DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, CHHATRAPATI SAMBHAJINAGAR.

CIRCULAR NO.SU/ B.Sc./NEP/54/2023

It is hereby inform to all concerned that, the syllabus prepared by the Board of Studies & Ad-hoc Boards and recommended by the Dean, Faculty of Science & Technology the **Academic Council at its meeting held on 30 November 2023 has accepted the Following Syllabi as per Norms of National Education Policy – 2020** under the Faculty of Science & Technology run to the Affiliated Colleges, Dr.Babasaheb Ambedkar Marathwada University as appended herewith:-

Sr.No.	Courses	Semester
1.	B.A./B.Sc. Statistics	Ist and IInd semester
2.	B.A./B.Sc. Mathematics	Ist and IInd semester
3.	B.Sc.Forensic Science	Ist and IInd semester
4.	Bachelor of Computer Application	Ist and IInd semester
5.	B.Sc. Information Technology	Ist and IInd semester
6.	B.Sc.Automobile Technology	Ist and IInd semester
7.	B.Sc.Electronics	Ist and IInd semester
8.	B.Sc.Networking & Multimedia	Ist and IInd semester
9.	B.Sc.Fisheries Science	Ist and IInd semester
10.	B.Sc.Botany	Ist and IInd semester

This shall be effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Chhatrapati Sambhajinagar
431 004.
REF.NO.SU/2023/19911-19
Date:- 20.12.2023.

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Deputy Registrar,
Academic Section.

Copy forwarded with compliments to :-

1] **The Principal of all concerned Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

Copy to :-

1] **The Director, Board of Examinations & Evaluation, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.**

2] The Section Officer,[B.Sc.Unit] Examination Branch, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

3] The Programmer [Computer Unit-1] Examinations, Dr. Babasaheb Ambedkar Marathwada University, Chhatrpati Sambhajinagar.

4] The Programmer [Computer Unit-2] Examinations, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar

5] The In-charge,[E-Suvidha Kendra], Rajarshi Shahu Maharaj Pariksha Bhavan, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

6] The Public Relation Officer, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

7] The Record Keeper, Dr. Babasaheb Ambedkar Marathwada University, Chhatrapati Sambhajinagar.

DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY

CHHATRAPATI SAMBHAJINAGAR

FACULTY OF SCIENCE & TECHNOLOGY

3 Years B.Sc. Degree /

4 Years B.Sc.(Hons.)

& 4 Years B.Sc. (Hons with Research) Programme

As Per National Education Policy- 2020

Course Structure and Curriculum

(Outcome Based Credit System)

Subject: B.C.A. Science

(To be implemented from Academic Year -2024-2025)

Program Educational Objectives

PEO1

Develop proficiency as Information Technology expert with an ability to create a wide range of IT based applications for Industries, Government or other work environments.

PEO2

Attain the ability to adapt quickly to new environments and technologies, assimilate new information systems

PEO3

Posses the ability to think logically and capacity to understand technical problems with information systems.

PEO4

Posses the ability to collaborate as team members and team leaders to facilitate cutting edge technology solutions for information system and thereby providing improved functionality

Program Specific Outcomes

1. PSO1

Ability to design, develop implement computer programs and use knowledge in various domains to identify research gaps and hence provide solution to new ideas and innovations

2. PSO2

Work with and communicate effectively with professionals in various fields and pursue lifelong professional development in Information Technology

3. PSO3

Graduates should be proficient in designing and developing dynamic web applications, including the use of web technologies, frameworks, and content management systems.

AS PER NEP 2020
Faculty of Science
Course Structure (First Year)
B.C.A Science Three/Four Year Under Graduate Degree Program
Semester-I

Course Type	Course Code	Course Name	Teaching Scheme (Hrs. /Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major Mandatory	BCA/DSC1/C100	Computer Fundamentals	2		2		2+2+2=06
	BCA/DSC2/C101	Operating System-I	2		2		
	BCA/DSC3/C102	Practical Based on BCA/DSC1/C1 & BCA/DSC2/C2		4		2	
Generic Elective (GE) / Open Elective (OE) (Choose any one from pool of courses)	BCA/GE1/C103	A. Computational Mathematics OR B. Image Editing OR C. Principles of Internet	2		2		2+2=04
	BCA/GE2/C104	A. Digital Electronics OR B. Basics of HTML OR C. Basics of Computer Hardware	2		2		
VSC (Choose any one from pool of courses)	BCA/VSC1/C105	A. Programming in C/C++ -I OR B. Python Programming- I OR C. R Programming- I		4		2	2+2=04
SEC (VSEC) (Choose any one from pool of courses)	BCA/SEC1/C106	A.Programming Methodology OR B. Basic of Excel OR C. Open Source Tools	2		2		
AEC, VEC, IKS (Ability Enhancement Course)	BCA/AEC1/C107	Communication in English-I (Linguistic Approach) (Common Across faculty)	2		2		2+2+2=06
	BCA/VEC1/C108	Constitution of India (Common across faculty)	2		2		
	BCA/IKS1/C109	Indian Knowledge System (Common across faculties)	2		2		
OJT, FP, CEP, CC, RP	BCA/IKS1/C110	Health and Wellness (Common across faculty)		4		2	02
			16	12	14	08	22 Credits

AS PER NEP 2020
Faculty of Science
Course Structure (First Year)
B.C.A Science Three/Four Year Under Graduate Degree Program
Semester-II

Course Type	Course Code	Course Name	Teaching Scheme (Hrs. /Week)		Credits Assigned		Total Credits
			Theory	Practical	Theory	Practical	
Major	BCA/DSC4/C150	Data Structure	2		2		2+2+2=06
	BCA/DSC5/C151	Operating System-II	2		2		
	BCA/DSC6/C152	Practical Based on BCA/DSC4/C12 & BCA/DSC5/C13		4		2	
Minor	BCA/M1/C153	Database Concepts	2			2	02
Generic Elective (GE) / Open Elective (OE) (Choose any one from pool of courses)	BCA/GE3/ C154	A. Numerical Method OR B. Video Editing OR C. Introduction to XML	2		2		2+2=04
	BCA/GE4/ C155	A. 8086 Microprocessor OR B. Web Designing using CSS OR C. PC Maintenance	2		2		
VSC (Choose any one from pool of courses)	BCA/VSC2/ C156	A. Programming in C/C++ - II OR B. Python Programming-II OR C. R Programming - II		4		2	2+2=04
SEC (VSEC) (Choose any one from pool of courses)	BCA/SEC2/ C157	A. Web Commercial Elements OR B. Advance Excel OR C. Logical Reasoning	2		2		
AEC, VEC, IKS (Ability Enhancement Course)	BCA/AEC2/ C158	Communication in English- II (Soft Skill Development) (Common Across faculty)	2		2		2+2+2=04
	BCA/VEC2/ C159	Environmental Education (Common across faculty)	2		2		
OJT, FP, CEP, CC, RP	BCA/CC2/ C160	Yoga Education / Sports and fitness (Common across faculty)		4		2	02
			16	12	14	08	22 Credits

B.C.A. Science

Semester I

(NEP-2020)

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
DSCC	Theory	2	2	30

Course Code: BCA/DSC1/C100 **Title of the Course: Computer Fundamentals**

Course Objectives

To impart basic introduction to computer hardware, components, computer number system. How the CPU works, fundamenta about algorithms and flowchart as well as different types of software.

Course Outcomes

1.Knowledge of computer fundamental, CPU and its functionalities.
2.Understanding of block diagram of hardware peripherals.
3.Understanding the concepts of software and its types.
4.Understanding the number of system and its conversion between different numbers of systems.
5.Understanding the computer based application such as email and video conferencing.

Title of the Course: Computer Fundamentals	Total Hrs:30
Unit 1	15 Hrs
1. Fundamentals of Computer System Characteristics & features of Computers. Components of Computers. Organization of Computer. 2. Computer Generation & Classification Generation of Computers: First to Fifth Classification of Computers: Distributed & Parallel computers	
Unit 2	15 Hrs
3. Computer Memory Memory Cell & Organization Types of Memory (Primary And Secondary): RAM, ROM, PROM, EPROM, advantages and disadvantages of each. Secondary Storage Devices (FD, CD, HD, Pen drive, DVD, Tape Drive, DAT) 4. I/O Devices Input Devices: Touch screen, OMR, OBR, OCR, Light pen,Scanners Output Devices: Digitizers, Plotters, LCD, Plasma Display, Printers 5. Processor Structure of Instruction, Description of Processor, Processor Features RISC & CISC	

Reference Books

1. Fundamentals of Information Technology; By Chetan Srivastava, Kalyani Publishers
2. Fundamentals of Computers: By V.Rajaraman, PHI Publication, IVth Edition.
3. Fundamentals of Programming: By Raj K.Jain, S.Chand Publication
4. Computer Fundamental By B.Ram, BPB Publication.

