

Progressive Education Society's
Modern College of Arts, Science & Commerce, (Autonomous) Ganeshkhind, Pune 411016



Program Code: BSC CS09
Bachelor of Science (Computer Science)
(Under Faculty of Science & Technology)

A.Y: 2025 – 2026

Opposite to University of Pune, Pashan Road 411016
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Name of Program: Bachelor of Science (Computer Science)
Minor Embedded Systems & IOT
Minor Computational Mathematics

Program Structure:

- The Program is a Four Year (Eight semesters) Full Time Degree Program.
- The Program shall be based on a credit system comprising 176 credits.

Eligibility Criteria:

(a) Higher Secondary School Certificate (10+2) Science Stream with Mathematics or its equivalent examination
(b) Three Years Diploma Course, after S.S.C. (10th standard) of Board of Technical Education conducted by Government of Maharashtra or its equivalent.
Direct Second Year B.Sc. (a) In addition to above qualifications student who have (Computer Science) passed three years Diploma Course, after S.S.C. and 2 years Diploma course after H.S.C. of M.S.B.T.E. in IT/Computer Engineering/ Electronics Engineering OR E. & T.C. Engineering are eligible. However Such cases should be approved by Equivalence Committee of Science Faculty of respective colleges.

Medium of Instruction: English

Instructions for Teachers for Internal Evaluation for 20 Marks and 40 Marks:

External Examination: for External evaluation 30 marks & 60 marks

Award of Class:

Letter Grade	Grade Point
O (outstanding)	10
A+ (Excellent)	9
A (Very good)	8
B+ (Good)	7
B (Above average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

Question Paper Pattern:CIE

Max. Marks: 20 (Credit:02, Duration: 50 Min.)					
Question No.	Question		No. of sub questions	Marks to each sub question	Total Question Marks
1	Multiple Choice Questions 5		5	1	5
2	Define any 5		6	1	5
3	Attempt any two of the following		3	2	4
4	Attempt any two of the following		3	3	6
Total Marks:					20

Max. Marks: 20 (Credit 4, Duration: 50Min.)					
Question No.	Question		No. of sub questions	Marks to each sub question	Total Question Marks
1	Multiple Choice Questions 5		5	1	5
2	Define any 5		6	1	5
3	Attempt any two of the following		3	2	4
4	Attempt any two of the following		3	3	6
Total Marks:					20

For 2 credits CIE 20 Marks for internal Examination and 20 Marks for CBCS activity (Open book test, Seminars, Online Test, Surprise Test, Preparation of Models, Group Discussions etc.) average of 40 marks will be considered.

Question Paper Pattern: ESE

Max. Marks: 60 (Credit:04, Duration: 3 Hrs.)					
Question No.	Question		No. of sub questions	Marks to each sub question	Total Question Marks
1	Attempt All		10	1	10
2	Attempt any 5		7	2	10
3	Attempt any 5		7	3	15
4	Attempt any 3		5	5	15
5	Attempt any 2		4	5	10
Total Marks:					60

Max. Marks: 30 (Credit 2, Duration: 2 Hrs.)					
Question No.	Question		No. of sub questions	Marks to each sub question	Total Question Marks
1	Attempt All		5	1	5
2	Attempt any 5		7	2	10
3	Attempt any 2		4	5	10
4	Attempt any 1		2	5	5
Total Marks:					30

S.Y.BSc (Computer Science) Semester -III							
Course Type	Course Code	Course Title	Credits		Evaluation		
			TH	PR	CIE	ESE	Total
Major Mandator y (4T) + (2P)	24CMP23101	Introduction to C++	2		20	30	50
	24CMP23102	Advanced Database	2	-	20	30	50
	24CMP23103	Practical on C++ & ADB	-	2	20	30	50
Major Specific IKS	24CMP23104	Timeline of Computing	2	-	20	30	50
Minor 2T+2P		Electronics/Mathematics	2	-	20	30	50
			-	2	20	30	50
OE1(2)		Arts/ Commerce	2	-	20	30	50
VSEC(2)	24CMP23401	Practical Based On HTML & CSS	-	2	20	30	50
AEC(2)		Hindi/Marathi	2	-	20	30	50
CC (2)		2-D Animation	2	-	20	30	50
FP(2)	24CMP23601	Field Project	-	2	20	30	50
		Total	14	8	220	330	550

