CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF SCIENCE

Effective from Academic Batch: 2025-26

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Mobile Application Development**

Course Group: **Core Courses**

Course Objectives:

a) During theory lectures illustrations emphasizing the need for basic features of Mobile Computing and Cross Platform- the Mobile Application Development platform will be given.
b) During Practical sessions, students will be required to develop Mobile Application using Dart language in Flutter.
c) Students shall also develop applications with elegant user interfaces.
d) Build Interactive applications that deal with data storage using Firebase and state management.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Cross-Platform Mobile App Development with Flutter and Dart** Overview of Mobile App Development; Native vs. Cross-platform Development; Introduction to Flutter; Setting Up the Development Environment; Installing Flutter SDK; Setting up Android Studio/VS Code; Dart Programming Basics; Variables, Data Types, Functions, and Control Flow; Object-Oriented Programming Concepts in Dart; Understanding Flutter Architecture; Flutter Widgets and the Widget Tree; Stateless vs. Stateful Widgets;	15

2	**Building User Interfaces (UI) in Flutter** Layout Widgets; Containers, Rows, Columns, Stacks; Flex and Expanded Widgets; Working with Text, Images, and Icons; Text Styling and Customization; Adding Images and Icons to the UI; Form Handling and Input Widgets; Text Fields, Checkboxes, Radio Buttons, Dropdowns; Form Validation Techniques; Responsive UI Design; Media Query and Layout Builder; Adapting UI for Different Screen Sizes;	**15**
3	**State Management and Navigation** Understanding State Management ; Local vs. Global State; setState and Provider Package; Navigation and Routing; Navigator, Push, Pop, and Named Routes; Passing Data Between Screens; Handling Async Operations; Future and Stream in Dart; Working with APIs and Fetching Data	**15**
4	**Advanced Features and Deployment** Working with Databases; Using SQLite in Flutter; Introduction to Firebase Integration; Handling Media and Permissions; Camera, Gallery, and File Storage; Managing Permissions in Flutter; Performance Optimization Techniques; Debugging and Profiling Flutter Apps; Reducing App Size and Improving Efficiency; App Deployment; Building APKs and iOS Apps; Publishing Apps to Google Play Store and App Store;	**15**

Reference Books/Audio-visual Course:

1	Marco L. Napoli: Beginning Flutter: A Hands On Guide to App Development: Wrox publication: 2019.
2	Eric Windmill: Flutter in Action: Edition: Manning Publication: January 2020.
3	Alessandro Biessek: Flutter for Beginners: An introductory guide to building cross-platform mobile applications with Flutter and Dart 2: Packt publication: September 2019.

Supplementary learning Material:	
1	https://docs.flutter.dev/reference/tutorials
2	https://www.tutorialspoint.com/flutter/index.htm
3	https://www.javatpoint.com/flutter
4	https://fluttertutorial.in/

Pedagogy:

- Justify all the topics unit-wise
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %					
R	**U**	**A**	**N**	**E**	**C**
20	40	15	15	5	5

R: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Upon successful completion of the course, students will be, able to clear all object oriented programming and cross platform concepts	**25**
CO-2	able to learn Flutter and Dart step by step to build engaging native mobile apps for both Android and iOS .	**25**
CO-3	able to learn the reduce the code through native app performance, animated UI with material design and least testing	**25**
CO-4	able to use Firebase to authenticate the users and use the remote database.	**25**

Curriculum Revision:	
Version:	**1.0**
Drafted on (Month-Year):	**March-2025**
Last Reviewed on (Month-Year):	**April-2025**
Next Review on (Month-Year):	**April-2026**

CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF SCIENCE

Effective from Academic Batch: 2025-26

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Practical Based on Mobile Application Development**

Course Group: **Core Course**

Course Objectives:

- Understand the Flutter Framework & Dart Programming Language - Learn Dart syntax, control structures, functions, and OOP concepts; - Understand Flutter architecture and widget-based UI design
- Design and Build Interactive User Interfaces - Use built-in and custom widgets to build visually appealing UI; - Implement layout structures using Rows, Columns, Stacks, and Lists - Explore various state management techniques (setState, Provider, Riverpod, etc.)
- Understand backend integration (with Firebase): - Connect Flutter apps with Firebase for authentication, database, and storage; - Work with REST APIs and JSON data;
- Learn How to Test, debug, and publish Flutter apps to Google Play Store and Apple App Store – Also Build Real-Time Applications

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
--	--	6	3	--	--	50/20	50/20	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

List of Practical:

Below mentioned problem definitions are for basic practice. More problem definitions will be assigned for practice during theory / practical / tutorial sessions. Students should maintain records for all the problem definitions either in digital or hard-copy format.

