

BCA

(Spl in 1. Artificial Intelligence Machine Learning
2. Artificial Intelligence Data Science)
Effective from Academic Session – 2025-2026

BCA - Curriculum 2025-2026 Batch								
I SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	CC	25BC1CI111	Web Technology	3	0	0	3	3
2	CC	25BC1MA111	Digital Logic	2	0	0	2	2
3	CCL	25BC7CI172	Web Technology Lab	0	0	2	1	2
4	SEC	25BC1CI112	Problem Solving Technique using C	3	1	0	4	4
5	MDE	25B11MA111	Fundamentals of Mathematics	2	1	0	3	3
6	AEC	25B11HS111	English	1	0	2	2	3
7	VAC	25BC1CI113	Digital Technologies	2	0	0	2	2
8	VAC	25B11GE111	Environmental Science	2	0	0	2	2
9	SEC	25BC7CI171	Problem Solving Technique using C Lab	0	0	2	1	2
				Total			20	23
II SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	CC	25BC1CI211	Data Structures	3	1	0	4	4
2	CC	25BC1CI212	Database Management Systems	3	1	0	4	4
3	CC	25BC1CI213	Python	2	0	0	2	2
4	CCL	25BC7CI271	Data Structures Lab	0	0	2	1	2
5	CCL	25BC7CI272	Database Management Systems Lab	0	0	2	1	2
6	CCL	25BC7CI213	Python Lab	0	0	2	1	2
7	AEC	25B17HS271	Life Skills& Professional Communication Lab	0	0	2	Audit	2
8	AEC	25B11HS211	Universal Human Values (UHV)	2	1	0	3	3
9	MDE	25B11MA213	Discrete Computational Mathematics	3	1	0	4	4
				Total			20	25
SUMMER Training / INTERNSHIP (6-Weeks)								
III SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	CC	25BC1CIXXX	Algorithm and Problem Solving (APS)	3	1	0	4	4
2	CC	25BC1CIXXX	Object Oriented Programming (C++)	3	1	0	4	4
3	CCL	25BC1CIXXX	Algorithm and Problem Solving (APS) Lab	0	0	2	1	2
4	CCL	25BC1CIXXX	Object Oriented Programming (C++) Lab	0	0	2	1	2
5	MDE	25BC1MAXXX	Applied Probability and Statistics	2	1	0	3	3
6	MDEL	25BC1MAXXX	Applied Probability and Statistics Lab	0	0	2	1	2
7	SEC	25XXXXXX	Entrepreneurship Development	3	1	0	4	4
8	SEC	25XXXXXX	Multimedia Technology	2	0	0	2	2
9	SEC	25BC1CIXXX	Multimedia Technology Lab	0	0	2	1	2
				Total			21	25
	DSE	25XXXXXX	CA Discipline Elective A1(Basket)Spl-AIML	3	0	0	3	3
	DSE	25XXXXXX	CA Discipline Elective B1 (Basket) Spl-AIDS	3	0	0	3	3

IV SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	CC	25XXXXXX	Software Engineering and Quality Assurance	3	0	0	3	3
2	CC	25BC1CAXXX	Java Programming	3	1	0	4	4
3	CC	25BC1CAXXX	Operating System	3	0	0	3	3
4	CCL	25XXXXXX	Software Engg and Quality Assurance lab	0	0	2	1	2
5	CCL	25XXXXXX	Java Programming Lab	0	0	2	1	2
6	DSE	25XXXXXX	Discipline Elective-1	2	0	0	2	2
	DSE	25XXXXXX	Discipline Elective-1 Lab	0	0	2	1	2
7	MDE	25XXXXXX	Linear Algebra and Optimization	3	0	0	3	3
8	AEC	25XXXXXX	Critical and Creative Thinking	3	1	0	4	4
1	CC	25XXXXXX	Software Engineering and Quality Assurance	3	0	0	3	3
				Total			25	27
	DSE	25XXXXXX	CA Discipline Elective A2 and Discipline Elective A2 Lab (Basket)Spl-AIML	2	0	2	3	4
	DSE	25XXXXXX	CA Discipline Elective B2 and Discipline Elective B2 Lab (Basket) - Spl-AIDS	2	0	2	3	4
SUMMER Training / Internship (6 Weeks) 0-0-8								
V SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	CC	25BC1XXXX	Machine Learning	3	0	0	3	3
2	CC	25XXXXXX	Data Communication & Networking	3	0	0	3	3
3	CCL	25BC1XXXX	Machine Learning Lab	0	0	2	1	2
4	DSE	25XXXXXX	Discipline Elective-2	2	0	0	2	2
5	DSE	25XXXXXX	Discipline Elective-3	2	0	0	2	2
6	DSE	25XXXXXX	Full Stack Developer-I	2	0	0	2	2
7	DSE	25XXXXXX	Full Stack Developer- I Lab	0	0	2	1	2
8	DSE	25XXXXXX	Discipline Elective-2 Lab	0	0	2	1	2
9	DSE	25XXXXXX	Discipline Elective-3 Lab	0	0	2	1	2
10	PRC	25XXXXXX	Summer Internship	0	0	8	4	0
11	PRC	25XXXXXX	Major Project - I	0	0	8	4	8
				Total			24	28
	DSE	25XXXXXX	CA Discipline Elective A3 and Discipline Elective A3 Lab (Basket)Spl-AIML	2	0	2	3	4
	DSE	25XXXXXX	CA Discipline Elective B3 and Discipline Elective B3 Lab (Basket)Spl-AIDS	2	0	2	3	4

VI SEMESTER								
S. No.	Category Code	Subject Code	Name of the Subjects	Course Hours			Credits	Total Hours
				L	T	P		
1	DSE	25XXXXXX	Discipline Elective-4	3	0	0	3	3
2	DSE	25XXXXXX	Discipline Elective-5	3	0	0	3	3
3	OEC	25XXXXXX	Open Elective-1	3	0	0	3	3
4	CC	25XXXXXX	Full Stack Developer-II	2	0	0	2	2
5	CCL	25XXXXXX	Full Stack Developer-II Lab	0	0	2	1	2
6	CC	25BC1CAXXX	Computer Organization and Architecture	2	0	0	2	2
7	PRC	25XXXXXX	Major Project - II	0	0	8	4	8
				Total			18	23
	DSE	25XXXXXX	CA Discipline Elective A4 (Basket)Spl-AIML	3	0	0	3	3
	DSE	25XXXXXX	CA Discipline Elective B4 (Basket)Spl-AIDS	3	0	0	3	3