CIE :- Continuous Internal Examination, ESE :- End Semester Examination

S.Y.BSc (Computer Science) Semester -IV							
Course Type	Course Code	Course Title	Credits		Evaluation		
			TH	PR	CIE	ESE	Total
Major Mandatory (4T) =(2T+2T) +2P	24CMP24101	Data Structures	2	-	20	30	50
	24CMP24102	Introduction to JavaScript	2	—	20	30	50
	24CMP24102	Practical based on JavaScript	—	2	20	30	50
Minor (4) 2T+2P		Mathematics/Electronics	2	-	20	30	50
			—	2	20	30	50
OE3(2)		Arts/ Commerce	2	-	20	30	50
VSEC(2)	24CMP24401	Practical Based On Data Structures	-	2	20	30	50
SEC(2)		Mathematical Techniques using Python	-	2	20	30	50
AEC(2)		Marathi/Hindi	2	-	20	30	50
CC (2)		3 D Animation	2	-	20	30	50
CEP(2)	24CMP24601	Community Engagement Project	-	2	20	30	50
		Total	12	10	220	330	550

*Third
Semester*

Course Title: - Introduction to C++ Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP23101 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: Knowledge of C Programming Language.			
The main objectives of this course are to: - Acquire an understanding of basic object oriented concepts and the issues involved in effective class design. - Write C++ programs that use object oriented concepts such as information hiding, constructors, destructors, inheritance etc.			
Expected Course Outcomes: - To learn how to design C++ classes for code reuse. - To learn how to implement copy constructors and class member functions. - To understand the concepts of OOPS.			
UNIT	Contents	No of Lectures	
1	Introduction - Object oriented concepts. - Features, advantages and Applications of OOPS. - Data types, new operators and keywords, using namespace concepts. - Introduction to Reference variables, Managing console I/O - Classes, Objects and C++ stream classes. - Defining Data members and Member functions. - Array of objects - Templates	5	
2	Functions in C++ - Call by reference, Return by reference - Function overloading and default arguments - Inline function - Static class members(data members and member functions)	7	
3	Constructors and Destructors - Types of constructors (default, parameterized, copy) - Memory allocation (new and delete) - Destructor - Usage of 'this' pointer.	5	

4	Operator Overloading - Overloading Relational and Arithmetic operators (unary and binary operators) - Overloading using friend function & member Function	5
5	Inheritance - Types of inheritance with examples - Constructors and destructor in derived classes	4
6	Polymorphism - Introduction to Polymorphism in C++ - Types of Polymorphism - Run-Time Polymorphism (Dynamic Polymorphism) - Method Overriding - Virtual Functions and Dynamic Binding - Pure Virtual Functions (Abstract Classes)	4

Text Books

Object Oriented Concepts using C++ - Vision Publications. ISBN : 978-93-5016-294-1
Object Oriented Programming and Cpp - Nirali Prakashan. ISBN:9789390596683

Reference Books

1. Let Us C++" by Yashavant Kanetkar.
2. Object-Oriented Programming with C++" by E. Balagurusamy.
3. The Complete Reference C++"by Herbert Schildt.
4. C++ Programming Language "by Bjarne Stroustrup.

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)

Online Courses:

Udemy: https://www.udemy.com/share/101Wd43@N97VSoAIrCG80AlmdixDuJ6zoGnk_nPExOFIGWKTfjU_RzD93MVXy0WDUTpDeM0WOpA==/

Swayam: https://onlinecourses.nptel.ac.in/noc25_cs58/preview

Course Title: - Advanced Database Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP23102 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Database management system concepts • Relational database management system concepts			
The main objectives of this course are to: • To understand the fundamental concepts of databases. • To understand user requirements and frame it in a data model. • To understand creations, manipulation and querying of data in databases.			
Expected Course Outcomes: • To understand the concept of a transaction ,ACID properties and their maintenance. • To learn various SQL functions, procedures, cursors, triggers. • To understand the concepts of integrity and crash recovery in DBMS and RDBMS.			
UNIT	Contents	No of Lectures	
1	Introduction to PL SQL • PL/PgSQL: Data Types, Language structure • Stored Procedures • Stored Functions • Handling Errors and Exceptions • Cursors • Triggers • Examples on cursors, triggers, procedures, functions.	10	
2	Transaction Concepts and concurrency control • Describe a transaction, properties of transaction, state of the transaction. • Executing transactions concurrently associated problems in concurrent execution. • Schedules, types of schedules • Different types of locks, lock modes, 2PL and its variations. • Deadlock and deadlock handling - Deadlock Avoidance(wait-die, wound-wait), Deadlock Detection and Recovery (Wait for graph).	12	
3	Database Integrity and Security Concepts • Introduction to database security concepts	2	