1.	Install Flutter & Dart, set up environment, run a simple app
2.	Write a simple program to print “Hello, Dart!”
3.	Declare and use different types: int, double, String, bool, var, dynamic.
4.	Take user input and display a response (using stdin and stdout)
5.	Perform addition, subtraction, multiplication, division, and modulus on two numbers.
6.	Write a program to check whether a number is even or odd, positive or negative.
7.	Build a calculator using user choice and switch statements.
8.	Print multiplication table using for, while, and do-while loops.

9.	Perform add, remove, sort, and search operations on lists and sets. Create a map (dictionary), update key-value pairs, and iterate through it.
10.	Create named and anonymous functions. Use optional and named parameters.
11.	Define a class Student, create objects, and access its properties and methods.
12.	Create a base class Person and derive Employee class. (Inheritance), Implement an abstract class and an interface with multiple classes. (Abstract Classes and Interfaces), Use try, catch, on, finally to handle exceptions.
13.	Build a simple quiz in the console with score calculation and correct answers.
14.	Create a basic Flutter app with a "Hello World" message.
15.	Design a layout using Container, Row, Column, Padding, Center. (UI Layouts using Containers)
16.	Create a personal business card UI with an image and contact info (Business Card App)
17.	Implement navigation using Navigator.push() and Navigator.pop() (Navigation Between Screens)
18.	Build a form with TextField, Dropdown, Checkbox, and validate input.(User Input Form)
19.	Add and remove tasks, mark them as completed using stateful widgets. (To-Do List App)
20.	Take height and weight input, calculate BMI, and show results. (BMI Calculator App)
21.	Create a quiz with multiple questions and a scoring system. (Quiz App)
22.	Design both login and signup screens with form validation. (Login & Registration UI)
23.	Implement state management using the Provider package. (Counter App using Provider)
24.	Fetch and display weather data based on city name input. (Weather App (Using OpenWeatherMap API)
25.	Store, display, update, and delete notes locally using sqflite. (Notes App with SQLite)
26.	Register, log in, and log out using Firebase Email/Password Auth. (Firebase Authentication App)
27.	Create a simple inventory manager using Firebase Cloud Firestore. (Firestore CRUD App)
28.	Test, debug, and publish Flutter apps to Google Play Store and Apple App Store
29.	Build Real-Time Applications to Perform CRUD Operations

Reference Books:	
1	Dart for Absolute Beginners(Apress,2014)
2	Beginning Flutter: A Hands on Guide to App Development, Marco L. Napoli, Wrox-Programmer to Programmer.
3	Thomas Bailey, Alessandro Biessek - Flutter for Beginners_ An introductory guide to building cross-platform mobile applications with Flutter 2.5 and Dart-Packt Publishing (2021)
Supplementary learning Material:	
1	https://docs.flutter.dev/
2	https://dartpad.dev/
3	https://www.kodeco.com/flutter
4	https://www.youtube.com/watch?v=x0uinJvhNxI
5	https://www.geeksforgeeks.org/flutter-tutorial/
Pedagogy:	

- Explain / justify all the Program Definitions and correlate to real world problems and solution
- Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Practical) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
5	15	20	10	20	30	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understand the fundamentals of Flutter and Dart programming language	**25**
CO-2	Design and build user interfaces using Flutter widgets and layouts; Implement navigation and multi-screen app structures	**25**
CO-3	Manage application state effectively and Integrate Flutter apps with backend services and databases	**25**
CO-4	Handle user input and data validation through forms and Deploy Flutter apps to Android / iOS platforms	**25**