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours / semester
DSCC	Theory	2	2	30

Course Code: BCA/DSC1/C101 **Title of the Course: Operating System-I**

Course Objectives

To introduce students the basic functioning of operating systems as resource manager and its salient features.

To acquaint students about Process States, CPU Scheduling, Inter Process Communication, Synchronization, Deadlocks.

Course Outcomes

1.Gain knowledge of System Software, Program and Process.
2.Understand Types of Operating System, Basic functions of O.S. and Evolution of O.S.
3.Understand the concept of Process, Process Control Block and Threads.
4.Understand the CPU scheduling Non-Pre-emptive and Pre-emptive Scheduling algorithms Understand the concept of Synchronization and Deadlock.

Title of the Course: Operating System-I	Total Hrs:30
Unit 1	15 Hrs
Introduction to Operating System: Introduction to Software: Definition, Classification of software, Operating system as the main component of system software, Program and Process. Operating System Fundamental: O.S. as a resource manager, Structure of O.S., Types of O.S.- Single user and multiuser O.S., Basic functions of O.S., Characteristics of modern O.S. Evolution of O.S.: Early systems, Simple batch systems, Multiprogramming batch systems, Time sharing system, Operating system for Personal Computers, workstations and Hand held devices, Parallel systems, Distributed systems, Real time systems, Advantages and Disadvantages of each system. Concept of Process: Process States, Process Control Block, Operations on Processes, Threads.	
Unit 2	15 Hrs
CPU Scheduling: Types of schedulers, Criteria for scheduling, Non-Pre-emptive Scheduling Algorithms - First-come First-served Scheduling and Shortest Job First Scheduling, Pre-emptive Scheduling Algorithms- Priority Scheduling, Round Robin. Inter Process Communication and Synchronization: Concurrent and dependent process, need for synchronization, introduction of Critical Section and Semaphores, method of inter process communication, process synchronization, synchronization problem. Deadlocks: Concept of Deadlock, Deadlock Modeling, Methods for Handling Deadlock. Memory management.	

Reference Books
1. "Operating System", By S.R. Sathe & Anil S. Mokhade, MacMillan Publication.
2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
3. A.S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.
4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.
5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
DSCC	Practical	2	2	30

Course Code: BCA/DSC1/C102 **Title of the Course: Practical Based on BCA/DSC1/C1 & BCA/DSC2/C2**

Course Code: BCA/DSC1/C102	**Course Title :Practical Based on BCA/DSC1/C1 & BCA/DSC2/C2**
Sample List of experiments to be carried out based on the course **BCA/DSC1/C1 & BCA/DSC2/C2** Note : Implement any three programs from each unit.	

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours / semester
GE	Theory	2	2	30

Course Code: BCA/GE1/C103-A **Title of the Course: Computational Mathematics**

Course Objectives

1. To develop mathematical modeling skills
2. To teach numerical methods
3. To enhance programming skills
4. To promote critical thinking
5. To address optimization problems

Course Outcomes

By the end of the course, students should be able to:

1. Formulate mathematical models
2. Select appropriate numerical methods
3. Implement numerical algorithms
4. Evaluate the accuracy of solutions
5. Solve optimization problems
6. Apply computational mathematics to real-world scenarios

Title of the Course: Computational Mathematics	Total Hrs:30
Unit 1	15 Hrs
Overview of Computational Mathematics Understanding the role of computation in mathematics Historical perspective and significance in modern mathematics Numerical Methods Introduction to numerical analysis Root-finding methods, interpolation, and approximation Error analysis and stability of algorithms	
Unit 2	15 Hrs

Linear Algebra in Computation Matrix operations and linear system solving Eigenvalue and eigenvector computations Applications in science and engineering Optimization Techniques Introduction to optimization problems Unconstrained optimization: gradient descent and Newton's method Constrained optimization: linear and nonlinear programming Monte Carlo Simulation Basics of Monte Carlo methods Random number generation and sampling techniques Applications in probabilistic modeling and risk assessment	

Reference Books

1."Numerical Analysis" by Richard L. Burden and J. Douglas Faires

2."Numerical Recipes: The Art of Scientific Computing" by William H. Press, Saul A. Teukolsky, William T. Vetterling, and Brian Flannery

3."A First Course in Numerical Analysis" by Anthony Ralston and Philip Rabinowitz

4."Introduction to the Numerical Solution of Markov Chains" by William J. Stewart

5."Numerical Linear Algebra" by Lloyd N. Trefethen and David Bau III

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours / semester
GE	Theory	2	2	30

Course Code: BCA/GE1/C103-B **Title of the Course: Image Editing**

Course Objectives

1.Provide students with a fundamental understanding of image editing concepts, terminology, and principles.
2.Familiarize students with popular image editing software, such as Adobe Photoshop, GIMP, or other relevant tools, and teacl them how to use these applications effectively.
3. Teach various techniques for improving image quality, including color correction, contrast adjustment, sharpening, and noise reduction.

Course Outcomes

By the end of the course, students should be able to

1. Navigate and Use Image Editing Software
2. Enhance Image Quality
3. Manipulate Images Creatively
4. Create Original Artwork

Title of the Course: Image Editing	Total Hrs:30
Unit 1	15 Hrs
Fundamentals of Image Editing Introduction to Image Editing Overview of image editing and its applications Key concepts: resolution, color modes, and image formats Introduction to popular image editing software (e.g., Adobe Photoshop) Image Enhancement and Correction* Adjusting brightness, contrast, and exposure Color correction and manipulation Removing noise and artifacts Image Retouching and Restoration* Basic retouching techniques (blemish removal, skin smoothing) Restoring old or damaged photographs Non-destructive editing methods Advanced Image Editing Techniques Selections and Layers Creating selections and masks Working with layers for non-destructive editing Combining images and compositing	

Unit 2	15 Hrs
Filters and Special Effects Applying artistic and creative filters Adding text and typography to images Creating custom brushes and patterns Image Compositing and Manipulation Advanced techniques for image manipulation Creating surreal or fantasy images Specialized compositing and blending modes Digital Imaging Projects and Practical Applications Photo Editing Projects Student-led image editing projects Critique and feedback on editing work Discussing best practices and creative approaches Digital Imaging in Media and Advertising Understanding image editing in advertising and media Discussing ethical considerations Guest lecture from industry professionals	

Reference Books

1. "Adobe Photoshop CC Classroom in a Book" by Andrew Faulkner and Conrad Chavez

2. "The Adobe Photoshop Lightroom Classic CC Book" by Martin Evening

3. "Photoshop for Photographers" by Martin Evening

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours / semester
GE	Theory	2	2	30

Course Code: BCA/GE1/C103-C **Title of the Course: Principles of Internet**

Course Objectives

1.Introduce the basic infrastructure of the Internet, including networks, servers, routers, and the global backbone.
2.Familiarize students with essential Internet protocols and standards, such as TCP/IP, DNS, HTTP, and SMTP.
3.Explore the principles of Internet governance, regulatory bodies, and policies affecting the Internet's use and operation.
4.Examine common security threats and best practices for securing online activities and data, including encryption, firewalls, and cybersecurity measures.