	• Methods for database security • Discretionary access control	
4	Crash Recovery • Failure classification • Recovery concepts • Log based recovery techniques (Deferred and Immediate update) • Recovery with concurrent transactions (Rollback, checkpoints, commit) • Database backup and recovery from catastrophic failure.	6

Text Books

Relational Database Management System, Parijat Prakashan ISBN:978-93-90769-02-5

Reference Books

- An Introduction to Database Systems. by C.J. Date, ISBN: 978-0201385908
- Database Management Systems by Raghuramkrishnan, third edition, ISBN: 978-0071231510

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)

Online Courses:

- [springer-fundamentals-of-relational-database-management-systems-apr-2007.pdf](#)
- [PG M.Sc. Information Technology 313 22 RDBMS CRC.pdf](#)
- https://www.vssut.ac.in/lecture_notes/lecture1423726199.pdf
- https://onlinecourses.nptel.ac.in/noc22_cs91/preview
- https://onlinecourses.swayam2.ac.in/aic20_sp36/preview

Course Title: - Practical on C++ & ADB Course Type: Major Mandatory Paper(Practical) Course Code: 24CMP23103 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Practicals: 10	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: ● Procedure and object oriented programming languages ● Database management and relational management system concepts			
The main objectives of this course are to: ● To understand the fundamental concepts of databases. ● To understand user requirements and frame it in a data model. ● To understand creations, manipulation and querying of data in databases.			
Expected Course Outcomes: ● To learn and apply various object oriented concepts practically. ● To learn and apply various SQL concepts practically.			
UNIT	Contents	No of Sessions	
C++ Practical			
1	Class, Object and Methods Implementation.	1	
2	Constructor : Copy Constructor, Default Constructor, Parameterized Constructor.	1	
3	Inline function, friend function, default argument	1	
4	Function Overloading.	1	
5	Operator Overloading.	1	
DBMS Practical			
7	Stored Function 1) A Simple Stored Function 2) A Stored Function that returns 3) A Stored Function recursive	1	
8	Cursors 1) A Simple Cursor 2) A Parameterized Cursor	1	
9	Triggers & Exception Handling 1) Before Triggers (insert, update, delete) 2) After Triggers (insert, update, delete)	2	
	For above practicals use any one database		

Reference Books
https://web.cs.laurentian.ca/kpassi/cosc2307/18plsqladv.pdf https://www.coursehero.com/file/243719430/6-AdvanceSQLpdf/

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)
Online Courses: https://onlinecourses.swayam2.ac.in/ini24_cs01/preview C++: https://www.udemy.com/share/101Wd43@N97VSoAIrCG80AlmdixDuJ6zoGnknPExOFIGWKTfjU_RzD93MVXy0WDUTpDeM0WOpA==/ https://onlinecourses.nptel.ac.in/noc25_cs58/preview

Course Title: - Timeline of Computing Course Type: Major Specific IKS(Theory) Course Code: 24CMP23104 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • General computing systems and Modern technology • Arithmetic skills and number systems • Key inventions and scientific inventors			
The main objectives of this course are to: • Understand the evolution of computing from early tools to modern technologies. • Analyze the contributions of key inventors, devices, and innovations in computing history. • Recognize the impact of technological milestones on society and industries. • Connect historical advancements to modern computing trends and future developments.			
Expected Course Outcomes: • To understand the history of computing and the era of computing. • To learn the foundations of modern computing. • To understand computing in the 21st century.			
UNIT	Contents	No of Lectures	
1	Pre-Computing Era • Introduction to Computing Concepts • Definition of computing • Early calculation tools: Abacus, Slide Rule • Historical Milestones in Pre-Computing • Mechanical calculators: Pascaline, Leibniz Wheel • Charles Babbage's Difference and Analytical Engines • Contributions of Ada Lovelace	4	