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FACULTY OF SCIENCE	
Effective from Academic Batch:2025-26	
Programme:	**Master of Computer Application (MCA)**
Semester:	**III**
Course Code:	
Course Title:	**Advanced Data Structure**
Course Group:	**CORE COURSES**

Course Objectives:

1. Introduce the fundamental concepts of data structures and their importance in computational problem solving.
2. Familiarize students with various **linear data structures** such as arrays, stacks, queues, and linked lists along with their operations and applications.
3. Provide a deep understanding of **non-linear data structures**, including trees and graphs, and explore their advanced concepts like AVL trees, traversals, and graph algorithms.
4. Equip students with knowledge of common **searching, sorting, and hashing techniques**, and their efficiency in handling large-scale data.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Data Structure:** Introduction, Primitive Data Structure, Importance of Data Structure, Types of Data Structure, Primitive & Non-Primitive Data types	07
2	**Linear Data Structure:** Array: Definition & concept, Representation & Application, 2D & 3D arrays, Matrix representation Stack: Definition & concept, Representation, applications, Expression: Infix, prefix & postfix, Expression conversion, stack & expression, recursion Queues: Definition & concept, types, representation, applications Linked List: Definition & concepts, types, representation, applications	18

3	**Nonlinear Data Structure:** Trees: Definition & Concept, Representation & Application, types, Traversals Advanced Tree Concepts: AVL Tree, Balancing, Height/Weight Balancing, Rotation Graphs: Definition & Concept, Representation & Application, types, Traversals Advanced Graph Concepts: Spanning Trees, Shortest Paths, DFS/BFS.	**18**
4	**Sorting ,Searching and Hashing Techniques:** Sorting :Introduction, Types of sorting techniques: Bubble sort, Radix sort, Selection sort, Quick sort, Merge sort, Insertion sort Searching: Introduction, Linear search, Binary search, Hashing: The symbol table, Hashing Functions, Collision-Resolution Techniques	**17**

Reference Books:	
1	An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill
2	Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International
3	Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
4	Fundamentals of Data Structures in C++-By Sartaj Sahani
5	Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan PublisherThomson Learning
Supplementary learning Material:	
1	https://www.javatpoint.com/data-structure-tutorial
2	https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3	https://www.programiz.com/dsa/data-structure-types
Pedagogy:	
• Justify all the topics unit-wise • Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment • Internal / External Examination as per the norms of CVM University	

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20	40	15	15	5	5	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Explain the fundamental principles of data structures, including primitive and non-primitive data types, and their role in software development.	**20**
CO-2	Apply linear data structures (arrays, stacks, queues, linked lists) for solving various computational problems using appropriate algorithms.	**30**
CO-3	Implement and analyze non-linear data structures such as trees and graphs, including advanced concepts like AVL trees, rotations, and graph traversals.	**30**
CO-4	Utilize efficient searching, sorting, and hashing algorithms to manage and retrieve data effectively in software applications.	**20**

Curriculum Revision:

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FACULTY OF SCIENCE	
Effective from Academic Batch:2025-26	
Programme:	**Master of Computer Application (MCA)**
Semester:	**III**
Course Code:	
Course Title:	**Practical Based on Advanced Data Structure**
Course Group:	**CORE COURSES**

Course Objectives:

1. To provide practical exposure to various linear and non-linear data structures and their real-time implementations.
2. To develop skills in implementing arrays, stacks, queues, linked lists, and recursion through hands-on exercises.
3. To design and implement advanced tree and graph structures such as AVL Trees, Graph Traversals, and Spanning Trees.
4. To analyze and compare different sorting, searching, and hashing techniques based on performance through experiments.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
--	--	6	3	--	--	50/20	50/20	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

List of Practical:

Implement all the Programs in C / C++:

Below mentioned problem definitions are for basic practice. More problem definitions will be assigned for practice during theory / practical / tutorial sessions. Students should maintain records for all the problem definitions either in digital or hard-copy format.

1	Implement array operations: insertion, deletion, and searching.
2	Implement stack using arrays and perform expression conversion (Infix to Postfix).
3	Evaluate a postfix expression using a stack.
4	Implement queue and circular queue using arrays.
5	Implement singly and doubly linked list with basic operations.
6	Implement recursive functions for factorial, Fibonacci, and Tower of Hanoi.
7	Construct a binary tree and perform preorder, inorder, and postorder traversals.