Course Outcomes

By the end of the course, students should be able to
1.Describe Internet History and Evolution
2.Understand Internet Infrastructure
3.Explain Internet Protocols
4.Discuss Internet Governance and Regulation

Title of the Course: Principles of Internet	Total Hrs:30
Unit 1	15 Hrs

Introduction to the Internet and its Foundations Introduction to the Internet Historical development and significance of the Internet Overview of the Internet's infrastructure and architecture Key terminology: IP addresses, domains, and web protocols Internet Protocols and Standards Understanding the OSI and TCP/IP models Exploring common Internet protocols (HTTP, FTP, SMTP, etc.) Domain Name System (DNS) and its role in web addressing Internet Governance and Regulation The role of ICANN, IETF, and other governing bodies Internet policies, regulations, and digital rights Net neutrality and cybersecurity Web Technologies and Internet Applications World Wide Web (WWW) The structure of web pages and URLs HTML, CSS, and JavaScript: fundamentals and usage Web development tools and platforms Web Browsing and Search Engines Web browsers and their features Effective web searching techniques Introduction to SEO (Search Engine Optimization)	
Unit 2	15 Hrs
Internet Security and Privacy Internet threats and vulnerabilities Encryption and secure communication Best practices for online privacy Internet and Society E-Commerce and Online Business Principles of e-commerce and online business models Payment gateways and online transactions Case studies of successful online businesses Social Media and Online Communication Social networking platforms and their impact Online communities and digital communication Social media etiquette and the role of influencers Emerging Trends and Future of the Internet Internet of Things (IoT) and its applications Artificial intelligence and machine learning on the Internet Ethical considerations and the future of Internet technology	

Reference Books

1. "Internet Technologies Handbook: Optimizing the IP Network" by Cisco Systems

2. "The Internet Book: Everything You Need to Know About Computer Networking and How the Internet Works" by Douglas E. Comer

3. "The Master Switch: The Rise and Fall of Information Empires" by Tim Wu

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE2/C104-A **Title of the Course: Digital Electronics**

Course Objectives

1.Gain a comprehensive understanding of the fundamental concepts of digital electronics, including binary numbering, logic gates, and Boolean algebra.
2.Learn how to design and analyze digital logic circuits, including combinational and sequential circuits.
3.Develop proficiency in various number systems used in digital electronics, such as binary, hexadecimal, and octal.
4.Explore different logic families, such as TTL and CMOS, and understand their characteristics and applications.

Course Outcomes

By the end of the course, students should be able to
1.Ability to Analyze Digital Circuits
2.Design Digital Systems
3.Proficiency in Number System Conversions
4.Knowledge of Logic Families
5.Practical Circuit Implementation

Title of the Course: Digital Electronics	Total Hrs:30
Unit 1	15 Hrs
1. Number Systems and Arithmetic Number System: Decimal, Octal, Hexadecimal & Binary Number System Conversion within Binary, Octal, Hexadecimal & Decimal Number System. Binary Arithmetic : Binary addition, subtraction, multiplication & division Binary subtraction using 1' complement, 2's complement method. Hexadecimal arithmetic: Addition, subtraction, multiplication & division 2. Boolean Algebra and Logic Gates Postulates of Boolean Algebra Theorems of Boolean Algebra: Complementation, commutative, AND, OR, Associative, Distributive, Absorption laws, De morgan's theorems Reducing Boolean expressions Logic Gates AND, OR, NOT, Ex-OR, Ex-NOR NAND as Universal building block Logic diagrams of Boolean expressions Boolean expressions for logic diagrams 3. Minimization Techniques Introduction, Minterms and Maxterms K-Map, K-map for 2 variables K-map for 3 variables K-map for 4 variables	
Unit 2	15 Hrs

4. Combinational and Arithmetic Logic Circuits Half Adder & Full Adder Binary parallel Adder Half Subtractor, Full Subtractor Adder/Subtractor in 2's complement system BCD to Decimal decoder 2: 4 demultiplexer 4 line to 1 line multiplexer 5. Flip Flops Introduction: RS FF Clocked RS FF, D FF Triggering, preset and clear JK FF, T FF, Race around condition Master slave FF 6. Counters Introduction: Asynchronous/ ripple counter Modulus Counter, MOD-12 counter Synchronous counter: Synchronous serial & synch parallel counter BCD counter Ring counter	

Reference Books

1. Digital Electronics and Micro-Computers - R.K.Gaur, Dhanpat Rai Publication

2. Digital Electronics and Logic Design - N.G.Palan, Technova Publication

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE2/C104-B **Title of the Course: Basics of HTML**

Course Objectives

1. Introduce students to the fundamentals of web development and the role of HTML in creating web content.
2. Teach students the syntax, structure, and elements of HTML, including tags, attributes, and document structure.
3. Emphasize the use of semantic HTML to create meaningful and accessible web pages.
4. Instruct students on how to format text using HTML, including headings, paragraphs, lists, and emphasis tags.
5. Familiarize students with creating hyperlinks and anchors to navigate between web pages and external resources.

Course Outcomes

By the end of the course, students should be able to:

1. Develop simple web pages using HTML, incorporating text, links, and images.
2. Demonstrate a solid understanding of HTML syntax, including tags and attributes.
3. Employ semantic HTML elements to structure web content in a meaningful and accessible way.
4. Format text content using headings, paragraphs, lists, and emphasis tags effectively.
5. Create hyperlinks to navigate within web pages and link to external resources.

Title of the Course: Basics of HTML	Total Hrs:30
Unit 1	15 Hrs
Introduction to HTML 1.1 What is HTML? 1.2 History and evolution of HTML 1.3 HTML Document structure 1.4 Basic HTML tags and elements 1.5 Creating a simple HTML document 1.6 Text formatting and structure with HTML 1.7 Adding comments and whitespace HTML Elements and Attributes 2.1 Heading and paragraph tags 2.2 Lists (Ordered and Unordered) 2.3 Links and anchors 2.4 Images and multimedia 2.5 Tables and forms 2.6 Semantic HTML: Headers, footers, sections, and articles 2.7 HTML attributes and their usage 2.8 HTML forms and input elements	
Unit 2	15 Hrs

Advanced HTML Topics 3.1 HTML5 and its new elements 3.2 Working with iframes and embedded content 3.3 HTML metadata and SEO best practices 3.4 HTML and CSS: Styling web pages 3.5 HTML and JavaScript: Basic interaction 3.6 Responsive web design and mobile considerations 3.7 Web accessibility and best practices 3.8 HTML validation and debugging tools	

Reference Books

1. HTML and CSS Design and Build Websites" by Jon Duckett

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours / semester
GE	Theory	2	2	30

Course Code: BCA/GE2/C104-C **Title of the Course: Basics of Computer Hardware**

Course Objectives

1. Develop a basic understanding of the major hardware components that make up a computer system, including the central processing unit (CPU), memory, storage devices, and input/output peripherals.
2. Explore the architecture of a computer system, including the Von Neumann architecture, and understand the flow of data and instructions within a computer.
3. Learn about different types of computers, from personal computers to supercomputers, and their respective purposes and capabilities.
4. Familiarize students with various input and output devices, such as keyboards, mice, monitors, printers, and their roles in computer systems.
5. Gain knowledge about different types of storage devices, including hard disk drives (HDDs), solid-state drives (SSDs), and optical drives, and understand their features and applications.

Course Outcomes

1. Identify Computer Components
2. Comprehend Computer Architecture
3. Distinguish Types of Computers
4. Use Peripheral Devices
5. Evaluate Storage Technologies

Syllabus- Course1: Title: Basics of Computer Hardware	Total Hrs:30
Unit 1	15 Hrs
Introduction to Computer Hardware** 1.1 What is Computer Hardware? 1.2 Historical Overview of Computer Hardware 1.3 Components of a Computer System 1.4 Central Processing Unit (CPU) and its functions 1.5 Memory and Storage Devices 1.6 Input and Output Devices 1.7 Motherboard and System Architecture 1.8 Booting and BIOS/UEFI Peripherals and Expansion Devices 2.1 Keyboards and Mice 2.2 Monitors and Display Technology 2.3 Printers and Scanners 2.4 External Storage Devices 2.5 Expansion Cards and Slots 2.6 USB and Other Ports 2.7 Networking Hardware (Routers, Modems, etc.) 2.8 Sound Cards and Audio Devices	

Unit 2	15 Hrs
Maintenance and Troubleshooting** 3.1 Computer Maintenance Best Practices 3.2 Software and Hardware Updates 3.3 Common Hardware Problems and Solutions 3.4 Diagnosing and Troubleshooting Hardware Issues 3.5 Data Backup and Recovery 3.6 Preventing Overheating and Dust Accumulation 3.7 Hardware Security and Anti-static Precautions 3.8 Emerging Trends in Computer Hardware	

Reference Books

1. "Upgrading and Repairing PCs" by Scott Mueller

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC1/C105-A **Title of the Course: Programming in C/C++ -I**

Course Objectives

1.Introduce students to the basic concepts of programming, including variables, data types, control structures, and functions.
2.Familiarize students with the syntax and structure of C and C++ languages, including variables, operators, and control statements.
3.Teach procedural programming in C, including functions, arrays, pointers, and file handling.
4.Introduce object-oriented programming (OOP) concepts in C++, including classes, objects, inheritance, and polymorphism.