2	Foundations of Modern Computing ● Evolution of Programming : ● Early programming languages (Fortran, COBOL, Lisp) ● Machine language and assembly ● Turing's concept of a universal machine ● Birth of Electronic Computing ● First generation of computers: ENIAC, UNIVAC ● Vacuum tube technology ● Alan Turing's contributions to cryptography ● Transition to Transistors and Integrated Circuits: ● Second and third-generation computers ● Rise of IBM and mainframes ● Impact of Moore's Law	8
3	Personal Computing Revolution ● Development of Microprocessors: ● Intel 4004 and subsequent chips ● Evolution of processors in personal computers ● Birth of the PC Era: ● Role of companies like Apple, IBM, and Microsoft ● Rise of graphical user interfaces (GUIs) ● Early operating systems (DOS, Windows, MacOS) ● Networking and the Internet: ● ARPANET and the rise of networking ● Birth of the World Wide Web (Tim Berners-Lee) ● Impact of email and early web browsers	8
4	Computing in the 21st Century ● Mobile Computing and Devices: ● Evolution of mobile phones to smartphones ● Impact of operating systems like iOS and Android ● Cloud Computing and Big Data: ● Introduction to cloud platforms (AWS, Azure) ● Role of big data in computing ● Fog, Edge and Quantum Computing Introduction and Applications ● Basics of artificial intelligence and machine learning	10

	Blockchain and Decentralized Systems: • Basics of blockchain technology • Applications in finance, healthcare, and beyond	
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Reference Books
• Computer: A History of the Information Machine by Martin Campbell-Kelly and William Aspray • https://books.google.co.in/books?id=0MZVDgAAQBAJ&lpg=PA1&pg=PT27#v=onepage&q&f=false

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)
Online Courses: • https://fortran-lang.org/ • https://unacademy.com/content/bank-exam/study-material/computer-knowledge/notes-on-lisp/ • https://www.ibm.com/topics/cobol • https://ieeexplore.ieee.org/abstract/document/6369705

Course Title: - Practical Based On HTML & CSS Course Type: VSEC(Practical) Course Code: 24CMP23401 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Knowledge of HTML CSS & Bootstrap . • Knowledge of windows os and Browsers like Chrome, firefox. • Knowledge of Vs Code or notepad.			
The main objectives of this course are to: • Knowledge of HTML Tags and CSS classes . • Knowledge of Bootstrap Components			
Expected Course Outcomes: • To get knowledge of HTML and CSS coding construct • To Build static as well as Dynamic website using HTML CSS Build User Friendly Interfaces.			
Sr No	Assignments		No of Hours
1	Assignment On Introduction to HTML & Different HTML Tags • Introduction to the HTML Tags. • Use of Different Tags Like & Basic html structure <head> <body> • Use of Tags Like <h1>to<h6>,<table>,<Audio> <Video> • Use of List Order and UnOrder		3
2	Assignment Using HTML To Create Forms Like (Student Registration Form) • Use of HTML Tags Like Button Textbox Title • Create Submit buttons also use Different types of input Tags like (Radio Button ,Checkbox ,Date Selection)		4
3	Assignment on HTML to Create Tables • Create Table in HTML Using <Table> tag • Use <tr>& <td> to add rows and columns		4
4	Assignment On Introduction to CSS & Different elements in CSS • Introduction to Cascading Style Sheet CSS • Use of Classes in CSS • Use of CSS elements		4
5	Assignment On Use of CSS By Inline Internal and external CSS • Creation of .css file for external css and Link to html Page via <Link> tag. • Use of CSS By Inline ,Internal and External		4
6	Assignment on HTML and CSS to Create Home Page for Shopping Website with attractive Design • Use of Nav tag to create Nav Bar • create Navbar create menu also add relevant images Using tag		4

7	Assignment On Bootstrap • Introduction to Bootstrap • Use of Bootstrap Components	3
8	Assignment to Create Landing Page of Website, also registration form and Login Page with Use of HTML , CSS & Bootstrap • create Dynamic Web pages Using HTML CSS and Bootstrap Components • Link all Design Webpages to Each Other By Use of <Link> Tag also Link Hosted Website on click of Some action	4