8	Implement AVL Tree with insertion and required rotations.
9	Represent a graph using adjacency list and perform DFS and BFS traversal.
10	Apply Dijkstra's algorithm to find the shortest path in a weighted graph.
11	Implement sorting algorithms: Quick sort and Merge sort.
12	Implement hashing with linear probing and quadratic probing .
Reference Books:	
1	An Introduction to Data Structures with Applications. by Jean-Paul Tremblay & Paul G. Sorenson Publisher-Tata McGraw Hill
2	Data Structures using C & C++ -By Ten Baum Publisher – Prenctice-Hall International
3	Fundamentals of Computer Algorithms by Horowitz, Sahni,Galgotia Pub. 2001 ed.
4	Fundamentals of Data Structures in C++-By Sartaj Sahani
5	Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan PublisherThomson Learning
Supplementary learning Material:	
1	https://www.javatpoint.com/data-structure-tutorial
2	https://www.tutorialspoint.com/data_structures_algorithms/index.htm
3	https://www.programiz.com/dsa/data-structure-types
Pedagogy:	
• Explain / justify all the Program Definitions and correlate to real world problems and solution • Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment • Internal / External Examination as per the norms of CVM University	

Suggested Specification table with Marks (Practical) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
5	15	20	10	20	30	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Implement and demonstrate operations on linear data structures such as arrays, stacks, queues, and linked lists using code-based practice.	**25**

CO-2	Develop and test recursive functions and expression conversions (infix, prefix, postfix) using stack applications.	**25**
CO-3	Design and implement non-linear data structures including trees (BST, AVL), and graphs with real-time traversal and optimization techniques (DFS, BFS, shortest path).	**25**
CO-4	Apply and evaluate sorting (Quick, Merge, Radix, etc.), searching (Linear, Binary), and hashing techniques (with collision resolution) for efficient data access and manipulation.	**25**

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FACULTY OF SCIENCE

Effective from Academic Batch:2024-25

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Responsive Frameworks**

Course Group: **CORE COURSES**

Course Objectives:

- Knowing Responsive meaning, its use and types of its frameworks.
- Applying Bootstrap as responsive framework.
- Using forms with bootstrap and Introduction Tailwind framework.
- Using more components of Tailwind framework.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Responsive web Design** **Layout variations:** Fixed layout, Fluid layout, Adaptive layout, Hybrid layout **Viewport, Media queries, Flexible Images, Flexible Videos, Frameworks, Templates.**	15
2	**Introduction to Bootstrap Framework** Importance of Bootstrap framework, Setting up environment to use Bootstrap framework, Design first basic responsive page **Bootstrap Components :** Bootstrap Get Started, Bootstrap Containers, Bootstrap Grid Basic, Bootstrap Typography, Bootstrap Colors, Bootstrap Tables, Bootstrap Images, Bootstrap Jumbotron, Bootstrap Alerts, Bootstrap Buttons, Bootstrap Button Groups, Bootstrap Badges, Bootstrap Progress Bars, Bootstrap Spinners, Bootstrap Pagination, Bootstrap List Groups, Bootstrap Cards, Bootstrap Dropdowns, Bootstrap Collapse, Bootstrap Navs, Bootstrap Navbar, Bootstrap Carousel, Bootstrap Modal, Bootstrap Tooltip, Bootstrap Popover, Bootstrap Toast, Bootstrap Scrollspy, Bootstrap Offcanvas, Bootstrap Utilities, Bootstrap Dark Mode, Bootstrap Flex	15

3	**Bootstrap Forms** Bootstrap Forms, Bootstrap Select Menus, Bootstrap Checks and Radios, Bootstrap Range, Bootstrap Input Groups, Bootstrap Floating Labels, Bootstrap Form Validation **Introduction to Tailwind CSS** Tailwind CSS Layout, Tailwind CSS Flexbox, Tailwind CSS Grid, Tailwind CSS Alignment, Tailwind CSS Spacing, Tailwind CSS Sizing, Tailwind CSS Typography	**15**
4	**Tailwind CSS Components** Tailwind CSS Backgrounds, Tailwind CSS Borders, Tailwind CSS Effects, Tailwind CSS Filters, Tables, Tailwind CSS Transitions and Animations, Tailwind CSS Transforms, Tailwind CSS Interactivity, Tailwind CSS SVG, Tailwind CSS Screen Readers	**15**