Credits Summary: BCA & BCA - AIDS/AIML			
Semester		Credits (BCA - CORE)	Credits (BCA - AIDS/AIML)
I		20	20
II		20	20
III		21	24
IV		25	28
V		24	27
VI		18	21
Total		128	140

Category	Category Code	Credits	
Major Core Courses/Labs	CC/CCL	56	
Ability Enhancement Courses	AEC	9	
Multi-Disciplinary Elective course	MDE/MDEL	14	
Value added Courses	VAC	4	
Skill Enhancement Courses	SEC	12	
Discipline Specific Elective	DSE	18	
Open Elective Course	OEC	3	
Seminar/Internships/Projects	PRC	12	Total = 128
Spl – AI/ML – A	AI ML	12	Total = 140
Spl – AI/DS – B	AI DS	12	Total = 140

Department of CSE and Mathematics

Bucket Wise Tentative List of BCA Discipline Electives (To be updated time to time)

Discipline Elective – 1 and Discipline Elective – 1 Lab (offered in 4th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Data Analytics using R and Python	2	0	0	2	2
2	XXXXXXX	Data Analytics using R and Python Lab	0	0	2	2	1
3	XXXXXXX	Fundamentals of Smart Systems and IoT	2	0	0	2	2
4	XXXXXXX	Fundamentals of Smart Systems and IoT Lab	0	0	2	2	1

Discipline Elective – 2 and Discipline Elective – 2 Lab (offered in 5th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Data Mining and Data Warehousing	2	0	0	2	2
2	XXXXXXX	Data Mining and Data Warehousing Lab	0	0	2	2	1
3	XXXXXXX	Agile Software Development Process	2	0	0	2	2
4	XXXXXXX	Agile Software Development Process Lab	0	0	2	2	1
5	XXXXXXX	IoT Analytics	2	0	0	2	2
6	XXXXXXX	IoT Analytics Lab	0	0	2	2	1

Discipline Elective – 3 and Discipline Elective – 3 Lab (offered in 5th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Introduction to Blockchain Technology	2	0	0	2	2
2	XXXXXXX	Introduction to Blockchain Technology Lab	0	0	2	2	1
3	XXXXXXX	Computing for Data Science	2	0	0	2	2
4	XXXXXXX	Computing for Data Science Lab	0	0	2	2	1

Discipline Elective – 4 (offered in 6th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Information Security	3	0	0	3	3
2	XXXXXXX	Cloud Computing Essentials: Azure and AWS	3	0	0	3	3
			3	0	0	3	3
			3	0	0	3	3

Discipline Elective – 5 (offered in 6th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Machine Learning and Big Data	3	0	0	3	3
2	XXXXXXX	Fundamentals of Fog and Edge Computing	3	0	0	3	3

Open Elective -1 (Open) (offered in 6th Semester)

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Robotics	3	0	0	3	3
2	XXXXXXX	IoT	3	0	0	3	3
3	XXXXXXX		3	0	0	3	3

Bucket Wise Tentative List of Specialization Elective Courses (To be updated)

A-AI ML

B- AI DS

CA Discipline Elective A1 and Discipline Elective A1 Lab (offered in 3rd Semester) – AI ML

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXX	Multivariate Calculus in ML	3	0	0	3	3

CA Discipline Elective A2 and Discipline Elective A2 Lab (offered in 4th Semester) – AI ML

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Introduction to Data Engineering	2	0	0	2	2
2	XXXXXXX	Introduction to Data Engineering Lab	0	0	2	2	1

CA Discipline Elective A3 and Discipline Elective A3 Lab (offered in 5th Semester)– AI ML

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Search in AI	2	0	0	2	2
2	XXXXXXX	Search in AI Lab	0	0	2	2	1
3	XXXXXXX	IoT Analytics	2	0	0	2	2
4	XXXXXXX	IoT Analytics Lab	0	0	2	2	1

CA Discipline Elective A4 (offered in 6th Semester)– AI ML

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Reinforcement Learning	3	0	0	3	3
2	XXXXXXX	Cloud Computing Essentials: Azure and AWS	3	0	0	3	3

CA Discipline Elective B1 and Discipline Elective B1 Lab (offered in 3rd Semester) - AI DS

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXX	Optimization for Data Science	3	0	0	3	3

CA Discipline Elective B2 and Discipline Elective B2 Lab (offered in 4th Semester) - AI DS

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Introduction to Data Engineering	2	0	0	2	2
2	XXXXXXX	Introduction to Data Engineering Lab	0	0	2	2	1
3	XXXXXXX	Foundation of Data Science and Visualization	2	0	0	2	2
4	XXXXXXX	Foundation of Data Science and Visualization Lab	0	0	2	2	1

CA Discipline Elective B3 and Discipline Elective B3 Lab (offered in 5th Semester)- AI DS

S. No.	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Big Data Analytics	2	0	0	2	2
2	XXXXXXX	Big Data Analytics Lab	0	0	2	2	1
	XXXXXXX	Computational Data Analysis	2	0	0	2	2
	XXXXXXX	Computational Data Analysis Lab	0	0	2	2	1

CA Discipline Elective B4 (offered in 6th Semester) - AI DS

	Course Code	Course Title	L	T	P	Total	Credits
1	XXXXXXX	Reinforcement Learning	3	0	0	3	3
2	XXXXXXX	Responsible AI and AI Ethics	3	0	0	3	3
3	XXXXXXX	Statistical Analysis and Computing	3	0	0	3	3
4	XXXXXXX	Time Series Analysis and Forecasting	3	0	0	3	3

Web Technology

COURSE CODE: 25BC1CI111

COURSE CREDITS: 3

CORE/ELECTIVE: CORE

L-T-P: 3-0-0

Prerequisite: Basic computer literacy, familiarity with web browsing, foundational logic and problem-solving skills, and an interest in web development.