Text Books

Create modern-looking websites with HTML and CSS ISBN : 978-1-4932-2423-4
Web Development with HTML & CSS. ISBN:978-1-941333-54-9

Reference Books

Responsive Web Design with HTML5 and CSS by Ben Frain
Get Coding!: Learn HTML, CSS & JavaScript & Build a Website, App & Game – by Young Rewired State
<https://www.w3schools.com/html/default.asp>
<https://getbootstrap.com/>

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)

Online Courses:

<https://www.coursera.org/learn/html-and-css-in-depth>
<https://www.codecademy.com/catalog/language/html-css>

Course Title: - Field Project Course Type: FP Course Code: 24CMP23601 Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: - Technologies Like Google Form, Microsoft form. - Select Topic from Day Today's Problem from the Surrounding And Take Survey about the corresponding topic. - Data analysis libraries, and data visualization tools. - Data cleaning and preprocessing.			
Course Objectives: - To get knowledge of data collection and preparation. - To understand data exploration and descriptive analysis. - To learn how to design data using visualization tools. - To get knowledge of data reporting and presentation. - To learn how to implement and deploy the model.			
After successfully completing this course, students will be able to : - To discover valuable insights and make informed decisions, solve problems, or optimize processes. - To make the data more understandable and accessible using visual representations of data, such as charts, graphs, and dashboards. - To generate reports by communicating the results to stakeholders, management, or clients.			
UNIT	Assignments		
1	Selection of Topic		
2	Problem Definition (Explanation about Selected Topic)		
3	Methodology(which Methods You have Used To Take Survey eg. Google Forms, real time Survey)		
4	Data Collection (Screenshot Of Google Form.)		
5	Explanation of All Questions included in Google Form (why you ask this Question)		
6	Data Analysis/Report (Screenshot of Excel Data, Pie Charts and Graphs) Description about Analysis (Description about what you have analyze for Survey)		
7	Conclusion		
8	References		

*Fourth
Semester*

Course Title: - Data Structures Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24101 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of algorithms and problem-solving • Knowledge of C Programming Language			
The main objectives of this course are to: • To learn the systematic way of solving problems. • To understand the different methods of organizing large amounts of data. • To efficiently implement the different data structures. • To efficiently implement solutions for specific problems. • To apply linear data structures. • To efficiently implement the non-linear data structures.			
Expected Course Outcomes: • To use well-organized data structures in solving various problems. • To differentiate the usage of various data structures in problem solution • To implement algorithms to solve problems using appropriate data structures			
UNIT	Contents		No of Lectures
1	Introduction to Data Structures and Algorithm Analysis • Introduction ○ Need of Data Structure ○ Definitions - Data and information, Data type, Data object, ADT, Data Structure • Types of Data Structures • Algorithm analysis Space and time complexity, Graphical understanding of the relation between different functions of n, examples of linear loop, logarithmic, quadratic loop etc. • Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω, Theta θ)		2

2	Searching & Sorting ● Searching ○ Linear Search ○ Binary Search ● Sorting Terminology- Internal, External, Stable, In-place Sorting ● Comparison Based Sorting - Lower bound on comparison-based sorting, Methods- Bubble Sort, Insertion Sort. Algorithm design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort, complexity analysis of sorting methods.	6
3	Linked List ● List as a Data Structure, differences with array. ● Dynamic implementation of Linked List, internal and external pointers ● Types of Linked List – Singly, Doubly ● Operations on Linked List - create, traverse, insert, delete, search. ● Applications of Linked List-polynomial representation	6
4	Stack ● Introduction ● Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations. ● Implementation- Static and Dynamic with comparison ● Applications of stack ● Function call and recursion, String reversal, palindrome checking ● Expression types - infix, prefix and postfix, expression conversion and evaluation.	3
5	Queue ● Introduction ● Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(), differences with stack. ● Implementation - Static and Dynamic with comparison ● Types of Queue - Linear Queue, Circular Queue, (with implementation) ● Priority Queue, Double Ended Queue ● Applications – CPU Scheduling in multiprogramming environment, Round robin algorithm.	4