Course Outcomes

By the end of the course, students should be able to:
1.Write Basic Programs
2.Understand C/C++ Syntax
3.Develop Procedural Programs (C)
4.Apply Object-Oriented Programming (C++)

Course Outcomes

Course Code: BCA/DSC1/C102	Course Title : Programming in C/C++ -I

Hands on Based on following Curriculum
1.1 What is C Programming?
1.2 History and Evolution of C
1.3 Setting Up the Development Environment
1.4 Writing and Compiling Your First C Program
1.5 Data Types, Variables, and Constants
1.6 Input and Output in C
1.7 Operators and Expressions

Control Structure, Function and Array
2.1 Control Structures (if statements, loops)
2.2 Functions and Modular Programming
2.3 Arrays and Strings

3.1 Pointers and Memory Management
3.2 Structures and Unions
3.3 File Input/Output (I/O)
3.4 Preprocessor Directives

Reference Books

1. "Programming in C" by Stephen G. Kochan (for C programming) and "C++ Primer" by Stanley B. Lippman (for C++ programming).

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC1/C105-B **Title of the Course: Python Programming- I**

Course Objectives

1.Introduce students to the basic concepts of programming, including variables, data types, control structures, and functions.
2.Familiarize students with the syntax and structure of the Python programming language, including variables, data types, and control statements.
3.Teach students how to write simple Python programs, covering input/output, arithmetic operations, and decision-making constructs.
4.Introduce fundamental data structures in Python, such as lists, dictionaries, and tuples, and how to work with them.
5.Teach the creation and use of functions and modules to promote code reusability and organization.

Course Outcomes

By the end of the course, students should be able to:
1.Write Basic Python Programs
2.Understand Python Syntax
3.Implement Data Structures
4.Develop Functions and Module

Course Code: BCA/DSC1/C102	Course Title : Python Programming- I
Hands on Based on following Curriculum Introduction to Python 1.1 What is Python? 1.2 History and Evolution of Python 1.3 Installing Python and Setting Up the Environment 1.4 Your First Python Program 1.5 Variables, Data Types, and Basic Input/Output 1.6 Control Structures (if statements, loops) 1.7 Functions and Modular Programming 1.8 Lists and Tuples Intermediate Python Programming 2.1 Dictionaries and Sets 2.2 File Input/Output (I/O) 2.3 Exception Handling Note: Hands on Based on Above Points Modules and Libraries 3.1 Working with Modules and Libraries 3.2 Object-Oriented Programming (OOP) in Python 3.3 Classes and Objects 3.4 Inheritance and Polymorphism	

Reference Books

1. "Python Crash Course" by Eric Matthes (for beginners)
2. "Python for Data Analysis" by Wes McKinney

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC1/C105-C **Title of the Course: R Programming- I**

Course Objectives

1.Provide students with an overview of R, its history, and its significance in data analysis, statistics, and data science.
2.Teach the basic syntax of R, including variables, data types, and data structures like vectors, data frames, and lists.
3.Instruct students on how to import data from various file formats (e.g., CSV, Excel) and export results to external files.
4.Introduce techniques for data manipulation, such as subsetting, filtering, and transforming data frames.

Course Outcomes

By the end of the course, students should be able to:
1.Use R for Data Analysis
2.Understand R Syntax
3.Import and Export Data
4.Manipulate Data

Course Code: BCA/VSC1/C105-C	Course Title: Title: R Programming- I

Hands on Based on following Curriculum

Introduction to R Programming
1.1 What is R Programming?
1.2 History and Evolution of R
1.3 Installing R and Setting Up the Environment
1.4 Your First R Script
1.5 Variables, Data Types, and Basic Data Structures (vectors, matrices)

Data Manipulation using R
2.1 Data Import and Export
2.2 Basic Data Manipulation and Exploration
2.3 Control Structures (if statements, loops)
2.4 Functions and Modularity in R
2.5 Working with Packages and Libraries
Note: Hands on Based on Above Points

Data Analysis and Visualization
3.1 Data Frames and Data Tables
3.2 Data Cleaning and Preprocessing
3.3 Descriptive Statistics and Data Visualization
3.4 Basic Plotting (bar charts, scatter plots, histograms)
3.5 Advanced Data Visualization (ggplot2)
Note: Hands on Based on Above Points

Reference Books

1."R for Data Science" by Hadley Wickham and Garrett Grolemund (for data analysis)

2."An Introduction to Machine Learning" by Alpaydin, Mehmedali (for machine learning)

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	2	30

Course Code: BCA/SEC1/C106-A **Title of the Course: Programming Methodology**

Course Objectives

1.Learn to develop simple algorithms and flow charts to solve a problem. Develop problem solving skills coupled with top dow design principles.
2.Learn about the strategies of writing efficient and algorithms/programs.
3.Develop the skills for formulating iterative solutions to a problem.

Course Outcomes

1.Learn the History and types of Programming.
2.Learn various approach of writing program.
3.Learn to develop simple algorithms and flow charts to solve a problem.

Title of the Course: Programming Methodology	Total Hrs:30
Unit 1	15 Hrs
Introduction to Programming Environment Introduction to Programming, Definition of program and programmer, features of good programming language, Bugs and Debugging, Programming Techniques Top Down Programming approaches: Types of programming methodologies, Procedural Programming, Functional Programming, Structural Programming, Modular Designing, Logical Programming Designing, Bottom Up Designing, Object Oriented Programming	
Unit 2	15 Hrs
Programming Languages History of languages, Classification of computer language: Types of Programming Languages- Machine Languages, Assembly Languages, High Level Languages, low level language, Structure Language, Object oriented Language, Modular techniques, Modular Programming - advantages, identifying the modules, step-by-step solution, control structures, decision control structures, selection control structures, loop control structures, 4GL,Assembler, Linker, Loader, Interpreter & Compiler, TASM, Debug Algorithm Definition, Characteristics, Advantages and disadvantages, Pscudocode or Structured English, Algorithm, basic features and properties of algorithm.	

Reference Books

1. Fundaments of Computer V. Rajaraman

2. Programming Logic and Design, Comprehensive By Joyce Farrell

3. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	2	30

Course Code: BCA/SEC1/C106-B **Title of the Course: Basic of Excel**

Course Objectives

1.Indicate the names and functions of the Excel interface components.
2.Enter and edit data.
3.Format data and cells.
4.Construct formulas, including the use of built-in functions, and relative and absolute references.
5.Create and modify charts.
6.Preview and print worksheets.
7.Use the Excel online Help feature.

Course Outcomes

1.Demonstrating the basic mechanics and navigation of an Excel spreadsheet.
2.Formatting techniques and presentation styles.
3.Learning the use and utility of functions and formulas on excel spreadsheet.
4.Working knowledge of organizing and displaying large amounts and complex data.
5.Using clip art to enhance ideas and information in Excel worksheets.
6.Understanding the need and use of using Excel templates

Title of the Course: Basic of Excel	Total Hrs:30
Unit 1	15 Hrs
Level 1 Content: Getting Started with Excel, Identify the Elements of the Excel Interface, Navigate and Select Cells in Worksheets, Customize the Excel Interface, Create a Basic Worksheet, Performing Calculations in an Excel Worksheet, Create Formulas in a Worksheet, Insert ,Functions in a Worksheet, Reuse Formulas, Modifying an Excel Worksheet, Edit Worksheet Data, Find and Replace Data, Manipulate Worksheet Elements Level 2 Content: Modifying the Appearance of a Worksheet, Apply Font Properties, Add Borders and Colors to Cells, Align Content in a Cell, Apply Number Formatting, Apply Cell Styles, Managing an Excel Workbook, Manage Worksheets, View Worksheets and Workbooks, Printing Excel Workbooks, Define the Page Layout, Print a Workbook	
Unit 2	15 Hrs

Excel Workbooks **Content: Managing Workbooks, Using Workbook Views, Selecting and Switching Between ,Worksheets, Inserting and Deleting Worksheets, Renaming, Moving, and Copying ,Worksheets, Splitting and Freezing a Window, Creating Headers and Footers, Hiding Rows, Columns, Worksheets, and Windows, Setting the Print Area, Adjusting Page ,Margins and Orientation, Adding Print Titles, Gridlines, and Row and Column Headings, Adjusting Paper Size and Print Scale, Printing a Selection, Multiple Worksheets, and Workbooks, Working with Multiple Workbook Windows, Creating a Template** **Excel Functions** **Content: More Functions and Formulas, Formulas with Multiple Operators, Inserting and ,Editing a Function, Auto Calculate and Manual Calculation, Defining Names, Using and Managing Defined Names, Displaying and Tracing Formulas, Understanding Formula Errors, Using Logical Functions (IF),Using Financial Functions (PMT),Using Database Functions (DSUM),Using Lookup Functions (VLOOKUP),User Defined and Compatibility Functions, Financial Functions, Date & Time Functions, Math & Trig Functions, Statistical Functions, Lookup & Reference Functions, Database Functions, Text Functions, Logical Functions, Information Functions, Engineering and Cube Functions**	

Reference Books

1. Excel 2019 Bible, Michael Alexander, 1th edition, Wiley.

B.Sc. Semester-I
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	2	30

Course Code: BCA/SEC1/C106-C **Title of the Course: Open Source Tools**

Course Objectives

1.Define open source software and its principles, including the four essential freedoms.
2.Introduce students to a range of popular open source software applications and tools used in various domains, such as operating systems, office suites, graphics editing, and programming.
3.Teach students how to install, configure, and maintain open source software effectively, focusing on both desktop and serve applications.

