SAMARTH EDUCATIONAL TRUST
SAWKAR INSTITUTES
SATARA

AGCE

SYLLABUS FIRST YEAR

Bachelor of Computer Applications

Syllabus and Course Structure of First Year BCA Programme at Arvind Gavali College of Engineering, Satara - Designed to nurture foundational knowledge, practical skills, and holistic development for future engineers

ARVIND GAVALI COLLEGE OF ENGINEERING, SATARA.

+91-9957100100
http.//www.agce.edu.in
Panmalewadi, Varye, Satara

SAMARTH EDUCATIONAL TRUST

ARVIND GAVALI COLLEGE OF ENGINEERING, SATARA (AN AUTONOMOUS INSTITUTE)

Teaching and Evaluation Scheme for First Year B.C.A.

List of Abbreviations

Sr. No.	Abbreviation	Description	Code
1	L	Lecture	
2	T	Tutorial	
3	P	Practical	
4	Cr	Credits	
5	PCC	Program Core Course	
6	AEC	Ability Enhancement Course	
7	MDE	Multi-Disciplinary Elective Courses	
8	VAC	Value Added Courses	
9	SEC	Skill Enhancement Courses	
10	DSE	Discipline Specific Courses	
11	OE	Open Elective	

Semester II

Sr. No.	Category	Course Code	Course Name	Teaching Scheme					Evaluation Scheme			
				L	T	P	Hrs./ Week	Cr	Components	Max	Min for Passing	
1	PCC	25BCA1201	Mathematics Foundations to Computer Science- II	3	--	--	3	3	CA1 MSE CA2 ESE	10 30 10 50	 20	40
2	PCC	25BCA1202	Data Structures	3	--	--	3	3	CA1 MSE CA2 ESE	10 30 10 50	 20	40
3	PCC	25BCA1203	Operating Systems	3	--	--	3	3	CA1 MSE CA2 ESE	10 30 10 50	 20	40
4	SEC	25BCA1204	Object Oriented Programming using Java	3	--	--	3	3	CA1 MSE CA2 ESE	10 30 10 50	 20	40
5	SEC	25BCA1205	Web Technologies	2	--	--	2	2	CA1 MSE CA2 ESE	10 30 10 50	 20	40
6	VAC	25BCA1206	Indian Constitution	2	--	--	2	2	CA1 MSE CA2 ESE	10 30 10 50	 20	40
7	AEC	25BCA1207	Additional Course - Indian or Foreign Language Other than Mother Tongue and English	1	1	--	2	AU	CA1 MSE CA2 ESE	25 -- 25 --	 --	20
8	PCC	25BCA1202L	Data Structures Laboratory	--	--	2	2	1	CA1 CA2 POE	25 25 --	 --	20
9	SEC	25BCA1204L	Object Oriented Programming using Java Laboratory	--	--	4	4	2	CA1 CA2 POE	25 25 50	 20	40
10	SEC	25BCA1205L	Web Technologies Laboratory	--	--	4	4	2	CA1 CA2 POE	25 25 50	 20	40
			Total	**17**	**1**	**10**	**28**	**21**		**850**		
Total Contact Hours –28 Total Credits – 21												

Title of the Course Mathematics Foundation to Computer Science –II Course Code: 25BCA1201	L	T	P	Credit
	3	--	--	3

Course Prerequisite:

Basic understanding of high school mathematics. With set theory, algebraic operations, and logical reasoning.

Course Description:

This course introduces fundamental concepts in mathematical logic, combinatorics, algebraic structures, and optimization techniques such as linear programming and transportation methods. It equips students with analytical and problem-solving skills essential for advanced studies and real-world applications .

Course Objectives:

1. To mathematical logic, including propositional logic, truth tables, and proof techniques in solving computational and logical problems
2. To understand principles of combinatory such as counting, permutations and combinations and binomial Theorems for analyzing discrete structures.
3. To understand of algebraic structures including semigroups, monoids, groups, and Abelian groups
4. To solve linear programming problems using graphical methods, the simplex method and duality for optimal decision-making
5. To apply methods like the north-west corner rule, least cost method, Vogel's approximate optimal decision-making

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Apply the concepts of propositional logic and proof techniques to solve logical and computational problems
CO2	Use combinatorial principles to solve problems involving counting, arrangements, and selections.
CO3	Understand and work with algebraic structures such as semigroups, monoids, and groups in theoretical and applied contexts
CO4	Formulate and solve linear programming problems using graphical and simplex methods, including duality concepts.
CO5	Analyze and solve transportation problems using optimization techniques like Vogel's and MODI methods.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3			1							2
CO2	3	3			1							2
CO3	3	2										2
CO4	3	3	2		2						2	2
CO5	3	3	2		2						2	2