Reference Books:	
1	Responsive Web Design with HTML5 and CSS Third Edition By Ben Frain, Publisher: Packt
2	Practical Bootstrap: Learn to Develop Responsively with One of the Most Popular CSS Frameworks, by Panos Matsinopoulos, Publisher: Apress
3	Tailwind CSS by Ivaylo Gerchev, Publisher(s): SitePoint, ISBN: 9781925836516
Supplementary learning Material:	
1	https://www.w3schools.com/css/css_rwd_intro.asp
2	https://www.w3schools.com/bootstrap5/index.php
3	https://getbootstrap.com/docs/5.0/getting-started/introduction/
4	https://v2.tailwindcss.com/docs
5	https://www.geeksforgeeks.org/tailwind-css/
Pedagogy:	
• Justify all the topics unit-wise • Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment • Internal / External Examination as per the norms of CVM University	

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20	40	15	15	5	5	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understanding the responsive design idea and implementation.	**25**
CO-2	Able to use of bootstrap and apply it as responsive design.	**25**
CO-3	Creating forms using bootstrap. Applying tailwind as responsive design.	**25**
CO-4	Creating more interactive design using tailwind components.	**25**

Curriculum Revision:	
Version:	1.0
Drafted on (Month-Year):	March-2025
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Next Review on (Month-Year):	April-2026

FACULTY OF SCIENCE

Effective from Academic Batch:2024-25

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Practical Based on Responsive Frameworks**

Course Group: CORE COURSES

Course Objectives:

- Knowing Responsive meaning, its use and types of its frameworks.
- Applying Bootstrap as responsive framework.
- Using forms with bootstrap and Introduction Tailwind framework.
- Using more components of Tailwind framework.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
--	--	6	3	--	--	50/20	50/20	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

List of Practical:

Below mentioned problem definitions are for basic practice. More problem definitions will be assigned for practice during theory / practical / tutorial sessions. Students should maintain records for all the problem definitions either in digital or hard-copy format.

Reference Books:	
1	Responsive Web Design with HTML5 and CSS Third Edition By Ben Frain, Publisher: Packt
2	Practical Bootstrap: Learn to Develop Responsively with One of the Most Popular CSS Frameworks, by Panos Matsinopoulos, Publisher: Apress
3	Tailwind CSS by Ivaylo Gerchev, Publisher(s): SitePoint, ISBN: 9781925836516
Supplementary learning Material:	
1	https://www.w3schools.com/css/css_rwd_intro.asp
2	https://www.w3schools.com/bootstrap5/index.php
3	https://getbootstrap.com/docs/5.0/getting-started/introduction/
4	https://v2.tailwindcss.com/docs
5	https://www.geeksforgeeks.org/tailwind-css/

Pedagogy:
• Explain / justify all the Program Definitionsand correlate to real world problems and solution • Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment • Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Practical) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
5	15	20	10	20	30	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Understanding the responsive design idea and implementation.	**25**
CO-2	Able to use of bootstrap and apply it as responsive design.	**25**
CO-3	Creating forms using bootstrap. Applying tailwind as responsive design.	**25**
CO-4	Creating more interactive design using tailwind components.	**25**

Curriculum Revision:	
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FACULTY OF SCIENCE

Effective from Academic Batch:2025-26

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Cloud Computing**

Course Group: **Elective Courses– II**

Course Objectives:

- This course will provide an opportunity to study the new area of cloud computing, its infrastructure, architecture and services and provide an insight into the various delivery models and service providers.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**:Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Introduction to Cloud Computing:** Characteristics of Cloud Computing; Cloud Service Models Infrastructure as a Service, Platform as a Service, Software as a Service and Anything as a Service; Cloud Deployment Models Hybrid Cloud ; Difference Between Traditional Commuting and Cloud Computing ; Virtualization; Need of Virtualization; Types of Virtualization ; Virtualization in Cloud Computing	**10**
2	**Cloud Infrastructure and Architectures**: Cloud Computing Stack ; Composability ; Infrastructure ; Platforms ; Virtual Applications ; Communication Protocols ; Applications; Cloud Data Center Architecture 2.3 Conceptual View of Networking in Cloud Computing; (Overview of SAN, DFS, etc.) ; Computing Cluster in Cloud ;Service Level Agreement and Cloud Pricing Model ; Cloud Security Concepts; Industrial Platforms and New Developments: Amazon Web Services, Google App Engine, Microsoft Azure	**17**
3	**Service Offerings** by Cloud Providers; Introduction to Amazon Cloud Services ;EC2 Cloud Compute ;Elastic Container Service ; Elastic Kubernetes Service ; Lambda Computing ; VPC – Virtual Private Cloud ; S3 Storage ; RDS – Relational Database Service ; ; Introduction to Microsoft Azure ; Service Fabric ; AKS – Azure Kubernetes Service ; Container Instances ; Azure SQL ; Azure DevOps ;Security Center ; Azure IoT Hub ; Traffic Manager ; Co Services ; Google App Engine ; Google Compute Engine ; Google Kubernetes Engine ; Cloud ; Cloud SQ	**18**

4	**Cloud Delivery Model Considerations**: Cloud Delivery Models: The Cloud Provider Perspective, The Cloud Consumer Perspective, Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management Considerations, Service Quality Metrics and SLAs: Service Quality Metrics, SLA Guidelines	**15**

Reference Books:	
1	Cloud Computing and Virtualization by Dac Chatterjee, WILEY, 2018
2	Cloud Computing : A Practical Approach by Anthony Velte, Toby Velte, Robert Elsenpeter, Mc Graw Hill, 2017
3	Cloud Computing – Black Book by Kailash Jayaswal, Jagannath kallakurchi, Donald Houde, Deven Shah, Dreamtech Press, 2014
4	Architecting The Cloud by Michael Kavis, WILEY, 2014
5	Google Cloud Platform Cookbook by LegorieRajan, Packt Publication, 2018
6	Building Your Next Big Thing with Google Cloud Platform by S.P.T. Krishnan, Jose L. Ugia Gonzalez, Apress, 2015
7	Learning AWS by Aurobindo Sarkar, Amit Shah, Packt Publication, 2015
Supplementary learning Material:	
1	coursera.org/learn/introduction
2	https://onlinecourses.nptel.ac.in/noc22_cs20/preview
3	https://www.tutorialspoint.com/cloud_computing/index.htm
Pedagogy:	
• Justify all the topics unit-wise • Assignments / Quiz / Presentation / Participation for continuous evaluation and assessment • Internal / External Examination as per the norms of CVM University	

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20	40	15	15	5	5	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Students will learn basics of cloud computing, types of cloud computing difference between traditional and cloud computing.	**25**
CO-2	The students will be familiar with various cloud infrastructures, architectures and services.	**25**
CO-3	They will get the knowledge of various services offering by cloud providers.	**25**
CO-4	Students will get various business aspects of cloud delivery models considerations.	**25**

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CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF SCIENCE

Effective from Academic Batch: 2025-26

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Block Chain**

Course Group: **Elective Courses**

Course Objectives:

a) To introduce the fundamentals of blockchain technology and distributed ledger systems.
b) To understand cryptocurrencies, especially Bitcoin and Ethereum.
c) To explore the development of smart contracts and decentralized applications.
d) To examine real-world blockchain applications and associated challenges.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Blockchain Fundamentals:** Overview of Blockchain Technology; History and Evolution of Blockchain; Distributed Ledger Technology (DLT); Public vs Private vs Consortium Blockchains; Cryptographic Principles: Hash Functions; Public Key Cryptography; Digital Signatures; Merkle Trees	15
2	**Bitcoin and Cryptocurrencies :** Bitcoin Overview: Structure and Components; Blockchain Data Structure: Blocks, Chains, and Transactions; Mining and Proof-of-Work; Wallets, Keys, and Addresses; Altcoins, ICOs, and Token Standards; Forks: Hard and Soft Forks;	15
3	**Ethereum and Smart Contracts :** Ethereum Architecture and EVM; Smart Contracts: Design and Implementation; Solidity Programming: Variables, Functions, Control Structures; Gas and Transactions; DApps (Decentralized Applications); Development Tools: Remix IDE, Metamask, Truffle	15