6	Tree ● Concept and Terminologies ● Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree. ● Representation – Static and Dynamic ● Implementation and Operations on Binary Search Tree - Create, Insert, Tree traversals– preorder, inorder, postorder (recursive implementation), Counting leaf, non-leaf and total nodes, Copy, Mirror. ● Applications of trees ● AVL Tree- concept and rotations.	6
7	Graph ● Concept and terminologies ● Graph Representation – Adjacency matrix, Adjacency list ● Graph Traversals – Breadth First Search and Depth First Search (with implementation) ● Applications of graph	3

Text Books

Data Structure and Algorithm - Parijat Prakashan ISBN 9789390769148
Data Structure and Algorithm-II - Vision Publications

Reference Books

1. Classic Data Structures-D. Samanta, Prentice Hall India Pvt. Ltd.
2. Fundamentals of Data Structures in C- Ellis Horowitz, SartajSahni,Susan Anderson- Freed, 2nd Edition, Universities Press.
3. Data Structures using C and C++-YedidyahLangsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
4. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)

Online Courses:

- <https://drive.google.com/file/d/1Z8DqgWwTkSfE0cbI9wTnvq1pMcawF80b/view>
- [3rd-Sem_CSE_Data-Structure_SM.pdf](#)
- https://onlinecourses.swayam2.ac.in/nou23_cs13/preview

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
The main objectives of this course are to: • To understand the fundamentals of JavaScript, including syntax, variables, data types, control structures, functions, DOM manipulation, and event handling. • Students will be equipped to write basic JavaScript programs and begin using it in web development projects.			
Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
UNIT	Contents		No of Lectures
1	Introduction to JavaScript What is JavaScript? • The history of JavaScript and its evolution • JavaScript's role in web development. • Interaction between JavaScript with HTML and CSS(Internal and External Javascript). • Setting up the development environment (installing text editors, using the browser console). • JavaScript Platforms Node.JS, React Native, Angular etc.		2

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
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Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
2	Basics of JavaScript • Syntax and Structure Statements, Semicolons and Line Breaks Comments in Java Script • Variables var, let, const Primitive data types (String, Number, Boolean, Null, Undefined, Symbol, BigInt) • Data Types and Type Conversion Implicit and explicit conversion Type checking (typeof, instanceof) • Operators in Javascript • Control Flow Statements • Conditionals if, else, else if, switch statements • Loops for, while, do...while loops Loop control: break, continue • Type coercion		5

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
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Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
3	Functions • Defining Functions Function Declaration, Expression, and Arrow Functions • Parameters and Return Values Default Parameters Rest Parameters (...args) Closures • Scope and Hoisting Local vs Global scope Function Scope vs Block Scope Hoisting behavior in functions		4

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
The main objectives of this course are to: • To understand the fundamentals of JavaScript, including syntax, variables, data types, control structures, functions, DOM manipulation, and event handling. • Students will be equipped to write basic JavaScript programs and begin using it in web development projects.			
Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
4	Objects, Arrays and Strings • Objects Creating and accessing objects Object properties, methods, and this keyword • Arrays Creating arrays, accessing and manipulating elements Common Array methods: map(), filter(), reduce(), forEach(),.push(), .pop(), .shift(), .unshift(), .slice(), .splice() • Destructuring Object and Array destructuring Spread() and Rest() • Introduction to Strings Template Strings String Methods String Manipulation Methods, searching		5

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
The main objectives of this course are to: • To understand the fundamentals of JavaScript, including syntax, variables, data types, control structures, functions, DOM manipulation, and event handling. • Students will be equipped to write basic JavaScript programs and begin using it in web development projects.			
Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
5	DOM Manipulation Introduction to DOM. Interacting with HTML elements via JavaScript Selecting DOM elements: getElementById(), querySelector(), querySelectorAll(). Modifying content and styles with JavaScript. • Introduction to Events Events in JavaScript. Common events: click, mouseover, keydown, submit. Using addEventListener() to handle events. Event bubbling and event delegation/capturing. • Handling Forms and User Input Event handling on form submissions. Accessing form elements. Validating form inputs using JavaScript. • Error Handling Error Handling in JavaScript Different types of errors (Syntax errors, Runtime errors). Using try, catch, and finally for error handling Throwing custom errors with throw.		8
6	Asynchronous JavaScript • Introduction to Asynchronous JavaScript Synchronous vs Asynchronous programming. Understanding the Event Loop and Call Stack. Using setTimeout() and setInterval() for delays.		6