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Mathematical Logic** Propositional Logic : Statement, Types of statement Logical Connectives, Translating English Sentences, Truth Tables, Tautologies, Contradiction , Universal and Existential Quantifiers, Logical Equivalences, Logic gates and circuits , Methods of proofs: Rules of inference for propositional logic, modus ponens, modus tollens, Introduction to Proof Techniques, Direct Proof, Proof by Contradiction, Mathematical induction	**08**
2	**Combinatorics** Basics of Counting, Rules of Sum and Product, Permutations and Combinations , Principle of Inclusion and Exclusion, Pigeonhole Principle Binomial coefficients, Binomial theorem	**08**
3	**Algebraic Structure** The structure of algebra, Algebraic Systems, Semi Groups, Monoids, Groups, Abelian groups and their examples	**08**
4	**Linear Programming and Optimization Techniques** Introduction, LP formulation, Graphical method for solving LPs with two variables, Special cases in graphical methods, Simplex method, Duality.	**08**
5	**Transportation Problem Methods and Applications** Transportation problem: Definition, Linear form, North-west corner method, least cost method, Vogel's approximation method for	**08**

	finding feasible solution, MODI method for finding optimum solution.	

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Engineering Mathematics-I	G. V. Kumbhojkar	C. Jamnadas & Co
2	Higher Engineering Mathematics	Dr. B. S. Grewal	Khannaa Publishers,delhi
3	Numerical Methods in Engineering and science	B.S.Agrewal	Pune Vidyarthi Griha Prakashan, Pune
4	A Text Book of Applied Mathematics Vol. I	P.N.Wartikar & J.N.Wartikar	Khanna Publishers

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Advanced Engineering Mathematics	Erwin Kreyszig	John Wiley & Sons
2	District Mathematical Structure	Y. N. Singh	Nish Enterprises
3	Mathematical Foundation of Computer Science	G.S.S Bhishma Rao	Scitech Publications Pvt. Ltd.
4	Discrete Mathematics & its Application with Combinatorics & Graph Theory	Kenneth . H . Rosen	McGraw Hill Education Pvt. Ltd.

Title of the Course: Data Structures Course Code: 25BCA1202	L	T	P	Credit
	3	--	--	3

Course Prerequisite:

Programming Fundamentals: Understanding the basic syntax and semantics of C programming language. Problem-Solving Skills: Ability to break down a problem into smaller steps and devise a step-by-step solution and familiarity with simple algorithms

Course Description:

The course intends to train students to enhance experimental skills and apply fundamental chemical principles to solve chemistry related problems in engineering. The course providing experience to students about qualitative and quantitative analysis of different samples using instrumental and non-instrumental techniques.

Course Objectives:

1. Understand the fundamental concepts of Data Structures and their applications. Develop problem-solving skills using Data Structures.
2. Implement Data Structures using C programming language

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand and explain the fundamental concepts of data structures, including arrays, linked lists, stacks, queues, trees, and graphs.
CO2	Implement linear and non-linear data structures using a high-level programming language (e.g., C, C++, Java, or Python).
CO3	Apply appropriate data structures in problem-solving and algorithm design to develop efficient software solutions.
CO4	Demonstrate proficiency in recursion and understand its application in data structures like trees and divide-and-conquer algorithms.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	2	2		3				1			2
CO3	3	3	3		3				1			2
CO4	3	3	2		2							2

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.
MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Introduction and Overview** Definition, Classification and Operations of Data Structures. Algorithms: Complexity, Time-Space Tradeoff. Arrays: Definition and Classification of Arrays, Representation of Linear Arrays in Memory, Operations on Linear Arrays: Traversing, Inserting, Deleting, Searching, Sorting and Merging. Searching: Linear Search and Binary Search, Comparison of Methods. Sorting: Bubble Sort, Selection Sort, and Insertion Sort. Two-Dimensional Arrays, Representation of Two Dimensional Arrays in Memory, Matrices and Sparse Matrices, Multi-Dimensional Arrays.	**08**
2	**Linked List and Arrays** Definition, Comparison with Arrays, Representation, Types of Linked lists, Traversing, Inserting, Deleting and Searching in Singly Linked List, Doubly Linked List and Circular Linked List. Applications of Linked Lists: Addition of Polynomials.	**08**
3	**Hashing and Collision** Hashing, Hash Tables, Types of Hash Functions, Collision, Collision Resolution with Open Addressing and Chaining Stacks:- Definition, Representation of Stacks using Arrays and Linked List, Operations on Stacks using Arrays and Linked List, Application of Stacks: Arithmetic Expressions, Polish Notation, Conversion of Infix Expression to Postfix Expression, Evaluation of Postfix Expression.	**08**
4	**Recursion**	**08**