4	**Applications, Challenges, and Future of Block Chain:** Blockchain in Finance, Healthcare, Supply Chain, Identity ; Introduction to Hyperledger Fabric and Sawtooth ; Consensus Mechanisms: PoS, DPoS, PBFT ; Blockchain Interoperability and Scalability; Security, Privacy, and Legal Issues; Environmental Impact and Ethical Concerns	**15**

Reference Books/Audio-visual Course:

1	Blockchain Basics by Daniel Drescher
2	Mastering Blockchain by Imran Bashir
3	Mastering Bitcoin by Andreas M. Antonopoulos
4	Mastering Ethereum by Andreas M. Antonopoulos and Gavin Wood
5	Introducing Ethereum and Solidity by Chris Dannen
6	Cryptocurrency: How Bitcoin and Digital Money are Challenging the Global Economic Order by Paul Vigna
7	Blockchain Technology and Applications by Pethuru Raj, Anupama C. Raman

Supplementary learning Material:	
1	Coursera – Blockchain Specialization by University at Buffalo
2	Udemy – Ethereum and Solidity: The Complete Developer's Guide by Stephen Grider
3	NPTEL – Blockchain Architecture Design and Use Cases
4	MIT OpenCourseWare – Cryptocurrency Engineering and Design

Pedagogy:

- Interactive Lecture Sessions
- Assignments / Quiz / Presentations / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20	40	15	15	5	5	

Course Outcomes (CO):

Sr.	**Course Outcome Statements**	**%weightage**
CO-1	Understand the basic concepts of blockchain and cryptographic foundations.	**25**
CO-2	Analyze the structure of Bitcoin and cryptocurrency systems.	**25**
CO-3	Design and develop smart contracts and DApps using Ethereum and Solidity.	**25**

CO-4	Evaluate real-world blockchain applications and analyze security & ethical issues.	**25**

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FACULTY OF SCIENCE

Effective from Academic Batch: 2025-26

Programme: **Master of Computer Application (MCA)**

Semester: **III**

Course Code:

Course Title: **Cyber Security**

Course Group: **Elective Courses**

Course Objectives:

a) Cyber security is critical because it helps to protect organizations and individuals from cyber-attacks. Cyber security can help to prevent data breaches, identity theft, and other types of cybercrime.

b) Organizations must have strong cyber security measures to protect their data and customers.

c) Cyber security is the protection of internet-connected systems such as hardware, software and data from cyber threats.

d) The practice is used by individuals and enterprises to protect against unauthorized access to data centers and other computerized systems.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
4	--	--	4	50/20	50/20	--	--	100/40

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Cyber Security:** Introduction and concept, Issues and challenges of cyber security, Definition: Cyberspace, Architecture of Cyberspace, Regulation of Cyberspace, Cyber security terminology, Cyberspace attack, Protection of end user machine	15
2	**Cyber Crime:** Classification of cyber crimes, Common cyber crimes, Cyber crime targeting computers and mobiles, financial frauds, Social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.	15

3	**Data Privacy and Data Security:** Definition: Data, meta-data, big data, and non-personal data, Data protection, Data privacy and data security, Personal Data Protection Bill and its compliance, Data protection principles, Big data security issues and challenges, Data protection regulations of other countries- General Data Protection Regulations(GDPR),2016 Personal Information Protection and Electronic Documents Act (PIPEDA), Social media- data privacy and security issues.	**15**
4	**Social Media Security:** Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media	**15**

Reference Books/Audio-visual Course:

1	Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
3	Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
4	Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
5	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6	Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
7	Fundamentals of Network Security by E. Maiwald, McGraw Hill.