Course Title: - Introduction to JavaScript Course Type: Major Mandatory Paper(Theory) Course Code: 24CMP24102 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
The main objectives of this course are to: • To understand the fundamentals of JavaScript, including syntax, variables, data types, control structures, functions, DOM manipulation, and event handling. • Students will be equipped to write basic JavaScript programs and begin using it in web development projects.			
Expected Course Outcomes: • To understand the basic concepts of Javascript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the fundamental and advanced skills of JavaScript for client side and server programming			
	Concept of asynchronous code in JavaScript. • Promises Introduction to Promise. Promise states (pending, fulfilled, rejected). Using .then(), .catch(), and .finally() with Promises. Chaining Promises for sequential operations.		

Text Books
Web Technologies, Nirali Prakashan ISBN: 9789390596331

Reference Books
1. JavaScript from Beginner to Professional by <i>Laurence Lars Svekis, Maaïke van Putten, Rob Percival</i> 2. The Good Parts written by <i>Douglas Crockford</i> 3. Professional Codeigniter By <i>Thomas Myer</i> , Wrox Publication, 4. Codeigniter 2 CookBook By <i>Rob Foster</i> ,PACKT Publication , 5. JQuery CookBook, O'reilly Publication.

Related Online Content (MOOCS, SWAYAM, NPTEL, WEBSITES etc.)
Online Courses: 1. www.php.net.in 2. www.W3schools.com

3. <https://www.tutorialspoint.com/codeigniter/index.htm>
4. <https://api.jquery.com/>
5. <http://codeigniter.com/docs>

Course Title:- Practical Course Based on JavaScript Course Type: Major Mandatory Paper(Practical) Course Code: 24CMP24103 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Practicals 10	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: • Basic knowledge of HTML and CSS (for web integration) • Students must know the creation of Web Pages.			
The main objectives of this course are to: • To understand the fundamentals of JavaScript, including syntax, variables, data types, control structures, functions, DOM manipulation, and event handling. • Students will be equipped to write basic JavaScript programs and begin using it in web development projects.			
Expected Course Outcomes: • To understand how to develop algorithms and solve problems using JavaScript. • To Learn how JavaScript integrates with HTML and CSS to create interactive web pages. • To understand the JavaScript syntax, variables, datatypes and control statement • To understand the Document Object Model (DOM) and how to traverse, manipulate, and update HTML elements dynamically.			
UNIT	Contents	Sessions	
1	Introduction to JavaScript Setting up the Development Environment • Install and configure a text editor (VS Code). • Writing a simple JavaScript program: Output "Hello, World!" using console.log(). • Opening the browser developer tools and using the console. • Running JavaScript in the browser console. Basic JavaScript Syntax and Structure • Writing simple statements and using comments (//, /* */). • Experiment with different data types (String, Number, Boolean, Null, Undefined). • Practice with basic expressions and operators (e.g., arithmetic operations, string concatenation).	1	

2	Variables, Data Types, and Operators Working with Variables and Operators ● Declare variables using var, let, and const. ● Practice with different data types (Strings, Numbers, Booleans). ● Understanding variable scope: Global vs. Local scope. Type coercion and conversion (e.g., converting a string to a number). Arithmetic operators (+, -, *, /, %). Comparison operators (==, ===, !=, >, <). Logical operators (&&, , !). Implement a simple calculator (e.g., addition, subtraction). Conditional Statements and Loops ● Writing programs using if, else if, and else. ● Use switch statements for multiple conditions. ● Develop a program to check if a number is positive, negative, or zero. ● Practice writing for, while, and do...while loops. ● Writing a program to print numbers from 1 to 10 using different loops. ● Implement loop control: break, continue. ● Use the forEach() method to iterate over an array of numbers	2
3	Functions and Scope Functions and Arrow Functions ● Create functions with parameters and return values. ● Write a program to calculate the factorial of a number using a function. ● Demonstrate function scope with local and global variables. Arrow Functions ● Writing the same function as an arrow function. ● Practice using arrow functions with array methods (e.g., map(), filter()).	1
4	Arrays and Objects Arrays ● Create an array and access elements by index. ● Use array methods: .push(), .pop(), .shift(), .unshift(), .slice(). ● Implement an array sorting function (e.g., sort an array of numbers). Objects ● Create objects and access properties. ● Modify object properties and practice object destructuring. ● Write a program that uses an object to store student data (name, age, grade).	2