	Definition, Recursive Notation, Runtime Stack, Applications of Recursion: Factorial of Number, GCD, Fibonacci Series and Towers of Hanoi. Queues Definition, Representation of Queues using Array and Linked List, Types of Queue: Simple Queue, Circular Queue, Double-Ended queue, Priority Queue, Operations on Simple Queues and Circular Queues using Array and Linked List, Applications of Queues.	
5	**Graphs and Trees** Definition, Terminology, Representation, Traversal. Trees Definition, Terminology, Binary Trees, Traversal of Binary Tree, Binary Search Tree, Inserting, Deleting and Searching in Binary Search Tree, Height Balanced Trees: AVL Trees, Insertion and Deletion in AVL Tree.	**08**

Text Books

Sr. No.	Title	Author	Publisher
1	Expert Data Structures with C	R.B. Patel	Khanna Book Publishing Company,
2	Data Structures with C	Seymour Lipschutz,	Schaum's Outlines, Tata McGraw-Hill,
3	Data Structures Through C	Yashavant Kanetkar	BPB Publications,

Reference Books

Sr. No.	Title	Author	Publisher
1	Expert Data Structures with C	R.B. Patel	Khanna Book Publishing Company,
2	Data Structures Using C	Reema Thareja	Oxford University Press,
3	Data Structure Using C	Udit Agarwal	S.K.Kataria & Sons

Title of the Course: Operating System Course Code: 25BCA1203	L	T	P	Credit
	3	--	--	3

Course Prerequisite:

Basic knowledge of computer organization and architecture and understanding of programming concepts, especially in C or C++.

Course Description:

This course introduces the fundamental concepts of operating systems. It covers process management, memory management, and file systems. Students learn about scheduling, synchronization, and deadlocks. The course also includes concepts of virtual memory and system security. It prepares students to understand and analyze OS design and functionality.

Course Objectives:

1. To understand different types and structures of operating systems designed for Mobile, Desktop and high-performance computing servers
2. To identify the core functionalities of operating systems such as process management, memory management and file system management
3. To analyze core functionalities of operating system to cater the need of end users and services Effectively.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Possess knowledge of Operating Systems and their types
CO2	Apply the concept of a process and scheduling algorithms.
CO3	Realize the concept of deadlock and different ways to handle it.
CO4	Understand various memory management techniques and file system.
CO5	Explore the synchronization mechanism and providing solutions to critical sections

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	3	2		2							2
CO3	3	3	2		2							2
CO4	3	2	2		2							2
CO5	3	3	3		3							2

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Operating system structure and Organization** Computer-System Organization- Architecture - Structure and operations of Operating System –Services - Interface between user and operating system -System Calls -System Boot	**08**
2	**Process and Thread Management** Process states -context switching-process control block – scheduling - Operations on Processes -Inter-process Communication - Threads Overview, Multithreading Models	**07**
3	**Process Synchronization** Race Condition - Critical section problem, Peterson's Solution, Mutex Locks, Semaphores, Classic Problems of Synchronization- Producer-Consumer problem, Readers-writer problem	**07**
4	**CPU Scheduling and Deadlock** Scheduling Algorithms – First come first served (FCFS),Shortest job first(SJF) scheduling -Deadlocks- System Model, Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance	**07**
5	**Main Memory** Swapping- Contiguous Memory Allocation - First Fit, Best Fit, Worst Fit- Segmentation- Paging - Virtual Memory- Demand Paging -Page Fault - LRU, OPR Page Replacement Algorithms, -Allocation of Frames –Thrashing	**07**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Operating system concepts, 2020, Tenth Edition,	A.Silberschatz, P.B. Galvin & G. Gagn	John Wiley.
2	Operating Systems,2nd Edition,.	Achyut S Godbole	McGraw Hill Publications
3	Operating Systems, Internals & Design Principles, , 6th Edition,	William Stalling	Pearson Publication

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Modern Operating Systems	Andrew S.Tanenbaum	Herbert Bos
2	Operating Systems Principal and Practice	Thomas Anderson	Michael Dahlin
3	Operating Systems Three Easy Pieces	Remzi H.Arpaci.Dusseau	Arpaci.Dussaeau

Title of the Course: Object Oriented Programming Using Java Course Code: 25BCA1204	L	T	P	Credit
	3	--	--	3

Course Prerequisite:

A basic understanding of programming concepts such as variables, datatypes, control structures (if-else, loops), and functions.