Course Objectives

1. To provide foundational knowledge of the Internet, the Web, and related technologies.
2. To introduce core web technologies and languages such as HTML, CSS, JavaScript, and PHP.
3. To enable students to design and develop static web pages using HTML, CSS, and JavaScript.
4. To equip students with the ability to build dynamic webpages using server-side scripting with PHP.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand the Internet, the Web, and its basic concept.	Understand (Level 2)
CO-2	Apply web languages and their components to build a basic web page.	Apply (Level 3)
CO-3	Develop static web pages using HTML, JavaScript, and CSS.	Apply (Level 3)
CO-4	Develop a dynamic web page using PHP.	Apply (Level 3)

Course Contents

Unit	Contents	Lectures required
1.	Introduction to the Internet and Web Technology: Understanding the Internet and its evolution, Overview of web browsers and web servers Distinction between static and dynamic web pages, Introduction to client-side and server-side scripting and overview of web programming languages, web protocols, and web application frameworks	8
2.	Creating HTML Pages: Understanding the structure of HTML documents, HTML tags and elements, headings, paragraphs, lists, and links, inserting images and multimedia content, Form handling and basic input element creation.	8
3.	Styling the Web Pages with CSS: Introduction to Cascading Style Sheets (CSS), CSS selectors and properties, Formatting text and backgrounds, applying layouts, and positioning elements Creating responsive designs for various devices	8
4.	Dynamic and Interactive Web Pages with JavaScript: Introduction to JavaScript and its role in web development, Variables, data types, and operators in JavaScript Control structures: loops and conditional statements, DOM manipulation for interactivity Event handling and form validation with JavaScript	8
5.	PHP and MySQL for Web Applications: Introduction to server-side scripting with PHP, Understanding PHP syntax and variables Working with forms and user input, connecting to a MySQL database, and performing basic CRUD operations Building a dynamic web application with PHP and MySQL	10

Total Lectures	42
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Suggested Textbook(s)

1. Thomas A. Powell, "The Complete Reference HTML and CSS," Tata McGraw Hill Publications.
2. Jeffrey C. Jackson, "Web Technologies: A Computer Science Perspective" Pearson, 2007.

Suggested Reference Book(s)

1. Stephen Holzner, "HTML Black Book," Dreamtech Press, 2000.
2. Rajkamal, "Internet and Web Technology," Tata McGraw Hill Education, 2017.
3. Deitel, Deitel and Goldberg, "Internet and World Wide Web How to Program," Pearson, 2003
4. Wendy Willard, "HTML Beginners Guide," Tata McGraw-Hill, 2013
5. Luke Welling and Laura Thomson, "PHP and MYSQL Web Development," Pearson Education

Online Resources

1. <https://www.w3schools.com/html/default.asp>
2. <https://www.w3schools.com/css/default.asp>
3. <https://www.w3schools.com/js/default.asp>
4. <https://www.w3schools.com/php/default.asp>

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10, Attendance – 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Web Technology	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	2	1	0	2	0	0	2	1.75
CO-2	2	2	2	3	1	0	2	2
CO-3	2	2	3	3	1	0	2	2.17
CO-4	2	2	3	3	1	1	2	2
CO-5	2	1	0	2	0	0	2	1.75
Average	2	1.75	2	2.75	0.75	0.25	2	

Digital Logic

COURSE CODE: 25BC1MA111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 2-0-0

Prerequisite: Basic knowledge of number systems, Boolean logic, computer fundamentals, and logical reasoning, with optional exposure to basic electronics and programming.

Course Objectives

1. To introduce number systems and coding schemes such as Binary, BCD, Gray, and Excess-3, along with their applications and conversions.
2. To develop an understanding of logic gates and Boolean algebra for digital logic design.
3. To enable simplification of logic expressions using Boolean identities, Karnaugh maps, and De Morgan's Theorems.
4. To provide knowledge of combinational circuits including adders, subtractors, multiplexers, encoders, decoders, and parity generators.
5. To explain the design and operation of sequential circuits such as flip-flops, shift registers, and counters.
6. To introduce memory devices, CPU design concepts, and Verilog for modeling and simulating digital systems.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Defining the basics Binary, Octal, Decimal, Hexadecimal, Conversions, BCD, Applications, Gray, Excess-3.	Remember (Level 1)
CO-2	Illustrate the various logic gates and Boolean algebra suite.	Understand (Level 2)
CO-3	Identification and description of various components, architectures of Karnaugh Maps, DE Morgan's Theorem, Boolean Algebra, Two-Level Circuits.	Understand (Level 2)
CO-4	Choose Adders, Subtractors, Multiplexers, Decoders, Encoders, Parity: Binary operations, data manipulation problems.	Apply (Level 3)
CO-5	Explain various Flip-Flops, Clocking, shift registers, and Counters: Sequential circuits, data storage, counting mechanisms.	Analyse (Level 4)
CO-6	Determine Counters, Memory, CPU Design, Verilog: Counting, data storage, processing, logic designs and evaluate it.	Evaluate (Level 5)

Course Contents

Unit	Contents	Lectures required
1.	Number System: Introduction to various number systems: Binary, Octal, Decimal, Hexadecimal, Conversion between different number systems, Binary Coded Decimal (BCD) and its applications, Gray codes and Excess-3 codes	4

2.	Boolean Algebra and Logic Gates: Basic concepts of Boolean algebra, Laws and identities of Boolean algebra, Logic gates: NOT, AND, OR, NAND, NOR, XOR, and XNOR, Universal gates: NAND and NOR, Implementation of logic gates using diodes and transistors	4
3.	Simplification of Boolean Functions: Karnaugh maps for simplification of Boolean expressions, De Morgan's Theorem and its applications, Use of Boolean algebra for logic simplification, Two-level implementations of logic circuits	4
4.	Combinational Logic with MSI and LSI: Adders and subtractors: Half adder, Full adder, half subtractor, Full subtractor, Multiplexers and demultiplexers, Decoders and encoders, Parity generation and checking	4
5.	Sequential Logic: Flip-flops: SR, D, JK, T flip-flops, Clocking in flip-flops: Clocked flip-flops, Master-slave flip-flops, Shift registers: Serial-in-serial-out, Serial-in-parallel-out, Parallel-in-serial-out, Parallel-in-parallel-out, Counters: Ripple counters, Synchronous counters, Modulo counters	4
6.	Registers and Counters: Types of counters: Ring counters, Twisted ring counters, Memory devices: RAM, ROM, PAL, PLA	4
7.	Processor Logic Design: Introduction to CPU design, Datapath and ALU design, System design using state machines, Introduction to Verilog for logic design and simulation	4
Total Lectures		28