Course Outcomes

By the end of the course, students should be able to:
1.Identify and Explain Open Source Principles
2.Use Common Open Source Tools
3.Collaborate with the Open Source Community
4.Develop with Open Source Tools

Title of the Course: Open Source Tools	Total Hrs:30
Unit 1	15 Hrs
Introduction to Open Source and Key Concepts 1.1 What is Open Source Software? 1.2 History and Philosophy of Open Source 1.3 Licensing and Legal Aspects 1.4 Benefits and Challenges of Open Source 1.5 Popular Open Source Initiatives and Communities 1.6 Open Source Tools vs. Proprietary Software 1.7 Setting Up Open Source Development Environments 1.8 Version Control Systems (e.g., Git) Common Open Source Tools and Applications 2.1 Text Editors and Integrated Development Environments (IDEs) 2.2 Office Suites (e.g., LibreOffice) 2.3 Graphics and Design Tools (e.g., GIMP, Inkscape) 2.4 Web Browsers (e.g., Mozilla Firefox) 2.5 Content Management Systems (e.g., WordPress) 2.6 Email Clients and Communication Tools (e.g., Thunderbird) 2.7 Virtualization and Cloud Computing (e.g., VirtualBox, Docker) 2.8 Data Analysis and Visualization Tools (e.g., R and Python) 2.9 Collaboration and Project Management (e.g., JIRA and Trello)	
Unit 2	15 Hrs

Open Source in Specific Domains 3.1 Open Source in Education 3.2 Open Source in Healthcare 3.3 Open Source in Government and Public Services 3.4 Open Source in Research and Scientific Computing 3.5 Open Source in Web Development 3.6 Open Source in Embedded Systems and IoT 3.7 Open Source in Security and Privacy 3.8 Open Source Licensing and Compliance	

Reference Books

1."The Cathedral & the Bazaar" by Eric S. Raymond

2."The Art of Community" by Jono Bacon

3."Open Sources: Voices from the Open Source Revolution" by Chris DiBona, Sam Ockman, and Mark Stone

4."The Linux Command Line" by William E. Shotts Jr.

B.C.A. Science

Semester II

(NEP-2020)

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
DSCC	Theory	2	2	30

Course Code: BCA/DSC4/C150 **Title of the Course: Data Structure**

Course Objectives

1.To provide fundamental knowledge of data structures and how they are organized/arranged in computer memory.
2.To provide knowledge on how data structures are implemented and processed.
3.To familiarize with basic techniques of algorithm analysis.
4.To equip with the implementation techniques of complex algorithms of insertion, deletion and modification of data stored ir various data structures.
5.To provide knowledge of the basic functioning of searching and sorting algorithms.

Course Outcomes

1.Ability to understand fundamental data structures like arrays, linked-lists, stack, queues, trees, graphs.
2.Ability to understand abstract data types.
3.Ability to program data structures and use them in implementations of abstract data types. Understanding of basic algorithmic complexity.
4.Ability to sensibly select appropriate data structures and algorithms for problems and to justify that choice.
5.Ability to understand searching and sorting algorithms, their implementation and suitable applications.

Title of the Course: Data Structure	Total Hrs:30
Unit 1	15 Hrs
Data Structures & Algorithm Analysis: Data Structures: Introduction to linear and non-linear data structures. Algorithm Analysis, Growth rates, Estimating the growth rate, Big O notation.	
Unit 2	15 Hrs
Arrays: Need for Arrays, Linear Arrays, representation of linear arrays (row-major order, column-major order), Traversing, insertion, modification, deletion in linear array, merging linear arrays. 2-dimenaitonal arrays introduction, representation of 2-dimenational array, sparse Searching & Sorting: Need for Searching and sorting, Linear search, binary search, bubble sort, selection sort, insertion sort.	

Reference Books

1. Data Structures using C, by Seema Threja, 2nd Edition, Oxford Press.

2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill

3. Fundamentals of Data Structures in C, by Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed

4. Design & Analysis of computer Algorithms by Alfred Aho, John Hopcroft and Jeffery Ullman (Link)

5. Introduction to Algorithms by Thomas Corman et.al (Link)

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
DSCC	Theory	2	2	30

Course Code: BCA/DSC4/C151 Title of the Course: Operating System-II

Course Objectives

To introduce students the Memory management, Disk management, Device management, Security Policy Mechanism and Introduction to Android Operating System.

Course Outcomes

1.Gain knowledge of Memory Management, Paging and Segmentation. Understand concept of File, Operation of file, File allocation methods.
2.Understand Disk fundamental, Disk Scheduling, Disk management.
3.Understand Dedicated devices, Shared devices, I/O Devices, I/O Hardware, Interrupts
4.Understand Security Policy Mechanism- Protection and Authentication.
5.Understand the basic introduction to Android Operating System.

Title of the Course: Operating System-II	Total Hrs:30
Unit 1	15 Hrs
Memory Management: Address Binding, Logical Vs. Physical address space, Memory Allocation Strategies- Fixed and Variable Partitions, Paging, Segmentation, Virtual Memory.	
Unit 2	15 Hrs
Disk Management: Concept of File, File Operation, Directory Structure, File Allocation Methods- Contiguous and Non-Contiguous allocation method, Secondary Storage Structure: Disk fundamental, Disk Scheduling FCFS Scheduling, SSTF Scheduling, SCAN Scheduling, Disk management. Device Management: Introduction: Dedicated devices, Shared devices and Virtual devices, Pipes, Buffer, I/O System Components: I/O Devices, I/O Hardware, Interrupts, Application I/O Interface.	

Reference Books

1. "Operating System", By S.R. Sathe & Anil S. Mokhade, MacMillan Publication.

2. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.

3. A.S. Tanenbaum, Modern Operating System, 3rd Edition, Pearson Education 2007.

4. G. Nutt, Operating System: A Modern Perspective, 2nd Edition Pearson Edition 1997.

5. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.

6. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
DSCC	Practical	2	2	30

Course Code: BCA/DSC6/C152 **Title of the Course: Practical Based on BCA/DSC3/C12 & BCA/DSC4/C13**

Course Code: BCA/DSC6/C152	**Course Title :Practical Based on BCA/DSC3/C12 & BCA/DSC4/C13**
Sample List of experiments to be carried out based on the course **BCA/DSC3/C12 & BCA/DSC4/C13** Note : Implement any three programs from each unit.	

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
Minor	Theory	2	2	30

Course Code: BCA/M1/C153 **Title of the Course: Database Concepts**

Course Objectives

1.Learn what is data, database and DBMS
2.Understand the basics of database designing.
3.Lear different SQL statements

Course Outcomes

1.Design a database.
2.Normalize a database.
3.Create a database perform various operations on database.

Title of the Course: Database Concepts	Total Hrs:30
Unit 1	15 Hrs
Introduction to Databases, Types of Data, Record and Files, File based System, What is database system, application and purpose of database system, Three-Level of data abstraction, instance and schema, data independence, database users, structure of a DBMS, Advantages and disadvantages of DBMS.	
Unit 2	15 Hrs
Entity, attributes and data association relation between entities, The importance of data models, The evolution of data models, Type of Data Model, Advantages and disadvantages of each model. Database Design, Design Phases, Normal Forms INF,2NF, 3NF and BCNF. ER-Model entity set, relationship set, attributes, constraints, ER-Diagram basic structure, mapping cardinality, Roles, weak entity set. Symbols used in ER-notations. ERD Issues, 12 Codd's rules SQL: SQl Languages DDL, DML, DCL, TCL, DDL Statements to Create and Manage Tables using Create & Alter, Manipulating Data using Insert, Update & Delete Statement., Retrieving Data Using SQL Select, Restricting and Sorting Data, Using SingleRow functions, Conversion Functions and Conditional Expressions, Aggregated Data Using Group Function, Displaying data	

Reference Books

1. Database system concepts(6th edition) AviSilverschatz, Henry F. Korth, S.Sudarshan 2. An introduction to database systems by Bipin C. Desai

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/ Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester	Duration of Exam	Formative Assessment Marks	Summative Assessment Marks	Total Marks
GE	Theory	2	2	30				

Course No.1 Course Code: BCA/GE3/C154-A Title of the Course: Numerical Method

Course Objectives

1.A student should be able to recall basic facts about mathematics and should be able to display knowledge of conventions suc as notations, terminology, state important facts resulting from their studies..
2.A student should get adequate exposure to global and local concerns that explore them many aspects of Mathematical Sciences.
3.Students get familiar with numerical analysis.