Course Description:

This course provides a comprehensive introduction to object-oriented programming (OOP), a fundamental programming paradigm used in modern software development. Students will learn how to design and develop robust, maintainable, and scalable software by applying core OOP concepts such as classes, objects, inheritance, encapsulation, polymorphism,

Course Objectives:

In this course, you will learn about:

1. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc. and exception handling mechanisms.
2. To understand streams and efficient user interface design techniques.
3. Understand the principles of inheritance, packages and interfaces.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Introduce the object oriented programming system concept.
CO2	Understanding the syntax and semantics of java programming language, basic concepts of OOP implementation and use of a variety of basic control structures including selection and repetition, classes and objects.
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes
CO4	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO5	Design event driven GUI and web related applications like Applets which mimic the real word scenarios.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	2	2		3				1			2
CO3	3	3	2		3				1			2
CO4	3	3	3		3				1			2

CO5	3	3	3		3				2	2	2	2

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.
MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Fundamentals of Object Oriented Programming** Basic Concepts of Object Oriented Programming (OOP), Benefits and Applications of OOP. Java Evolution: Java Features, Difference between Java, C and C++, Java and Internet, Java Environment. Overview of Java Language: Introduction to Simple Java Program, Application of two classes, Java Program Structure, Java Tokens and statements, Implementing Java program And JVM, Command Line Arguments.	**07**
2	**Constants, Variables and Data Types** Constants, Variables, Data Types, Declaration of Variables, Giving values to Variables, Symbolic Constants, Typecasting Operators & Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment & Decrement operators, conditional operators, Bitwise operators, Arithmetic Expressions, Evaluation of Expressions, Type Conversions in Expressions, Operator Precedence & Associativity. Decision Making, Branching & Looping: Decision Making with control satatement, Looping statements, Jump in loops, Labelled loops.	**07**
3	**Classes, Objects and Methods** Defining Class, Methods Declaration, Constructors, Methods Overloading, Overriding Methods, Inheritance.	**07**

	Arrays, Strings and Vectors: 1D arrays, Creating an Array, 2D arrays, Strings, Vectors, Wrapper Classes, Enumerated Types. Inheritance: Defining, extending classes, and Implementing Interfaces. Multiple inheritance and polymorphism, overriding methods, concept of Multithreading in Java	
4	**Packages** API Packages, System packages, Creating and accessing packages, Creating user defined packages, Adding class to a package. Exception Handling: Using the main keywords of exception handling: try, catch,throw, throws and finally; Nested try, Multiple catch statements, Creating user defined exceptions	**07**
5	**Thread** creating thread, Extending of thread class, life cycle of thread, using thread methods, implementing the runnable interface Applets:-Concepts of Applets, Differences between Applets and Applications, Life Cycle of an Applet, Applet tag, Creating and Executable Applets, Passing Parameters to Applets.	**08**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Programming with java A Primer Fourth edition	E Balagurusamy	Tata McGraw-Hill Publishing Company ltd
2	Java: The Complete Reference. 12th edition.	Schildt, H. (2022).	McGraw-Hill Education
3	Introduction to Java Programming (Comprehensive Version), Seventh Edition,	Daniel Liang,	Pearson.

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	The Complete Reference Java 2 –, 3rd Edition,	J.L. Meriam & L.G. Kraige	TMH
2	Java Programming (for java beginners)", First Edition, Volume 1, 2021	Beer, Johnston, and Eisenberg	VR1 Publications, Chennai
3	2005, Core JavaTM2 Volume I, Fundamental 7th Edition, Pearson Education.	Irving H. Shames	Pearson Education.
4	Core JAVA 2015.	H.J. Shah and S.B. Junnarkar	Khanna Book Publishing Company Private Limited
5	Programming in Java, 2nd Edition,2014.	R.C. Hibbeler	Oxford University Press

Title of the Course Web Technology Course Code: 25BCA1205	L	T	P	Credit
	2	--	--	2

Course Prerequisite:

Basic knowledge of computer fundamentals and networking fundamentals (client–server architecture, HTTP/HTTPS). Familiarity with basic HTML will be an added advantage.

Course Description:

This course introduces the fundamentals of web development, focusing on HTML for structuring web content and basic CSS for styling. Students will learn how to design and build responsive, user-friendly webpages using standard web technologies. The course emphasizes practical skills through hands-on projects involving webpage layout, forms, links, images, and multimedia integration

Course Objectives:

1. To understand the concepts and architecture of the World Wide Web, Mark up languages along with Cascading Style Sheets.
2. Understand the architecture and components of the World Wide Web, including protocols like HTTP, HTTPS, DNS, and web servers.
3. Design static and dynamic web pages using HTML, CSS, and JavaScript.
4. Build responsive web designs using modern CSS frameworks (e.g., Bootstrap).
5. Implement client-side scripting with JavaScript for form validation, DOM manipulation, and interactivity.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Enlist various HTML elements and tags
CO2	Use HTML elements and tags
CO3	Apply CSS and Java script features.
CO4	Design a website using HTML, CSS and JavaScript.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			2							2
CO2	2	2	1		3				1			2
CO3	2	3	2		3				1			2
CO4	2	3	3		3				2	2	2	2

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and CA2 are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

MSE is based on 50% of course content.

ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Introduction to WWW** Introduction to www, Protocols and Programs, Applications and development tools, web browsers, DNS, Web hosting Provider, Setting up of Windows/Linux/Unix web servers, Web hosting in cloud, Types of Web Hosting	**04**
2	**Introduction to HTML** Introduction to HTML, history of HTML, Objective, basic Structures of HTML, Header Tags, Body tags, Paragraph Tags. Tags for FORM Creation, TABLE, FORM, TEXTAREA, SELECT, IMG, IFRAME FIELDSET, ANCHOR Lists in HTML, Introduction to DIV tag, NAVBAR Design.	**04**
3	**Introduction to CSS and Bootstrap** Introduction to CSS, types, Selectors, and Responsiveness of a web page. Introduction to Bootstrap, downloads/linking, using classes of Bootstrap, understanding the Grid System in Bootstrap.	**04**
4	**Introduction to Java Script** Introduction to JavaScript: Functions and Events, Document Object model traversing using JavaScript. Output System in JavaScript i.e. Alert, throughput, Input	**04**

	box, Console. Variables and Arrays in Java Script. Date and String handling in JavaScript.	
5	**Introduction to AJAX** Introduction to AJAX, Purpose, advantages and disadvantages, AJAX based Web applications and alternatives of AJAX.	**04**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	HTML Black Book	Steven Holzner	Dreamtech Press
2	Web Applications : Concepts and Real World Design	Craig D. Knuckles & David S. Yuen	Wiley-India
3	Internet and World Wide Web How to program	Paul J. Deitel	Prentice Hall PTR, USA

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2016	Dream Tech	DT Editorial Services
3	Mastering HTML, CSS & Java Script, 2016	Laura Lemay	Web Publishing, BPB Publications
4	The Complete Reference HTML & CSS, Fifth Edition, 2017	Thomas A. Powell	Tata McGraw-Hill Education

Title of the Course: Indian Constitution Course Code: 25BCA1206	L	T	P	Credit
	2	--	--	2

Course Prerequisite:

Basic understanding of drafting of the constitution. Along with this understanding the fundamental rights and fundamental duties assigned to us by the Indian Constitution, Directive principle of state policies and three tier government system.

Course Description:

This course helps to understand the drafting of the Indian Constitution.
This course helps to know the fundamental rights and fundamental duties assigned to us by the Indian Constitution.
This will enable you to know the three tier government system implemented in INDIA

Course Objectives:

1. To understand the origin and framework of the Indian Constitution
2. To familiarize with rights, duties, and directive principles
3. To understand the distribution of powers.
4. To understand the constitutional amendments and committees.
5. To get comprehensive study of the Panchayat Raj system

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	The making of the Indian Constitution and its unique features.
CO2	Interpret fundamental rights, duties, directive principles, and judicial writs.
CO3	Describing the legislative, executive, and judicial powers under the three-tier system of governance.
CO4	Summarize major constitutional amendments, important committees, and powers of the Parliament and State Assemblies.
CO5	Analyze the structure, functions, and significance of Panchayat Raj institutions and local governance.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2				3		2		1		2
CO2	2	3				3		3		2		2
CO3	2	3				3		2		2	2	2
CO4	2	2				3		2		1	2	2
CO5	2	3				3	2	2	1	2	2	2

Assessment Scheme:
Two components of Continuous Assessment (CA-1, CA-2), Mid Semester Examination (MSE) and End Semester Examination (ESE) having 20%, 30% and 50% weightage respectively.

Assessment Component	Marks
CA1	10
MSE	30
CA2	10
ESE	50

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.
MSE is based on 50% of course content.
ESE is based on 100% course content with 60-70% weightage for course content covered after MSE.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	**Making of the Constitution** National and Nationality, 1935 Indian Independence act, Embedded system of constitution, Rigidity and flexibility of constitution, Citizenship of India, Preamble: 42nd constitution amendment act**.**	**05**
2	**Rights and Duties** Fundamental right, Fundamental duties, Directive principles of state policies, writs issued by Supreme Court, High Court, CAA	**05**
3	**Three tiers of Indian Constitution** Legislative powers of Indian Gov., Executive powers, Judicial powers, Rajya Sabha, Lok Sabha, Bills passed by simple and special majority, Judges and Minister Pay Scale	**05**
4	**Constitution Amendment Acts** Mini Constitution, Famous committees: Loknathan committee, Lokpal Bill, powers of parliament and state legislative assembly.	**05**
5	**Panchayat Raj** Municipal Corporation, Panchayat Samiti, Barter System, reservation system 1952 acts and role in North Eastern States, Village taluka district division implementations.	**05**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Introduction to the Constitution of India	Dr. D. D. Basu	LexisNexis (earlier published by Wadhwa and Company)
2	Indian Polity	M. Laxmikanth	McGraw Hill Education (India)
3	Our Constitution: An Introduction to India's Constitution and Constitutional Law, National Book Trust	Dr. Subhash C. Kashyap	National Book Trust (NBT), India

