper Code** : UCSCO234
Title of Paper : Lab Course-II: based On UCSCO232 **Paper** : IV
Credit : 2 (3 Hour Practical/Week/batch) **No. of Practical :** 13

Course Objectives:

1: To learn technologies like HTML5, CSS, JavaScript and Bootstrap.
2: To Apply HTML5 technologies to design dynamic, interactive and elegant Web Sites.
3: To Analyze a web page and identify its elements and attributes.
4: To create web pages using Cascading Style Sheets.
5: To build dynamic web pages using JavaScript (Client-side programming).
6:To apply Bootstrap technologies to design dynamic, interactive and elegant Web Sites.
7: To design dynamic, interactive and elegant Web sites.

Course Outcomes:

CO1: Students will practically implement technologies like HTML5, CSS, JavaScript and Bootstrap.
CO2: Students will Apply HTML5 technologies to design dynamic, interactive and elegant Web Sites.
CO3: Students will Analyze a web page and identify its elements and attributes.
CO4: Students will Create web pages using Cascading Style Sheets.
CO5: Students will Practically Build dynamic web pages using JavaScript (Client-side programming).
CO6: Students will Apply Bootstrap technologies to design dynamic, interactive and elegant Web Sites.
CO7: Students will Practically implement and Design dynamic, interactive and elegant Web sites.

Assignments on Introduction to Web Technology Using (HTML5, CSS, JavaScript and Bootstrap)	
Sr. No.	**Assignment Name**
1	Be acquainted with elements, Tags and advanced text formatting.
2	Practical implementation of all kinds of List in HTML5.
3	Practical implementation of all kinds of Tables in HTML5.
4	Designing of webpage with the help of iframes.

5	Practical implementation of Forms and all its controls.
6	Practical implementation of the Image Mapping.
7	Designing and Implementation of CSS for Lists and Tables.
8	Practice the use of multimedia components in HTML documents.
9	Practical implementation of all JavaScript concepts.
10	Designing beautiful web pages by using Bootstrap.

Mapping of this course with Programme Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
CO1	3	3	2	1	2	2	1
CO2	3	3	2	1	2	2	1
CO3	3	1	1	1	1	2	1
CO4	3	2	2	1	2	2	1
CO5	3	3	2	1	2	2	1
CO6	3	3	2	1	2	2	1
CO7	3	3	2	1	2	2	1

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Mapping of PO1 with All CO'S

CO1: PO1: - The application of technologies like HTML5, CSS, JavaScript, and Bootstrap directly aligns with the computer knowledge, involving mathematics, statistics, and computer fundamentals.

CO2: PO1: - Applying HTML5 technologies for dynamic and interactive web design aligns with the computer knowledge and fundamentals specified in PO1.

CO3: PO1: - Analyzing a web page requires applying knowledge of HTML elements and attributes, which is part of the computer knowledge and fundamentals outlined in PO1.

CO4: PO1: - Creating web pages with Cascading Style Sheets (CSS) involves applying knowledge of design principles and computer fundamentals specified in PO1.

CO5: PO1: - Building dynamic web pages with client-side programming (JavaScript) aligns with the application of computer knowledge and fundamentals.

CO6: PO1: - Applying Bootstrap technologies for dynamic and interactive web design aligns with the computer knowledge and fundamentals specified in PO1.

CO7: PO1: - Designing dynamic and interactive web sites involves applying computer knowledge and fundamentals, including mathematics, statistics, and programming.

Mapping of PO2 with All CO'S

CO1: PO2: - Applying these technologies aligns with designing and developing solutions for IT applications using the latest technologies, as specified in PO2.
CO2: PO2: - Applying HTML5 technologies for dynamic and interactive web design is directly aligned with designing solutions for IT applications using the latest technologies.
CO3: PO2: - While analyzing a web page is part of the development process, it may not explicitly capture the design aspect of solutions using the latest technologies.
CO4: PO2: - Creating web pages with Cascading Style Sheets (CSS) is part of the solution development process, but the explicit mention of the latest technologies is not emphasized.
CO5: PO2: - Building dynamic web pages with client-side programming (JavaScript) aligns with designing and implementing solutions using the latest technologies.
CO6: PO2: - Applying Bootstrap technologies for dynamic and interactive web design directly aligns with designing solutions using the latest technologies.
CO7: PO2: - Designing dynamic and interactive web sites is directly aligned with designing solutions for IT applications, as specified in PO2.