Course Outcomes

1.Different number theory algorithms.
2.Calculate approximate value for using approximation techniques.
3.Solve numerical problems using different numerical methods.
4.Write algorithms of different numerical techniques.

Title of the Course: Numerical Method	Total Hrs:30
Unit 1	15 Hrs
Introduction: Mathematical Modeling, Characteristics, Error in Calculatio, Significant Error, Absolute, Percentage Relative Error, Chopping off and Rounding off Error, Truncation Error, Propagation Error. Divisibility Theory in the Integer: Early Number Theory. The division Algorithm. Greatest Common divisor. The Euclidean Algorithm	
Unit 2	15 Hrs
Numerical Solutions of Transcendental Equations: Introduction and Matrix Notation of set of Equations Gauss Elimination Method Gauss Seidal Method Matrix Inversion Method Introduction and Polynomial Interpolation Newton-Gregory Forward Difference Interpolation Formula Newton-Gregory Backward Difference Interpolation For	

Reference Books

1."Numerical Analysis" by Richard L. Burden and J. Douglas Faires:

2."Numerical Methods for Engineers" by Steven C. Chapra and Raymond P. Canale:

3."Numerical Recipes in C: The Art of Scientific Computing" by William H. Press, Saul A. Teukolsky, et al.:

4."Numerical Mathematics" by Alfio Quarteroni and Riccardo Sacco:mula

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE3/C155-B **Title of the Course: Video Editing**

Course Objectives

1.Provide an overview of the video editing process, including its history, principles, and importance in various media industries
2.Introduce students to popular video editing software applications, such as Adobe Premiere Pro, Final Cut Pro, and DaVinci Resolve.
3.Teach fundamental video editing techniques, including cutting, trimming, transitions, and effects.
4.Instruct students on how to create and manage timelines, sequences, and projects effectively.

Course Outcomes

By the end of the course, students should be able to:

1.Understand Video Editing Concepts:
2.Proficiently Use Video Editing Software:
3.Apply Basic Video Editing Techniques:
4.Create and Manage Timelines
5.Edit Audio:

Title of the Course: Video Editing	Total Hrs:30
Unit 1	15 Hrs
Introduction to Video Editing 1.1 What is Video Editing? 1.2 History and Evolution of Video Editing 1.3 The Role of Video Editors 1.4 Introduction to Video Editing Software (e.g., Adobe Premiere Pro, Final Cut Pro, DaVinci Resolve) 1.5 Understanding Video Formats and Resolutions 1.6 Importing and Organizing Media 1.7 Basic Editing Tools and Functions 1.8 Trimming and Cutting Footage 1.9 Working with Timelines and Sequences Basic Video Editing Techniques 2.1 Adding Transitions and Effects 2.2 Working with Audio (Sound Editing) 2.3 Color Correction and Grading 2.4 Text and Graphics Overlay 2.5 Creating Montages and Storytelling 2.6 Keyframing and Animation 2.7 Exporting and Rendering Videos 2.8 Project Management and File Organization	

Unit 2	15 Hrs
Advanced Video Editing and Final Projects 3.1 Advanced Editing Techniques (e.g., multicamera editing, advanced transitions) 3.2 Working with Green Screens (Chroma Key) 3.3 Advanced Color Grading and Correction 3.4 Sound Design and Audio Effects 3.5 Video Compression and Export Settings 3.6 Collaboration and Sharing Work 3.7 Final Projects: Student-led video editing projects 3.8 Emerging Trends in Video Editing	

Reference Books

1."The Technique of Film and Video Editing: History, Theory, and Practice" by Ken Dancyger

2."In the Blink of an Eye" by Walter Murch

3."The Visual Story: Creating the Visual Structure of Film, TV and Digital Media" by Bruce Block

4."Adobe Premiere Pro Classroom in a Book" by Maxim Jago

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE3/C154-C **Title of the Course: Introduction to XML**

Course Objectives

1.Introduce students to the fundamental concepts of XML, including its role, importance, and use cases in data representation and exchange.
2.Teach students the syntax and structure of XML documents, including elements, attributes, and the hierarchical tree-like structure.
3.Explain the role of Document Type Definitions (DTDs) and XML Schema Definitions (XSD) in defining the structure and validation rules for XML documents.
4.Instruct students on how to validate XML documents against a specified schema to ensure data integrity and conformity.

Course Outcomes

By the end of the course, students should be able to:
1.Understand the fundamental concepts and principles of XML, its flexibility, and its suitability for various data representation tasks.
2.Create well-formed XML documents with proper structure, elements, and attributes
3.Develop and utilize DTDs and XML Schemas to define and validate the structure and content of XML documents
4.Validate XML documents against specified DTDs or XML Schemas to ensure compliance and data consistency

Title of the Course: Introduction to XML	Total Hrs:30
Unit 1	15 Hrs
Fundamentals of XML 1.1 What is XML? 1.2 History and Evolution of XML 1.3 Purpose and Use Cases of XML 1.4 XML Syntax and Structure 1.5 Well-Formed XML Documents 1.6 Elements, Attributes, and Text 1.7 XML Declaration and Document Type Declaration (DTD) 1.8 XML Schema (XSD) and Document Validation XML Document Manipulation and Transformation 2.1 Document Object Model (DOM) 2.2 SAX (Simple API for XML) Parsing 2.3 XPath: Navigating XML Documents 2.4 XSLT (Extensible Stylesheet Language Transformations) 2.5 XML Transformation and Styling 2.6 XML in Data Exchange (SOAP, REST, Web Services) 2.7 XML in Document Databases (e.g., XML databases)	
Unit 2	15 Hrs

Advanced XML Concepts and Applications 3.1 Namespaces and Avoiding Name Collisions 3.2 XML Best Practices and Coding Standards 3.3 XML in Web Development (RSS, Atom, sitemaps) 3.4 XML for Configuration Files 3.5 XML and Linked Data (RDF, OWL) 3.6 XML in Industry Standards (e.g., HL7 in healthcare) 3.7 XML Security and Digital Signatures 3.8 Emerging Trends and Future of XML	

Reference Books

1."XML: Visual QuickStart Guide" by Kevin Howard Goldberg

2."XML and JSON: Recipes for Semantic Web" by Benjamin Johnston

3."Beginning XML" by Joe Fawcett and Danny Ayers

4."Learning XML" by Erik T. Ray

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE4/C155-A **Title of the Course: 8086 Microprocessor**

Course Objectives

To get knowledge of internal architecture of 8086 microprocessor Understand different addressing modes. Learn assembly language instructions to construct an ALP.

Course Outcomes

Upon successful completion of the course, the students will be able to:
1.Functional block diagram of 8086 microprocessor
2.Functions of each pin of 8086 microprocessor
3.Use of instructions in different addressing modes Write an assembly language program.

Title of the Course: 8086 Microprocessor	Total Hrs:30
Unit 1	15 Hrs
Introduction to Microprocessor and Microcomputer: Microprocessor based personal computer system. Block diagram of microprocessor based computer system. Modern computer memory map, I/O Space. The Microprocessor, buses. Computer Data formats, ASCII Unicode, BCD.	
Unit 2	15 Hrs
Microprocessor and its architecture: 8086 internal architecture. Real Mode & Protected Mode Memory Addressing. Memory Paging. Pinout and Pin function of 8086 microprocessor. Addressing Modes: Data addressing modes. Program memory addressing modes. Stack memory addressing modes.	

Reference Books

1. The Intel Microprocessors: Architecture, programming and interfacing -

By Barry B. Brey

2. Microprocessors and Interfacing: Douglas Hall.

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE4/C155-B **Title of the Course: Web Designing using CSS**

Course Objectives

1.Provide an overview of web design principles, the role of CSS in web development, and its significance in creating attractive and user-friendly websites.
2.Introduce students to the basic syntax and rules of CSS, including selectors, properties, and values.
3.Teach how to apply CSS styles to HTML elements, including text formatting, color, and background properties.
4.Explain the concepts of layout and positioning in web design, covering techniques such as floats, positioning, and the CSS bo model.
5.Familiarize students with responsive web design techniques using media queries to adapt layouts for different devices and screen sizes.