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	The Indian Constitution: Cornerstone of a Nation	Granville Austin	Dhanalakshmi Publishers, Chennai
2	Constitution of India	Government of India	Ministry of Law and Justice, Legislative Department (Government of India)
3	Indian Government and Politic	B. L. Fadia	Sahitya Bhawan Publications, Agra

Title of the Course: Additional Course – Indian or Foreign Language Course Code: 25BCA1207	L	T	P	Credit
	1	--	--	AU

Course Prerequisite:

Desire to get acquainted with the Foreign language.

Course Description:

Japanese is a unique, context-driven language known for its politeness levels, minimal sounds, and deep cultural ties. It uses three scripts Hiragana for grammar, Katakana for foreign words, and Kanji for meaning—creating a blend of phonetic simplicity and written complexity. Its structure relies heavily on context, honorifics, and indirect expressions, reflecting Japan's social values and communication style.

Course Objectives:

1. To meet the needs of ever growing industry with respect to language support.
2. To get introduced to Japanese society and culture through language

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Read & Write Hiragana script at the level required to follow UG curriculum and JLPT level N5.1.
CO2	Read & Write Katakana script at the level required to follow UG curriculum and JLPT level N5.1.
CO3	Write & Speak basic sentences and questions related to self, family and friends.
CO4	Listen & comprehend and speak about time, hobbies, likes, dislikes and food preferences.
CO5	Write basic Kanjis.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1					1				2		3
CO2	1					1				2		3
CO3	1					2			2	3		3
CO4	1					2			2	3		3
CO5	1					1				2		3

Assessment Scheme:

Two components of Continuous Assessment (CA-1, CA-2), 50% weightage each.

Assessment Component	Marks
CA1	25
MSE	-
CA2	25
ESE	-

CA1 and **CA2** are based on Surprise test/ Assignment/ Quiz/Seminar/Group discussions presentation, etc.

Course Contents

Unit No.	Unit Title and Contents	Hours
1	Modified Kana Contracted Sounds	**03**
2	Nationality Colors	**03**
3	Rules of reading- Small " つ" "ん" sound, long pronunciation Body parts	**03**
4	Katakana Clock / Time	**03**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Industry 4.0: The Industrial Internet of Things	3A Network (editorial team)	3A Network, Japan
2	Genki	Eri Banno, Yutaka Ohno, Yoko Sakane, Chikako Shinagawa	The Japan Times Publishing (formerly The Japan Times)

Title of the Course: Data Structures Laboratory Course Code: 25BCA1202L	L	T	P	Credit
	--	--	2	1

Course Prerequisite:

Programming Fundamentals: Understanding the basic syntax and semantics of C programming language. Problem-Solving Skills: Ability to break down a problem into smaller steps and devise a step-by-step solution and familiarity with simple algorithms

Course Description:

The course intends to train students to enhance experimental skills and apply fundamental chemical principles to solve chemistry related problems in engineering. The course providing experience to students about qualitative and quantitative analysis of different samples using instrumental and non-instrumental techniques.

Course Objectives:

1. Understand the fundamental concepts of Data Structures and their applications.
2. Develop problem-solving skills using Data Structures.
3. Implement Data Structures using C programming language

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand and explain the fundamental concepts of data structures, including arrays, linked lists, stacks, queues, trees, and graphs.
CO2	Implement linear and non-linear data structures using a high-level programming language (e.g., C, C++, Java, or Python).
CO3	Apply appropriate data structures in problem-solving and algorithm design to develop efficient software solutions.
CO4	Demonstrate proficiency in recursion and understand its application in data structures like trees and divide-and-conquer algorithms.
CO5	Analyze and compare the time and space complexity of basic algorithms and data structures.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	2	2		3				1			2
CO3	3	3	3		3				1			2
CO4	3	3	2		2							2
CO5	3	3	2		2							2

Assessment Scheme:
Two components of in semester are Continuous Assessment (CA-1, CA-2), 50% weightage each.

Assessment Component	Marks
CA1	25
CA2	25
POE	-

CA1 and CA2 are based on 50% practical assignment.