Suggested Textbook(s):

1. Author(s): M. Morris Mano, Michael D. Ciletti, Title: Digital Design, Edition: 6th Edition Publisher: Pearson, Year of Publication: 2020
2. Author(s): Thomas L. Floyd, David M. Buchla, Title: Digital Fundamentals, Edition: 12th Edition Publisher: Pearson, Year of Publication: 2019
3. Author(s): Charles H. Roth, Jr., Larry L. Kinney, Title: Fundamentals of Logic Design Edition: 7th Edition, Publisher: Cengage Learning, Year of Publication: 2014

Suggested Reference Book(s):

1. Introduction to Switching Theory and Logic Design – Fredriac J. Hill, Gerald R. Peterson, 3rd Ed, John Wiley & Sons Inc.
2. Digital Fundamentals – A Systems Approach – Thomas L. Floyd, Pearson, 2013.
3. Switching Theory and Logic Design – Bhanu Bhaskara –Tata McGraw Hill Publication, 2012

Online Resources:

1. https://www.youtube.com/watch?v=BoIOLczVulQ&list=PLyqSpQzTE6M_dZdF7Bd-UncI5_L_1VkXF
2. <https://www.youtube.com/watch?v=oNh6V91zdPY&list=PLbRMhDVUMnge4gDT0vBWjCb3Lz0HnYKkX>

Evaluation Scheme:

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance – 5
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Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Digital Logic	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	1	1	1	2	1.57
CO-2	3	3	1	2	1	1	2	1.86
CO-3	3	3	2	2	1	1	2	2
CO-4	3	3	2	3	2	1	2	2.29
CO-5	3	3	3	3	2	2	2	2.57
Average	3	2.83	2	2.33	1.5	1.33	2.16	

Web Technology Lab

COURSE CODE: 25BC7CI172

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Course Objectives

1. To introduce the fundamentals of web development using HTML for creating static web pages.
2. To enable students to implement client-side scripting with JavaScript to enhance interactivity on web pages.
3. To familiarize students with server-side scripting basics using PHP for developing dynamic web content.
4. To equip students with skills to build full-stack web applications using PHP and MySQL for data handling and storage.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Build a webpage using HTML tags	Apply (Level 3)
CO-2	Apply client-side scripting language for a simple webpage	Apply (Level-3)
CO-3	Apply Basics of PHP for creating a webpage	Apply (Level-3)
CO-4	Build Dynamic web application with PHP and MSQL	Apply (Level-3)

Course Contents

Unit	Lab Module	Labs required
1.	Web page designing using HTML: basic structure of HTML, tags such as headings, paragraphs, formatting, images, tables, and lists with different attributes.	2
2.	Creating Cascading Style Sheets (CSS): CSS introduction, style rules, colors, backgrounds, borders, fonts, links, lists, tables, and text.	2
3.	Basic Programming in JavaScript: JS Introduction, Inclusion, Output, Variables, Data Types, Operators, Strings, and Functions	2
4.	Form Handling using JavaScript: HTML forms, client-side scripting using JavaScript	2
5.	Basics of PHP: Overview of PHP, basic commands with PHP examples	2
6.	Database handling using MySQL: Overview of MySQL, creating a database, selecting a database, listing database and table names, creating a table, inserting data, altering tables and data, deleting a database, and deleting data and tables	2

7.	Application Development: Develop dynamic web applications to solve real world problems	2
Total Labs		14

List of Experiments

S No	Description	Hours
1.	Design a basic HTML webpage using headings, paragraphs, lists, and images	2
2.	Create an HTML table with different table attributes (cell spacing, padding, borders)	2
3.	Design a personal profile webpage using lists, tables, and image tags	2
4.	Apply CSS styles to an HTML page to modify colors, fonts, borders, and background	2
5.	Create an HTML page and use internal, external, and inline CSS to style it	2
6.	Write a simple JavaScript program to display output, declare variables, and use basic operators	2
7.	Develop a JavaScript program using functions to perform arithmetic operations	2
8.	Design an HTML form and validate its fields using JavaScript (e.g., name, email, password)	2
9.	Create a basic PHP program that demonstrates variables, loops, and conditionals	2
10.	Build a PHP page to process form data submitted via POST/GET methods	2
11.	Connect PHP to MySQL and perform database creation and table insertion	2
12.	Implement a PHP-MySQL application for displaying and deleting data from a database	2
13.	Develop a mini dynamic web application like a Student Registration System or Login Page	2
14.	Create a feedback or contact form application that stores data into a MySQL database	2
Total Lab hours		28

Suggested Textbook(s):

1. Laura Lemay, Rafe Colburn, and Jennifer Kymin, Mastering HTML, CSS & JavaScript Web Publishing” (BPB Publications)
2. Thomas A. Powell, “HTML & CSS: The Complete Reference”, TMH

Suggested Reference Book(s):

1. AviSilberschatz, Henry F. Korth, and S. Sudarshan, “Database System Concepts”, 6th edition, McGrawHill, 2010.
2. Lynn Beighley & Michael Morrison, “Headfirst PHP & MySQL”, O’Reilly, 1st Edition

Online Resources

1. <https://www.w3schools.com/html/default.asp>
2. <https://www.w3schools.com/css/default.asp>
3. <https://www.w3schools.com/js/default.asp>
4. <https://www.w3schools.com/php/default.asp>

Evaluation Scheme

S. No	Exam	Coverage / Scope of Examination	Marks
1.	Mid Term Test	Viva and written exam	20
2.	End Term Test	Viva and written exam	20

3.	Lab Records		15
4.	Teacher Assessment	Quality and quantity of experiment performed, learning laboratory skills	30
5.	Attendance and discipline in lab		15
6.	Total		100

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Web Technology Lab	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	2	1	0	2	0	0	2	1.75
CO-2	2	2	2	3	1	0	2	2
CO-3	2	2	3	3	1	0	2	2.17
CO-4	2	2	3	3	1	1	2	2
CO-5	2	1	0	2	0	0	2	1.75
Average	2	1.75	2	2.75	0.75	0.25	2	

Problem Solving Technique Using C

COURSE CODE: 25BC1CI112

COURSE CREDITS: 4

CORE/ELECTIVE: SEC

L-T-P: 3-1-0

Prerequisite: Basic mathematical skills, logical reasoning, and fundamental computer literacy; no prior programming experience required.