Course Outcomes

By the end of the course, students should be able to:

1.Apply CSS for Web Design
2.Understand CSS Syntax
3.Style HTML Elements
4.Layout and Positioning
5.Design Responsive Websites

Title of the Course: Web Designing using CSS	Total Hrs:30
Unit 1	15 Hrs
Introduction to Web Design and CSS 1.1 What is Web Design and its Importance 1.2 History and Evolution of CSS 1.3 CSS and the Box Model 1.4 CSS Selectors and Properties 1.5 Styling Text, Fonts, and Colors 1.6 Backgrounds and Images in CSS 1.7 Working with CSS Classes and IDs 1.8 Introduction to Responsive Web Design 1.9 CSS Validation and Debugging Tools	
Unit 2	15 Hrs

Advanced CSS Techniques **2.1 CSS Layout and Positioning** **2.2 Flexbox and Grid Layout** **2.3 CSS Transitions and Animations** **2.4 CSS Pseudo-classes and Pseudo-elements** **2.5 CSS3 Features (e.g., gradients, shadows)** **2.6 Custom Fonts and Icons** **2.7 CSS Best Practices and Optimization** **2.8 Cross-Browser Compatibility and Vendor Prefixes** **Web Design Projects and Emerging Trends** **3.1 Creating a Multi-Page Website Layout** **3.2 Styling Forms and User Interfaces** **3.3 CSS for Navigation Menus and Buttons** **3.4 Web Typography and Layout Challenges** **3.5 CSS for Mobile and Tablet Devices** **3.6 CSS Frameworks (e.g., Bootstrap)**	

Reference Books

1. "CSS: The Definitive Guide" by Eric A. Meyer and Estelle Weyl

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
GE	Theory	2	2	30

Course Code: BCA/GE4/C155-C **Title of the Course: PC Maintenance**

Course Objectives

1.Provide an overview of the importance of maintaining personal computers, including hardware and software components.
2.Familiarize students with the various hardware components of a PC, including the CPU, RAM, hard drive, graphics card, and motherboard.
3.Teach students how to perform software maintenance tasks, such as updating operating systems, drivers, and applications.
4.Introduce strategies for protecting a computer from viruses, malware, and other security threats, including the use of antivirus software.
5.Instruct students on the importance of data backup and recovery procedures and demonstrate how to create backups and restore data.

Course Outcomes

By the end of the course, students should be able to:
1.Understand PC Maintenance
2.Identify Hardware Components
3.Perform Software Maintenance
4.Protect Against Viruses and Malware
5.Implement Data Backup and Recovery

Title of the Course: PC Maintenance	Total Hrs:30
Unit 1	15 Hrs
Introduction to PC Maintenance and Basic Troubleshooting 1.1 What is PC Maintenance? 1.2 The Importance of PC Maintenance 1.3 Basic Computer Components and Their Functions 1.4 Common PC Issues and Symptoms 1.5 Troubleshooting Methodology 1.6 Operating System Maintenance 1.7 Disk Cleanup and Defragmentation 1.8 Managing Software Updates 1.9 Introduction to PC Security and Antivirus Software 1.10 Backup and Recovery Procedures Hardware Maintenance and Upgrades 2.1 Preventive Maintenance for Hardware 2.2 Cleaning and Dust Control 2.3 Managing Hardware Drivers 2.4 Memory (RAM) Testing and Upgrades 2.5 Hard Drive Maintenance and SMART Monitoring 2.6 Cleaning and Replacing Input Devices (e.g., Keyboard, Mouse) 2.7 Display Maintenance and Cleaning 2.8 Basic Network Troubleshooting 2.9 Expanding and Upgrading PC Components 2.10 BIOS/UEFI Updates and Configuration	
Unit 2	15 Hrs
Advanced PC Maintenance and Troubleshooting 3.1 Advanced Troubleshooting Techniques 3.2 Diagnosing and Resolving Hardware Failures 3.3 Dealing with Overheating and Fan Maintenance 3.4 Replacing and Upgrading Power Supply Units (PSUs) 3.5 Understanding System Restore and Recovery Options 3.6 Data Backup Strategies and Recovery Tools 3.7 Preventive Measures Against Malware and Viruses 3.8 Networking and Internet Connectivity Issues 3.9 Remote Desktop and Support Tools 3.10 Emerging Trends in PC Maintenance	

Reference Books

1."CompTIA A+ Certification All-in-One Exam Guide" by Mike Meyers

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC2/C156-A **Title of the Course: C/C++ Programming- II**

Course Objectives

1.Introduce students to the basic concepts of programming, including variables, data types, control structures, and functions.
2.Familiarize students with the syntax and structure of C and C++ languages, including variables, operators, and control statements.
3.Teach procedural programming in C, including functions, arrays, pointers, and file handling.
4.Introduce object-oriented programming (OOP) concepts in C++, including classes, objects, inheritance, and polymorphism.

Course Outcomes

By the end of the course, students should be able to:
1.Write Basic Programs
2.Understand C/C++ Syntax
3.Develop Procedural Programs (C)
4.Apply Object-Oriented Programming (C++)

Course Code: BCA/VSC2/C156-A	Title of the Course: C/C++ Programmi
Hands on Based on following Curriculum C++ Programming and Advanced Topics 1.1 Introduction to C++ and OOP Concepts 1.2 Basic C++ Syntax and Data Types 1.3 Classes and Objects in C++ 1.4 Constructors and Destructors 2.1 Inheritance and Polymorphism 2.2 Operator Overloading 2.3 Templates and Standard Template Library (STL) 3.1 Exception Handling 3.2 File Handling in C++	

Reference Books

1."Programming in C" by Stephen G. Kochan (for C programming)

2."C++ Primer" by Stanley B. Lippman (for C++ programming).

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC2/C156-B Title of the Course: Python Programming- II

Course Objectives

1.Introduce students to the basic concepts of programming, including variables, data types, control structures, and functions.
2.Familiarize students with the syntax and structure of the Python programming language, including variables, data types, and control statements.
3.Teach students how to write simple Python programs, covering input/output, arithmetic operations, and decision-making constructs.
4.Introduce fundamental data structures in Python, such as lists, dictionaries, and tuples, and how to work with them.
5.Teach the creation and use of functions and modules to promote code reusability and organization.

Course Outcomes

By the end of the course, students should be able to:
1.Write Basic Python Programs
2.Understand Python Syntax
3.Implement Data Structures
4.Develop Functions and Module

Course Code: BCA/VSC2/C156-B	Title of the Course: Python Programming- II

Hands on Based on following Curriculum

Advanced Python Concepts and Libraries
1.1 Advanced Data Types (e.g., sets, dictionaries, namedtuples)
1.2 List Comprehensions and Generator Expressions
1.3 Decorators and Metaprogramming
1.4 Context Managers and the `with` Statement
1.5 Iterators and Generators
1.6 Functional Programming in Python
1.7 Concurrency and Parallelism (e.g., multiprocessing, threading)
1.8 Profiling and Optimization Techniques
1.9 Regular Expressions in Python
1.10 Advanced Python Standard Library Module

Object-Oriented Programming and Design Patterns
2.1 Review of OOP Principles in Python
2.2 Inheritance and Polymorphism
2.3 Design Patterns (e.g., Singleton, Factory, Observer)
2.4 Building Python Classes and Modules
2.5 Exception Handling and Custom Exception Classes
2.6 Advanced Topics in Object-Oriented Programming
2.7 Pythonic Design and Code Patterns
2.8 Testing and Test-Driven Development (TDD)
2.9 Introduction to Code Documentation (e.g., Docstrings)

Python Web Development and Data Science
3.1 Web Development Frameworks (e.g., Flask, Django)
3.2 Building RESTful APIs with Python
3.3 Database Integration and ORMs
3.4 Web Security and Authentication
3.5 Data Manipulation with NumPy and Pandas
3.6 Data Visualization with Matplotlib and Seaborn
3.7 Machine Learning with Scikit-Learn

Reference Books

1."Fluent Python" by Luciano Ramalho

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
VSC	Practical	2	4	60

Course Code: BCA/VSC2/C156-C **Title of the Course: R Programming- II**

Course Objectives

1.Provide students with an overview of R, its history, and its significance in data analysis, statistics, and data science.
2.Teach the basic syntax of R, including variables, data types, and data structures like vectors, data frames, and lists.
3.Instruct students on how to import data from various file formats (e.g., CSV, Excel) and export results to external files.
4.Introduce techniques for data manipulation, such as subsetting, filtering, and transforming data frames.