Course Contents

Sr.No.	Practical Title and Contents	Hours
1	Write a program for insertion and deletion operations in an array	**02**
2	Write a program to search for an element in an array using Linear Search and Binary Search	**02**
3	Write a program to sort an array using Bubble Sort, Selection Sort and Insertion Sort.	**02**
4	Write a program to merge two arrays.	**02**
5	Write a program to multiply two matrices.	**02**
6	Write a program to implement stack operations using an array.	**02**
7	Write a program to implement stack operations using a linked list.	**02**
8	Write a program to add two polynomials using a linked lists.	**02**
9	Write a program to evaluate a postfix expression using a stack.	**02**
10	Write a program to implement simple queue operations using an array	**02**
11	Write a program to perform insertion operation in a binary search tree.	**02**
12	Write a program to insert an element into a Singly Linked List: (a) At the beginning (b) At the end (c) At a specified position	**02**
13	Write a program to perform the following operations in a Doubly Linked List: (a) Create (b) Search for an element	**02**

14	Write a program to perform insertion operation in a binary search tree.	**02**
15	Write a program to implement simple queue operations using an array.	**02**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Expert Data Structures with C	R.B. Patel	Khanna Book Publishing Company,
2	Data Structures with C	Seymour Lipschutz,	Schaum's Outlines, Tata McGraw-Hill,

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Data Structures Through C	Yashavant Kanetkar	BPB Publications
2	Data Structures Using C	Reema Thareja	Oxford University Press,

Title of the Course: Object Oriented Programming using Java Laboratory Course Code: 25BCA1204L	L	T	P	Credit
	- -	- -	4	2

Course Prerequisite:

Basic programming knowledge and basic Java syntax.

Course Description:

The Java Programming Lab is designed to provide hands-on experience in Java programming, focusing on the practical application of core programming principles and Object-Oriented Programming (OOP) concepts. The course aims to bridge the gap between theoretical knowledge and real-world programming through structured lab exercises and projects. Students will develop skills in writing efficient, reusable, and modular code while applying best practices in software development. By the end of the course, students will be able to solve complex problems, build applications, and effectively use debugging, testing, and version control tools.

Course Objectives:

1. To provide hands-on experience in writing, compiling, and executing Java programs using basic programming constructs like variables, loops, and conditionals.
2. To introduce students to core Object-Oriented Programming (OOP) concepts such as classes, objects, inheritance, polymorphism, encapsulation, and method overloading in Java.
3. To develop the ability to design and implement modular, reusable, and maintainable code by applying OOP principles and best practices.

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading.
CO2	Identify classes, objects, members of a class and the relationships among them needed for a specific problem.
CO3	Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structure
CO4	Use testing and debugging tools to automatically discover errors of Java programs as well as use versioning tools for collaborative programming/editing.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	3	2		2				1			2
CO3	3	3	3		3				1			2
CO4	2	2	2		3			1	2	1	2	3

Assessment Scheme:

Two components of in semester are Continuous Assessment (CA-1, CA-2), End Semester Practical Oral Examination (POE), have 25%, 25% and 50% weightage, respectively.

Assessment Component	Marks
CA1	25
CA2	25
POE	50

CA1 and CA2 are based on 50% practical assignment.

POE is based on 100% Experiments

Course Contents

Sr.No.	Practical Title and Contents	Hours
1	Demonstration of installation and configuration of Jdk with Command line. a) Write a java program to take user input and print it. b) Write a java program to swap two numbers.	**02**
2	Write a java program to find the largest number out of n natural numbers.	**02**
3	Write a java program to find the Fibonacci series & Factorial of a number using recursive and non-recursive functions.	**02**
4	Write a java program to multiply two given matrices	**02**
5	Write a Java program for sorting a given list of names in ascending order	**02**
6	Write a Java program that checks whether a given string is a palindrome or not . Ex: MADAM is a palindrome.	**02**
7	Write a Java program that takes a number from the user and generates an integer between 1 and 7. It displays the weekday name.	**02**
8	Write a Java program that takes a year from the user and prints whether it is a leap year or not.	**02**
9	Write a java program to read n number of values in an array and display it in reverse order.	**02**
10	Write a Program to Print Pyramid Number Pattern in Java. * *** ***** *******	**02**
11	Write a Java program to create an interface Shape with the getArea() method. Create three classes Rectangle, Circle, and Triangle that implement the Shape interface. Implement the getArea() method for each of the three classes.	**02**

12	Write a Java Program to Find the Largest Element in Array	**02**
13	Create a JAVA class called Student with the following details as variables within it. a. USN, NAME, BRANCH, PHONE, PERCENTAGE b. Write a JAVA program to create n Student objects and print the USN,Name, Branch, Phone, and percentage of these objects with suitable headings.	**02**
14	Write a Java program to create a Date object using the Calendar class.	**02**
15	Write a Java program to create an Applet that reads Employee information using parameters and displays name of employee, designation, salary and tax.	**02**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	Programming with java A Primer Fourth edition	E Balagurusamy	Murach's Publication
2	Java: The Complete Reference. 12th edition.	Schildt, H.	Herbert Schildt
3	Introduction to Java Programming (Comprehensive Version), Seventh Edition,	Daniel Liang,	Y. Daniel Liang