Course Objectives

1. To develop algorithmic thinking and problem-solving skills by introducing students to the concepts of algorithms, flowcharts, and pseudocode to solve basic logical and computational problems.
2. To introduce the fundamentals of C programming, including syntax, data types, variables, control structures, and modular programming, enabling students to implement solutions for elementary problems.
3. To equip students with the knowledge of elementary numerical programming, including array operations, matrix manipulations, and basic mathematical computations, essential for engineering and scientific applications.
4. To provide a deeper understanding of advanced C programming constructs, such as structures, unions, and pointers, including their use in handling arrays and functions effectively.
5. To familiarize students with standard searching and sorting techniques, allowing them to evaluate and implement different algorithms for efficient data processing and analysis.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduce algorithmic thinking with pseudo code and flowchart to solve Problem.	Understanding Level (C2)
CO-2	Describe various data types, memory allocation schemes, arithmetic and logical operation precedence, and the need for arrays and structures.	Understanding Level (C2)
CO-3	Apply critical thinking skills to choose the appropriate data types, i.e., Array, Structures, and Union for a given problem.	Applying Level (C3)
CO-4	Implement functions with and without pointers for different problems.	Applying Level (C3)
CO-5	Compare the solutions using various searching (Linear, Binary) and sorting (Bubble, Selection, and Insertion) algorithms.	Analyzing Level (C4)

Course Contents

Unit	Contents	Lectures required
1.	Algorithmic Thinking: Introduction to Algorithmic Thinking and Problem Solving, Step by step solution to simple problems, developing logic/flow- chart/pseudo code to solve problems like simple/logical games, puzzles.	8

2.	C Programming: Introduction to C Programming syntax and semantics, data types and variables, expressions and assignments, array, simple I/O, conditional and iterative control structures, functions and parameter passing, e.g., factorial, Fibonacci, Programs for pattern generation.	12
3.	Programs for Elementary Numerical Problems: Unit conversion, Average, Sum, Min, Max of a list of numbers, Common operations with Matrix, polynomial, and polygons, Approximating the square root of a number, Finding the greatest common divisor	6
4.	Advanced C programming: Structure, Union, pointers, Pointer arithmetic, handling 1 D and 2 D array using its pointer notation, sending these in function.	10
5.	Searching and Sorting Techniques: Linear and binary search, Insertion, Selection, and Bubble sort.	6
Total Lectures		42

Suggested TextBook(s)

1. Deitel, Paul; Deitel, Harvey, C: How to Program (8 Edition.). Pearson. ISBN 978-0133976892, 2015.
2. Perry, Greg; Miller, Dean, C Programming: Absolute Beginner's Guide (3 ed.). Que. ISBN 978-0789751980, 2013.
3. C Programming: The Definitive Beginner's Reference, Harry H. Chaudhary, First MIT-Createspace-Inc, 2014.
4. Programming in ANSI C, E Balagurusamy, 8th Edition, Mc Graw Hill 2019,
5. Stroustrup, Bjarne, The C++ Programming Language (Fourth ed.). Addison-Wesley. ISBN 978-0-321-56384- 2, 2013.

Suggested Reference Book(s)

1. David Griffiths, and Dawn Griffiths “Head First C 1/e Edition”, O’Reilly Publication, 2012.
2. D. S. Malik, “C++ Programming: From Problem Analysis to Program Design, 6th Edition, Course Technology, Cengage Learning, 2012
3. Peter Prinz, Tony Crawford, “C in a Nutshell, 2nd Edition, O’Reilly , 2016.
4. Mittal, Mandeep, & Porwal, Shardha, “C Programming”, Alpha Science International Limited, 2016.

Online Resources

1. https://www.youtube.com/watch?v=t9WKOcRB63Q&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1
2. https://ocw.mit.edu/courses/6-s096-effective-programming-in-c-and-c-january-iap-2014/resources/mit6_s096iap14_lecture1/

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus

4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5
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Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Problem Solving Technique Using C	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	3	2	2	2	1	2	2.14
CO-2	3	2	2	2	1	1	2	1.86
CO-3	3	3	2	2	1	1	2	2
CO-4	3	2	2	3	1	1	2	2
CO-5	3	3	2	3	2	1	2	2.29
Average	3	2.6	2	2.4	1.4	1	2	

Fundamentals of Mathematics

COURSE CODE: 25B11MA111

COURSE CREDITS: 3

CORE/ELECTIVE: MDE

L-T-P: 2-1-0

Prerequisite: Basic computer literacy, familiarity with web browsing, foundational logic and problem-solving skills, and an interest in web development.