Course Outcomes

By the end of the course, students should be able to:
1.Use R for Data Analysis
2.Understand R Syntax
3.Import and Export Data
4.Manipulate Data

Course Code: BCA/VSC2/C156-C	Title of the Course: R Programming- II
Hands on Based on following Curriculum **Statistical Analysis** **1.1 Statistical Analysis with R (t-tests, ANOVA, correlation)** **1.2 Exploratory Data Analysis (EDA)** **1.3 Handling Missing Data** **1.4 Working with Dates and Times** **Advanced Topics in R** **2.1 Data Mining and Machine Learning in R** **2.2 Introduction to Regression Analysis** **2.3 Clustering and Dimensionality Reduction** **2.4 Text Mining and Natural Language Processing** **Web Scrapping and Database** **3.1 Web Scraping with R** **3.2 Interactive Visualizations (Shiny)** **3.3 Introduction to R Markdown and Reporting** **3.4 Connecting R to Databases** **3.5 Version Control and Collaboration with Git and GitHub**	

Reference Books

1."R for Data Science" by Hadley Wickham and Garrett Grolemund (for data analysis)

2."An Introduction to Machine Learning" by Alpaydin, Mehmedali (for machine learning)

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	4	60

Course Code: BCA/SEC2/C157-A Title of the Course: Web Commercial Elements

Course Objectives

1. Provide students with an understanding of what JavaScript is, its history, and its role in web development.
2.Teach the basic syntax, data types, and language features of JavaScript, including variables, operators, and control structures
3.Explain how to create functions, understand function scope, and use functions to organize and modularize code.
4.Introduce the DOM and its role in manipulating HTML and CSS to create dynamic web pages.
5.Teach students how to handle user interactions and events in web applications using JavaScript.

Course Outcomes

By the end of the course, students should be able to:

1.Write JavaScript Code
2.Understand JavaScript Syntax
3.Create and Use Functions
4.Manipulate the DOM
5.Handle Events

Syllabus- Course1: Title: Web Commercial Elements	Total Hrs:60
Unit 1	20 Hrs

Introduction to JavaScript Programming 1.1 What is JavaScript? 1.2 History and Evolution of JavaScript 1.3 Setting Up a JavaScript Development Environment 1.4 Basic JavaScript Syntax 1.5 Variables, Data Types, and Operators 1.6 Conditional Statements (if, else if, else) 1.7 Loops (for, while, do...while) 1.8 Functions and Scope 1.9 Handling User Input and Events 1.10 Debugging JavaScript Code Advanced JavaScript Concepts and DOM Manipulation 2.1 Working with Arrays and Objects 2.2 DOM (Document Object Model) Introduction 2.3 Accessing and Manipulating DOM Elements 2.4 Event Handling and Event Listeners 2.5 Asynchronous JavaScript (Callbacks, Promises) 2.6 Error Handling and Exceptions 2.7 Local Storage and Cookies 2.8 Modern JavaScript (ES6 and Beyond) 2.9 Interactive Web Forms with JavaScript 2.10 Building Responsive Web Layouts with JavaScript	
Unit 2	20 Hrs
JavaScript Applications and Frameworks 3.1 Introduction to JavaScript Libraries (e.g., jQuery) 3.2 Introduction to Front-End Frameworks (e.g.Angular) 3.3 Building Interactive Web Applications 3.4 AJAX and Fetch API 3.5 Working with JSON Data 3.6 Cross-Origin Resource Sharing (CORS) 3.7 JavaScript for Web Animation and Graphics 3.8 Introduction to Node.js and Server-Side JavaScript 3.9 Building Simple Server-Side Applications 3.10 JavaScript Best Practices and Code Optimization	

Reference Books

1. "Eloquent JavaScript" by Marijn Haverbeke

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	2	30

Course No.1 Course Code: BCA/SEC2/C157-B Title of the Course: Advance Excel

Course Objectives

To teach students how to use complex Excel formulas and functions to solve sophisticated problems and automate tasks .

Course Outcomes

After completion of the Advanced Excel course you will be able to: Use advanced functions and productivity tools to assist in developing worksheets. Manipulate data lists using Outline, Autofilter and PivotTables. Use Consolidation to summarise and report results from multiple worksheets.

Syllabus- Course1: Title: Advance Excel	Total Hrs:30
Unit 1	15 Hrs
Excel Sorting and Filtering Data Working with Data Ranges, Sorting by One Column, Sorting by Colors or Icons, Sorting by Multiple Columns, Sorting by a Custom List, Filtering Data, Creating a Custom AutoFilter, Using an Advanced Filter, Working with Tables, Creating a Table, Adding and Removing Data, Working with the Total Row, Sorting a Table, Filtering a Table, Removing Duplicate Rows of Data, Formatting the Table, Using Data Validation, Summarizing a Table with a PivotTable, Converting to a Range Excel Advanced Level-1 Working with the Web and External Data, Inserting a Hyperlink, Creating a Web Page from a Workbook, Importing Data from an Access Database or TextFile, Importing Data from the Web and Other Sources, Working with Existing Data Connections	
Unit 2	15 Hrs
Excel Advanced Level-2 Working with Objects, Inserting Clip Art, Inserting Pictures and Graphics Files, Formatting Pictures and Graphics, Inserting Shapes, Formatting Shapes, Resize, Move, Copy ,and Delete Objects, Applying Special Effects to Objects, Grouping Objects, Aligning Objects, Flipping and Rotating Objects, Layering Objects, Inserting Smart Art, Working with Smart Art Elements, Formatting Smart Art, Using Word Art, Inserting an Embedded Object, Inserting Symbols	

Reference Books

1. Excel 2019 Bible, Michael Alexander, 1th edition, Wiley.

B.Sc. Semester-II
Subject: B.C.A. Science
Discipline Specific Course(DSC)

Type of Course	Theory/Practical	Credits	Instruction hour per week	Total No.Of. Lectures/Hours/ semester
SEC	Theory	2	2	30

Course Code: BCA/SEC2/C157-C **Title of the Course: Logical Reasoning**

Course Objectives

1.Familiarize students with the concept of logical reasoning and its significance in decision-making and problem-solving.
2.Help students identify common logical fallacies and errors in reasoning in everyday arguments and discussions.
3.Introduce the principles of deductive reasoning, including syllogisms and propositional logic.
4.Teach students inductive reasoning techniques, such as generalization, analogy, and causal reasoning.
5.Enhance students' critical thinking skills by teaching them to evaluate arguments, evidence, and the validity of reasoning.

Course Outcomes

By the end of the course, students should be able to:

1.Apply Logical Reasoning
2.Identify Logical Fallacies
3.Use Deductive Reasoning
4.Apply Inductive Reasoning
5.Demonstrate Critical Thinking

Syllabus- Course1: Title: Logical Reasoning	Total Hrs:30
Unit 1	15 Hrs
Fundamentals of Logical Reasoning 1.1 What is Logical Reasoning? 1.2 Importance of Critical Thinking and Logic 1.3 Deductive and Inductive Reasoning 1.4 Analyzing and Evaluating Arguments 1.5 Identifying Assumptions and Premises 1.6 Logical Fallacies and Errors in Reasoning 1.7 Propositional Logic and Truth Tables 1.8 Predicate Logic and Quantification 1.9 Venn Diagrams and Set Theory 1.10 Problem-Solving Strategies	
Unit 2	15 Hrs

Advanced Logical Reasoning 2.1 Conditional Statements and Implication 2.2 Logical Equivalence and Contrapositive 2.3 Inference and Proof Techniques 2.4 Logical Reasoning in Mathematics 2.5 Critical Thinking in Real-World Scenarios 2.6 Causal Reasoning and Causation 2.7 Decision Making and Rational Choice 2.8 Abductive Reasoning and Hypothesis Testing 2.9 Game Theory and Strategic Thinking 2.10 Ethical Reasoning and Moral Dilemmas Practical Applications and Problem-Solving 3.1 Logical Reasoning in Science and Research 3.2 Legal Reasoning and Argumentation 3.3 Logical Reasoning in Computer Science 3.4 Reasoning in Business and Economics 3.5 Problem-Solving in Everyday Life 3.6 Preparing for Logical Reasoning Tests (e.g., LSAT, GMAT) 3.7 Brain Teasers and Puzzles	

Reference Books

1."Critical Thinking: A Concise Guide" by Tracy Bowell and Gary Kemp