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	The Complete Reference Java 2 –, 3rd Edition,	Charles Severance	University of Michigan,
2	Java Programming (for java beginners)", First Edition, Volume 1,	Dr. R. Nageswara Rao	Dreamtech Press, 1st Edition,
3	2005, Core JavaTM2 Volume I, Fundamental 7th Edition, Pearson Education.	Allen B. Downey	O'Reilly Media, 2nd Edition
4	Core JAVA.	Dr. Anita Goel	Pearson

Title of the Course: Web Technology Laboratory Course Code: 25BCA1205L	L	T	P	Credit
	--	--	4	2

Course Prerequisite:

Basic knowledge of computer fundamentals and networking fundamentals (client–server architecture, HTTP/HTTPS). Familiarity with basic HTML will be an added advantage

Course Description:

This course introduces the fundamentals of web development, focusing on HTML for structuring web content and basic CSS for styling. Students will learn how to design and build responsive, user-friendly webpages using standard web technologies. The course emphasizes practical skills through hands-on projects involving webpage layout, forms, links, images, and multimedia integration.

Course Objectives:

1. To understand the concepts and architecture of the World Wide Web, Markup languages along with Cascading Style Sheets.
2. To understand the concepts of event handling and data validation mechanisms.
3. To understand the concepts of embedded dynamic scripting on client and server side Internet Programming and basic full stack web development.
4. To develop modern interactive web applications

Course Outcomes:

CO	After the completion of the course the student should be able to
CO1	Identify and use various HTML elements and attributes to create structured web pages.
CO2	Apply CSS styling techniques to enhance the presentation and layout of web pages.
CO3	Implement interactivity in web pages using JavaScript and basic DOM manipulation.
CO4	Develop responsive web pages using HTML, CSS, and JavaScript that meet specific design requirements.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1			2					1		2
CO2	2	2	1		3				1	1		2
CO3	2	3	2		3				1	1		2
CO4	2	3	3		3				2	2	2	2

Assessment Scheme:

Two components of in semester are Continuous Assessment (CA-1, CA-2), End Semester Practical Oral Examination (POE), have 25%, 25% and 50% weightage, respectively.

Assessment Component	Marks
CA1	25
CA2	25
POE	50

CA1 and CA2 are based on 50% practical assignment.

POE is based on 100% Experiments

Course Contents

Sr.No.	Practical Title and Contents	Hours
1	Create Your Resume using different HTML tags (use text, color and lists.)	**02**
2	Create your class time table using table tag.	**02**
3	Design a Webpage for your college containing description of courses, department, faculties, library etc. using list tags, href tags, and anchor tags.	**02**
4	Create web page using Frame with header frame, left frame, right frame, and status bar frame. On clicking in the left frame, information should be displayed in right frame.	**02**
5	Create web page for student admission form using different form elements in HTML.	**02**
6	Create a Web Page of a super market using internal CSS.	**02**
7	Use Inline CSS to format your resume created through HTML tags.	**02**
8	Use External CSS to format your time table created.	**02**
9	Use all the CSS (inline, internal and external) to format college web page that you have created.	**02**
10	Write a HTML Program to create your college website for mobile device using CSS.	**02**
11	Write a JavaScript program using Switch case.	**02**

12	Develop a Simple calculator for addiction, subtraction, multiplication and division operations using JavaScript.	**02**
13	Create HTML form for Student Information like Register Number, Name, Mobile Number, DOB and Email-Id with validations using JavaScript. (Use required field validator and length validator)	**02**
14	Write an HTML program to create login page with validations using JavaScript. (Use Regular Expressions for validations)	**02**
15	Create XML schema for Student Information.	**02**

Text Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	HTML Black Book	Steven Holzner	Dreamtech Press
2	Web Applications : Concepts and Real World Design	Craig D. Knuckles & David S. Yuen	Wiley-India
3	Internet and World Wide Web How to program	Paul J. Deitel	Prentice Hall PTR, USA

Reference Books			
Sr. No.	**Title**	**Author**	**Publisher**
1	HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery	Dream Tech	University of Michigan, Version 2.7.0.
2	Mastering HTML, CSS & Java Script	Laura Lemay	Dreamtech Press, 1st Edition.
3	The Complete Reference HTML & CSS, Fifth Edition	Thomas A. Powell	O'Reilly Media, 2nd Edition.