5	DOM Manipulation Introduction to the DOM and Modifying the DOM • Use JavaScript to access HTML elements by id, class, and tag name. • Writing a program that changes the content of an HTML element using .innerHTML and .textContent. • Use JavaScript to change the style of an element (e.g., change background color, font size). • Create a simple webpage where clicking a button changes the text of a paragraph. Handling User Events • Attach event listeners to HTML elements using addEventListener(). • Create a button that changes the color of a div when clicked. • Implement mouseover and mouseout events to change the appearance of elements. Form Validation • Create a simple HTML form (e.g., registration form). • Use JavaScript to validate user input (check if fields are empty, if email format is correct). • Prevent form submission if validation fails.	2
6	Asynchronous JavaScript Using setTimeout and setInterval • Writing a program that uses setTimeout() to display a message after a delay. • Use setInterval() to display the time every second • Introduction to Promises Create a simple Promise that resolves after a delay. Handle promise results with .then() and .catch(). Write a program to simulate an API call using a Promise.	2

Course Title: - Practical Based On Data Structures Course Type: Major Mandatory Paper(Practical) Course Code: 24CMP24401 Semester- IV			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Sessions: 10	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Prerequisites: Student should have basic knowledge of: Knowledge of C Programming.			
The main objectives of this course are to: Study and execution of all the Data structure Algorithms.			
Expected Course Outcomes: - To Demonstrate algorithms of DS. - To Understand and apply the algorithms role in System Software.			
Sr. No.	Assignments		No.of Sessions
1	Searching Algorithms & Sorting Algorithms -I Implementation of searching algorithms to search an element using: Linear Search, Binary Search (with time complexity),Practicals of sorting algorithms: Bubble Sort, Insertion Sort		2
2	Link List Singly link list, Circular link list, Doubly Link List Insertion(At any position), Deletion(At any position), Searching,show.		3
3	Stack & Its Applications Static and Dynamic implementation of Stack to perform following operations: Init, Push, Pop, Peek, Isempty, Isfull.		1
4	Queue & Its Applications Static and Dynamic implementation of linear Queue to perform following operations: Init, enqueue, dequeue Peek, IsEmpty, IsFull.		2
5	Binary Search Tree and Traversals - Implement Binary Search Tree (BST) to perform following operations on BST– Create, Recursive Traversals - Inorder, Preorder, Postorder - Perform following operations: insert, delete, copy and mirror image of BST, counting leaf, non-leaf and total nodes.		2

Course Title: - Community Engagement Project Course Type: 24CMP24601 Course Code: Semester- III			
Teaching Scheme: 2 Hours / Week	No. of Credits: 2	No. of Lectures: 30	Examination Scheme: CIE: 20 Marks ESE: 30 Marks
Course Objectives: After successfully completing this course, students will be able to : • Build partnerships with community leaders, organizations, and residents to co-create solutions that address identified issues. • Learn about the different ways to work with communities and why community engagement is important.			
UNIT	List Of Activities		
1	River Cleaning Activity(Clean areas near by River)		
2	Orphanage Engagement:(Host storytelling, sports days, or art workshops for children in orphanages.)		
3	Computer Literacy Camp in Rural Areas		
4	Cyber Security Awareness (Aware People about cyber crime and teach people how to avoid)		
5	Blood Donation Camp (Collaborate with local hospitals or Red Cross to organize drives.)		
6	Tree Plantation (Collaborate with local authorities to plant trees in urban and rural areas)		
7	Recycling Programs (Start campaigns to teach proper waste segregation and recycling)		
8	Clean-Up Drives (Start campaigns to teach proper waste segregation and recycling.)		
9	Women's Empowerment: Offer skill training workshops (tailoring, baking, coding) for women to become self-reliant.		
10	Food Distribution: Cook and distribute meals to homeless people or struggling families.		