Mapping of PO3 with All CO'S

CO1: PO3: - Applying these technologies is part of modern tool usage, but the direct connection to the application of appropriate techniques and resources may be moderate.
CO2: PO3: - Applying HTML5 technologies for dynamic and interactive web design contributes to modern tool usage, but the connection to prediction and modeling may be moderate.
CO3: PO3: - Analyzing a web page involves modern tool usage, but the direct connection to prediction and modeling is not explicitly mentioned.
CO4: PO3: - Creating web pages with Cascading Style Sheets (CSS) is part of modern tool usage, but the emphasis on prediction and modeling is not explicit.
CO5: PO3: - Building dynamic web pages with client-side programming (JavaScript) contributes to modern tool usage, but the connection to prediction and modeling may be moderate.
CO6: PO3: - Applying Bootstrap technologies for dynamic and interactive web design is part of modern tool usage, but the emphasis on prediction and modeling is not explicit.
CO7: PO3: - Designing dynamic and interactive web sites involves modern tool usage, but the connection to prediction and modeling may be moderate.

Mapping of PO4 with All CO'S

CO1: PO4: - The application of technologies is not explicitly connected to understanding the impact on societal and environmental contexts or demonstrating knowledge of sustainable development.
CO2: PO4: - The application of HTML5 technologies for web design is not explicitly connected to understanding societal and environmental impact or demonstrating knowledge of sustainable development.
CO3: PO4: - Analyzing a web page does not explicitly address understanding societal and environmental impact or demonstrating knowledge of sustainable development.

CO4: PO4: - Creating web pages with Cascading Style Sheets (CSS) is not explicitly connected to understanding societal and environmental impact or demonstrating knowledge of sustainable development.
CO5: PO4: - Building dynamic web pages with client-side programming (JavaScript) is not explicitly connected to understanding societal and environmental impact or demonstrating knowledge of sustainable development.
CO6: PO4: - Applying Bootstrap technologies for web design is not explicitly connected to understanding societal and environmental impact or demonstrating knowledge of sustainable development.
CO7: PO4: - Designing dynamic and interactive web sites is not explicitly connected to understanding societal and environmental impact or demonstrating knowledge of sustainable development.

Mapping of PO5 with All CO'S

CO1: PO5: - Applying technologies involves considerations of ethical principles related to responsible use and design, but the direct link to professional ethics and responsibilities may be moderate.
CO2: PO5: - Applying HTML5 technologies for web design involves ethical considerations, but the direct connection to professional ethics and responsibilities may be moderate.
CO3: PO5: - Analyzing a web page may involve ethical considerations, but the direct link to professional ethics and responsibilities is not explicitly mentioned.
CO4: PO5: - Creating web pages with Cascading Style Sheets (CSS) involves ethical considerations related to design principles, but the direct link to professional ethics and responsibilities may be moderate.
CO5: PO5: - Building dynamic web pages with client-side programming (JavaScript) involves ethical considerations, but the direct connection to professional ethics and responsibilities may be moderate.
CO6: PO5: - Applying Bootstrap technologies for web design involves ethical considerations, but the direct link to professional ethics and responsibilities may be moderate.
CO7: PO5: - Designing dynamic and interactive web sites involves ethical considerations, but the direct connection to professional ethics and responsibilities may be moderate.

Mapping of PO6 with All CO'S

CO1: PO6: - Applying technologies involves individual work, but the direct connection to functioning in diverse teams is not explicitly mentioned.
CO2: PO6: - Applying HTML5 technologies for web design involves individual skills, but the connection to team collaboration is not explicitly emphasized.
CO3: PO6: - Analyzing a web page may involve both individual and collaborative efforts, contributing to functioning in diverse teams to some extent.
CO4: PO6: - Creating web pages with Cascading Style Sheets (CSS) may involve individual work, but the direct connection to team collaboration is not explicitly mentioned.
CO5: PO6: - Building dynamic web pages with client-side programming (JavaScript) may involve individual and collaborative efforts, contributing to functioning in diverse teams to some extent.

CO6: PO6: - Applying Bootstrap technologies for web design involves individual skills, but the connection to team collaboration is not explicitly emphasized.
CO7: PO6: - Designing dynamic and interactive web sites involves individual skills, but the connection to team collaboration is not explicitly emphasized.

Mapping of PO7 with All CO'S

CO1: PO7: - Applying technologies is a component of innovation and employability, but the direct connection to identifying opportunities, creating value, and pursuing entrepreneurial skills is not explicitly mentioned.
CO2: PO7: - Applying HTML5 technologies for web design is a component of innovation and employability, but the direct connection to entrepreneurial skills and creating value is not explicitly emphasized.
CO3: PO7: - Analyzing a web page is not explicitly linked to innovation, employability, or entrepreneurial skills in the provided context.
CO4: PO7: - Creating web pages with Cascading Style Sheets (CSS) is a component of employability, but the direct connection to innovation and entrepreneurial skills is not explicitly mentioned.
CO5: PO7: - Building dynamic web pages with client-side programming (JavaScript) is a component of employability, but the direct connection to innovation and entrepreneurial skills is not explicitly emphasized.
CO6: PO7: - Applying Bootstrap technologies for web design is a component of employability, but the direct connection to innovation and entrepreneurial skills is not explicitly mentioned.
CO7: PO7: - Designing dynamic and interactive web sites is a component of employability, but the direct connection to innovation and entrepreneurial skills is not explicitly emphasized.