Course Objectives

1. To introduce the basic principles of set theory and foundational mathematical logic.
2. To develop an understanding of relations, functions, and their properties, including the basics of calculus for single-variable functions.
3. To provide knowledge of matrices, determinants, and eigen concepts essential for linear algebra applications.
4. To equip students with the skills to apply differential and integral calculus to solve real-world mathematical problems.
5. To enable the application of matrix theory for solving systems of linear equations.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Recall the basics of set theory.	Remembering Level (C1)
CO-2	Explain the concepts of relations and functions, calculus of functions of one variable, matrices and determinants, eigenvalues and eigenvectors.	Understanding Level (C2)
CO-3	Solve problems related to differential and integral calculus.	Applying Level (C3)
CO-4	Apply the theory of matrices and determinants to solve a system of linear equations.	Applying Level (C3)

Course Contents

Unit	Contents	Lectures required
1.	Sets, Relations and Functions: Sets and their representation. Union, intersection, and complement. Mapping or function. One-to-one, onto mappings, inverse and composite mappings. Relations, and their representation, types of relations, and equivalence relation.	10
2.	Differential Calculus: Basic concept of limit and continuity. Derivative. Rules of differentiation. Tangent to a curve. Taylor's series. Maxima and minima.	10
3.	Basics of Integral Calculus: Fundamental theorem of calculus (statement only). Integrals of elementary functions. Definite integral as a limit of sum. Properties of definite integrals.	10
4.	Matrices: Algebra of matrices. Determinant of a square matrix. Row echelon form. Linear dependence and independence. Rank of a matrix, solution of system of equations, Gauss elimination method. Eigenvalues and	12

	eigenvectors.	
Total Lectures		42

Suggested Textbook(s)

1. E. Kreyszig, Advanced Engineering Mathematics, 10th Ed., John Wiley, 2015.
2. Mathematics Textbooks for Class XI, XII, NCERT, 2019.

Suggested Reference Book(s)

1. J. Hass, C. Heil, M.D. Weir, Thomas Calculus, 14th Ed., Pearson Education, 2018.
2. R.K. Jain, S.R.K. Iyenger, Advanced Engineering Mathematics, 5th edition, Alpha Science
3. International, 2016.
4. H. Anton and C. Rorres, Elementary Linear Algebra, 11th Ed., Wiley, 2016.

Online Resources

1. <https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5>
2. <https://www.youtube.com/watch?v=zhKu0lQW0a8&list=PLFW6lRTa1g83LYdhDkUQfkXs7EbMBwYuF>

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance – 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Fundamentals of Mathematics	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	1	0	0	0	0	2	0.86
CO-2	3	2	0	0	1	0	2	1.14
CO-3	3	3	1	1	1	0	2	1.57
CO-4	3	3	1	1	1	0	2	1.57
Average	3	2	0.5	0.5	0.75	0	2	

English

COURSE CODE: 25B11HS111

COURSE CREDITS: 2

CORE/ELECTIVE:

CORE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. The student will be able to analyze communication situations and audiences to make choices about the most effective and efficient way to communicate and deliver messages.
2. The student will learn to deliver effective presentations in contexts that may require PowerPoint, extemporaneous or impromptu oral presentations
3. The student will learn to write grammatically correct business documents using appropriate business style.
4. The student will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
5. Students will develop command over their language and synchronize their thoughts into written form.

Course Outcomes:

S.No.	Course Outcomes	Level of Attainment
CO-1	Understand and learn the concepts of better and effective communication	Familiarity
CO-2	Learn the basics of business etiquettes, values and personal goal setting	Familiarity
CO-3	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Assessment
CO-4	Help make communication stronger by learning the nature and mechanics of effective writing.	Assessment
CO-5	Learn the different formats of business writing with correct knowledge of grammar.	Usage
CO-6	Develop command over language, using techniques of vocabulary building and identifying common errors, redundancies and grammatical syntax.	Usage

Course Contents:

Unit	Contents	Lectures required
1.	Concept and Nature of Communication: What is communication? Stage of communication. Ideation, encoding, transmission, decoding & response Channels of communication. Communication in organizational settings Etiquettes in social and Office settings. Work culture in Jobs Barriers to effective communication. Guidelines to overcome communication barriers	4
2.	Self-Development and Assessment: Self-Assessment, Awareness, Personal goal Setting	2
3.	Effective presentation: Pre- presentation jitters. Preparation and practice Delivering the presentation. Qualities of a skillful presenter. Capturing and maintaining attention. Handling questions Power point presentations	4
4.	Nature and Mechanics of Writing (Basic Writing Skills): Technique for writing precisely: Defining. Describing, Classifying. Use of Phrase and Clauses in sentences Importance of Proper Punctuation. Organizing Principles of Paragraphs in documents	5
5.	Technical Writing: Importance, structure and drafting and revising o Technical Reports. Technical writing style and Language. Business writing: Letters, Preparing resume, notices, agenda and minutes of meeting , Daily Dairy entry	6
6.	Vocabulary Development: Word Formation. Derivatives: Prefixes & Suffixes. Root words. Synonyms, Antonyms, Homophones and Homonyms One word substitution	2
7.	Grammar and Usage: Subject-Verb Agreement. Noun-Pronoun Agreement. Prepositions, Articles	3
8.	Identifying Common errors in writing: Redundancies, Clichés, Misplace modifiers, words often confused and misused	2
Total lectures		42

Suggested Text Book(s):

1. Practical English Usage. Michael Swan. OUP.1995.
2. Remedial English Grammar. F.T. Wood. Macmillan. 2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001.
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press. 2006
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. OUP
6. A Communicative Grammar of English. 3rd Edn. G. Leech and J. Svartvik. 2012
7. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.
8. Murphy, Herta A., Herbert Hildebrandt, Jane Thomas (2008) Effective Business Communication 7th Ed. New Delhi:Tata Mcgraw Hill Education Private Limited.
9. Guffey, M. A. (2000) Business Communication: Product & Process South-Western College Publishing.

Suggested Reference Book(s):

1. Lesikar, R. V., Flatley, M.E., Rentz, K. & Pande, N. (2009) Business communication 11th Ed. New Delhi: Mc Graw Hill.
2. Communication Skills. Sanjay Kumar and Pushp Lata. OUP. 2011.
3. Williams, K., Krizan, A. C., Logan, J. & Merrier, P. (2011) Business Communicating in Business 8th Ed. New Delhi: Cengage Learning.