Supplementary learning Material:	
1	https://nptel.ac.in/courses/106105031
2	https://nptel.ac.in/courses/106106129

Pedagogy:

- Interactive Lecture Sessions
- Assignments / Quiz / Presentations / Participation for continuous evaluation and assessment
- Internal / External Examination as per the norms of CVM University

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
20	40	15	15	5	5	

Course Outcomes (CO):

Sr.	**Course Outcome Statements**	**%weightage**

CO-1	Understand the concept of cyber security, Cyber space and basic terminology.	**25**
CO-2	Understanding classification of cybercrimes and different attacks.	**25**
CO-3	Understanding the concept of data privacy and its policy.	**25**
CO-4	Evaluate Use case based on social media security.	**25**

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CVM UNIVERSITY
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FACULTY OF SCIENCE

Effective from Academic Batch: 2024-25

Programme: **Master of Computer Application (MCA)**

Semester: **IV**

Course Code:

Course Title: **Project Work**

Course Group: **Core Courses**

Course Objectives:

a) To provide the hands on experience in analyzing, designing and implementing various projects, students are assigned major projects based on the languages they have learned so far.
b) To solve industrial (or society or research) problems.
c) To plan, schedule, and monitor the software project.
d) To develop, code, and test a large project cohesively.
e) To learn documentation of a project.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
--	--	--	25	--	--	350/140	350/140	700/280

* **J**: Jury; **V**: Viva; **P**: Practical

Guidelines:

Sr.	Contents
1	The project definition should be finalized after 3rd semester Examinations.
2	It is recommended that the team should be maximum about 2-3 students
3	Project plan [along with the division of work amongst teammates] would have been prepared and got approved within a maximum of 01 week of the start of the project.
4	It is advisable that object-oriented methodology is used with the reusability of classes and code, etc..
5	The output reports in the form of documentation should include a chapter on "Learning during Project Work", i.e. "Experience of Journey during Project Duration"
6	Data structure (database design) is mandatory
7	If a student is compelled to follow certain instructions (by the external, i.e. organization's Guide) which he/she does not agree to, such a student must prepare a supplementary report to document his/her version and present it to the examiners if such a need arises.

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8	Internal guides (i.e. The faculty members) must devote the time allocated as per the timetable to guide the students for the project.
9	Every 15 days students should be shows their project work progress to internal guide.
10	Every end of months students should be submits monthly progress reports to internal guide duly signed by external guide.
11	Internal guides (i.e. The faculty members) should preferably visit external guide to to track the project.
12	Project document/presentation should be prepared according to general instructions provided by college/university and documentation reports printed on single sides of paper for 02 copies of hard binding reports.
13	The semester end assessment of project work presentation shall be on the basis of presentation, documentation and viva voce.

Pedagogy:

At the start of course, the course delivery pattern, prerequisite of the subject will be discussed. The assessment and evaluation process will be broadly classified with the following 02 components viz.,:

1. In- Semester continuous Internal assessment and evaluation, and
2. End- Semester final examination

The weightage of internal assessment for Project work course will be 50%. However, the remaining 50% weightage for Project work course will be for End-Semester final examination.

Evaluation of the projects would be done considering the framework available at the Institute. The main parameter of assessment would be the ability of the students to code.

Though the project and domain specific knowledge would be assessed for, the evaluation would predominantly depend on the students' ability to explain, modify or revise of code.

Coding standards should have been implemented.

[Though the project would be evaluated for the entire team, the examiner should emphasize on the contribution of each team member in the project development]

In-Semester Continuous internal evaluation:

1. One Internal exam will be conducted as a part of internal project work evaluation.
2. Attendance/Monthly Progress work/reports will be considered in the internal evaluation.
3. Documentation/Presentation/Viva Voce are part of the internal evaluation.
4. Explanation of Analysis & Design/ Explanation of Code will be considered in the internal evaluation.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
5	5	40	5	5	40	

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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Doing the project will enable the student to go through rich experience in developing large projects. Such an experience will include encountering various technical issues, finding sources to resolve the issues and finally finding the solution of all these issues satisfactorily. • Thinking analytically, analyzing, and synthesizing requirements and complicated information for getting a good comprehension of the solution methodology to be adopted. • Ability to document and write well. • Organizing the time effectively. • Working with teammates and generating substantial output of the efforts. It will prepare the students for analyzing and programming for industrial problem and large projects work in future.	**100**

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