Evaluation Scheme:

S. No.	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour	Syllabus covered upto T-1
2	T-2	25	1.5 Hours	Syllabus covered upto T-2
3	T-3	35	2 Hours	Entire Syllabus
4	Teaching Assessment	25	Entire Semester	Etiquettes in Social and Office Settings (5) Self Development and Assessment (8) Notice and letter Writing/Report Writing (12)

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes (English and Technical Communi	PO-1	
	PO-2	
	PO-3	
	PO-4	
	PO-5	
	PO-6	
	PO-7	
	PO-8	
	PO-9	
	PO-10	
	PO-11	
	PO-12	
	Average	

cation)													
CO-1	1	3	3	3	1	2	3	3	3	3	1	3	2.4
CO-2	1	2	3	2	1	1	2	3	3	3	1	3	2.0
CO-3	1	2	3	2	2	2	1	2	3	3	1	3	2.0
CO-4	1	1	2	3	2	1	1	3	2	3	1	3	1.9
CO-5	1	2	3	2	2	2	1	3	2	3	1	3	2.0
CO-6	1	2	2	2	2	2	1	3	2	3	1	3	2
Average	1	2	2.6	2.3	1.6	1.6	1.5	2.8	2.5	3	1	3	

English Lab

COURSE CODE: 25B11HS111

COURSE CREDITS: 1

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. The students will learn to speak and write grammatically correct sentences with the ability to express thoughts with clarity and accuracy.
2. The students will learn the rules of grammar in writing. It will enhance their ability to use logical sequencing while writing any business letter or document.
3. The students will learn using new words and build their vocabulary steadily and systematically by following the exercises.
4. Students will develop command over their language and synchronize their thoughts while writing different types and kinds of Business letters.
5. Students will be groomed to develop the art of speaking logically, confidently and pragmatically which involves understanding work ethics and manners and the correct use of body language.

Course Outcomes:

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand and sharpen writing skills using correct grammar in emails, Business letters and Report writing.	Usage and Assessment
CO-2	Learn the basics of successful job applications.	Usage and Assessment
CO-3	Help make communication stronger by learning nonverbal cues and correct Body Language.	Familiarity and Assessment
CO-4	Enable students to prepare better Power Point Presentations with clarity of expression and appropriate language.	Familiarity and Assessment
CO-5	Develop advanced vocabulary by learning to use different ways of word construction and strategies of learning new words.	Usage and Assessment
CO-6	Learn about the ethics of writing and different types of formats in documents with command over language.	Usage and Assessment

List of Exercises

Subject Code	25B11HS111	Semester	1
Subject Name	English Lab		
Credits	01	Contact Hours	14

Faculty (Names)	Coordinator(s)	1. Dr. Deler Singh
	Teacher(s) (Alphabetically)	2. Dr. Atul Kumar Singh

Lab Exercise No.	Subtitle of the Module	Topics	Hours
1.	Essays: For and Against Software: Practical Writing	What will I learn? Stages of writing Brainstorming (1) Brainstorming (2) Planning your essay (1) Choosing a style Quick quiz: the Writing Process	1
2.	Job Applications: Your Online Profile Software: Practical	What will I learn? Your online profile: overview	1

	Writing	What does a profile look like The structure of a profile Proofreading: grammar Spell checking Writing focus: punctuation marks Practise proofreading Quick quiz: your personal profile	
3.	Official Letters Software: Practical Writing	What will I learn in this unit? Official letters: layout Official letters: vocabulary Build up an official letter Letters: style The cover letter: job applications Letters: proofreading Present perfect or simple past? Quick quiz: letters	1
4.	Emails: Asking for Information (I) Software: Practical Writing	What will I learn? Emails: an overview Emails: structure Finding functional language (study sheet) Asking people to do things Enquiries and Responses	1
5.	Emails: Asking for Information (II) Software: Practical Writing	Functional language for emails Emails: Correcting mistakes Write two emails (on PC note pad) Vocab Focus Quick quiz: Email basics	1

6.	Use of Body Language	This exercise will include showing a couple of videos to the students on the use of Body Language in communication and also how to interpret other people's body language when they communicate. This will include studying facial expressions, gestures, non- verbal cues and eye contact.	1
7.	A Short Report: Graphs (I) Software: Practical Writing	What will I learn in this unit? A report on graph Choosing tenses (1) Choosing tenses (2) Write a report (1) [on PC note pad] Prepositions of time (1) Describing differences (1) Quick quiz: A report on graphs	1

8.	A Short Report: Hotel and restaurants (II) Software: Practical Writing	What will I learn? Restaurant reviews: structure Vocab: Hotels and restaurants Topic sentences (1) Mixing sentences (1) Mixing sentences (2) Past or Present? Write two reviews (Any one of the two on PC note pad) Quick quiz: a short report	1
9.	Use of Power point presentation	This exercise will comprise of two videos on the specifics of preparing power- point presentations; the Do's and don'ts; examples from successful business entrepreneurs' presentations.	1

10.	Vocabulary Development	Synonyms, Antonyms, Standard Abbreviations One word Substitution Homophones, Homonyms, Paronyms, Words often confused and misused Word Functioning Idiomatically Foreign Words Prefixes Suffixes (5 each on PC note pad)	1
11.	Reported Speech Software: Tense Buster	Introduction The Rule Practice: Pronouns Practice: Verbal Actions Pronunciation: Stress and Rhythm Do you understand? Vocab: Reporting verb Your test	1
12.	Essays: Descriptive Software: Practical Writing	What will I learn? Planning your essay (1) Planning your essay (2) Words and senses (1) Vocab focus: choosing precise words Linking ideas (1) Linking ideas (2) Quick quiz: descriptive essays	1

13.	Avoiding Plagiarism Ist part Software: Practical Writing Taking Notes IInd part Software: Practical Writing	What will I learn? Plagiarism: an overview Identify plagiarism Past or present? Quick quiz: plagiarism <u>Taking notes</u> What will I learn? Taking notes: the main points Taking notes: the layout Taking notes: abbreviations Quick quiz: taking notes	1
14.	Text speak Software: Practical Writing	What will I learn? Text speak: an overview Text terms (1) Text terms (2) Inviting people to do things Responding appropriately Text speak and speaking Quick quiz: text speak	1
Total			14

Methodology

The course follows a lab-based teaching-learning method with classroom discussions and activities on fundamental concepts of grammar with a strong emphasis on skill development of students with regard to speaking, writing, logically interpreting ideas into words and reasoning in the classroom. The exercises are solved by the students on the software's and the marking is automatically shown. Additionally, they are asked to draft letters and memos in their Lab files/registers after reading specimens on the software's and improve their English with choice of specific and technical words.

Evaluation

Sr. No.	Components	Total Marks
1	Proforma	10
2	Mid Term	20
3	End term	20
4	Tutorial Activities	50
	Total	100

SOFTWARE DETAIL

There are presently three softwares running in the Language Lab. These are as follows:

1. **Software Clarity S. Net 7**
2. This software supports Wireless LAN and wired LAN.

Main Functions

1. Screen Broadcast: Teacher PC can broadcast the screen, video file, flash smoothly without delay to student PC.
2. Voice Broadcast: Teacher can broadcast his voice without delay to student PC.
3. Screen Recorder: Teacher and student can record their own operations and then save in video file, which can be broadcast in any PC which has installed media player
4. Monitor: Teacher can monitor any student PC in the classroom.
5. Media Player. Teacher can broadcast all kinds media file formats, such as MPEG, DAT, MVI and so on, to student PC without delay.
6. Control Website and application: Teacher can restrict student to visit any website or application freely.
7. Teacher can remote open website on student PC.
8. Group Teaching: Teacher can divide the students into several groups, and set leader for each group to run group teaching.
9. Exam: It has strong exam functions. Teacher can know student study progress from students by using this function easily.
10. Remote Command: Teacher can remote run the program in student PC; teacher can remote start-up, turn off and restart student computer.
11. File transfer and collect the file: Teacher can transfer the file to student PC easily, and also teacher can collect the file from student PC.
12. Restrict USB: Teacher can restrict student to use USB flash memory freely.
13. Digital Recorder: It can record teacher and student voice, which can be used in language lab.

Requirements

Teacher side Requirements: CPU Core 2 E6300, 2Gbytes Memory, 256Mbytes Display Card

Student side Requirements: CPU Core 2 E4300, 1Gbytes Memory, 128Mbytes Display Card

Operating System: Support all Windows, includes Windows 8.1, 8, 7, Vista, XP and so on. Network: Wired Network 10MB/100MB/1000MB. Wireless Network 802.11n.

Overview:

Clarity English publishes programs, aimed at specific language areas in English like Grammar, Reading, Study Skills & Results Tracking. Under 'Clarity English', there are three softwares in our language lab which are Tense Buster, Practical Writing and Clear Pronunciation. The Program named Tense Buster focuses on 33 areas of Grammar through reading, listening, speaking & writing. It is one of a kind which is accepted by British Council in all its 226 teaching centres.

3. Software: Tense Buster 9.0 (3 years)

Licence Details

Tense Buster V11

Licence type: Anonymous Access

Version: International English

Number of concurrent users: 33 Start date: 2021-08-09

Expiry date: 2025-08-08

Tense Buster is an ESL (English as a second language) program which focuses on helping students improve their reading, writing, listening, speaking, vocabulary and grammar skills in 5 levels (beginner, upper intermediate, intermediate, lower intermediate, advanced).

Tense Buster covers 33 aspects of the English language through presentations, practice exercises, rules, tests and learner training tips. Students learn how to ask questions, make comparisons, and report on what they've heard, in addition to learning how to describe past, present and future events. Each unit begins with a presentation of a grammar topic based on a dialogue, a newspaper article, a radio broadcast or an extract from a story, where learners are encouraged to form theories about how the grammar works. Next comes checking questions focusing on key areas of difficulty, and a grammar rule. Students move on to practice and testing activities in which the language is contextualized and key aspects of form and function are highlighted. Each unit includes a video-based pronunciation activity relating to an aspect of the grammar. Finally, each unit includes a vocabulary session and ends by suggesting extension activities. All activities include detailed feedback.

Multimedia Authoring Kit

This kit enables the teacher to create effective exercises tailored to students' specific needs. The Tense Buster Multimedia Authoring Kit comprises a wide range of exercise types. It lets you add your own material and adapt the courses to the needs of your students. Use any one of these formats to create your own activities: drag and drop, proof reading and free practice as well as target spotting, multiple choice questions, true/false, text and gap fill.

4. Software: Practical Writing

Licence Details (3 years)

Practical Writing V11

Licence type: Anonymous Access

Version: International English

Number of concurrent users: 33 Start date: 2021-08-09

Expiry date: 2025-08-08

This cloud-based software helps in developing the writing skills of the students. It has 10 core skill development areas:

1. Essays: For and Against
2. Job Applications: your online profile
3. Emails: Asking for Information
4. A Short Report: Graphs
5. A Short Report: Hotels and Restaurants
6. Avoiding Plagiarism
7. Taking Notes
8. Essays: Descriptive
9. Textspeak
10. Official Letters

Each area deals with a separate set of exercises that are designed to master the skill set of LSRW. It entails learning about reports, cover letters, resumes, drafting business letters, textspeak, spell check etc. It covers a wide range of topics on grammar, functional language, formal and communicative language. The Lab exercises will be covered from Tense Buster and Practical Writing software. Every week the students perform the exercises and enter their auto-system-generated scores on the printed pro format.

5. Software: Clear Pronunciation 2 V11

License Details (1 year)

Clear Pronunciation 2 V11 Licence type:

Anonymous Access

Version: British English Number of
concurrent users: 33 Start date: 2021-08-09

Expiry date: 2022-08-08

This software is particularly for learning and practicing phonetics or the study of the sounds of human speech. It deals with five distinct areas:

- Consonant Clusters
- Word Stress
- Connected Speech
- Sentence stress
- Intonation

All these areas will make the students practice correct pronunciation and listen to their own recorded voices and make improvement

Digital Technologies

COURSE CODE: 25BC1CI113

COURSE CREDITS: 2

CORE/ELECTIVE: VAC

L-T-P: 2-0-0

Prerequisite: Basic computer literacy, foundational math and logic skills, English comprehension, and an interest in technology.

Course Objectives

1. Introduce foundational concepts of digital technologies, including hardware, software, and emerging trends.
2. Provide an overview of modern computing technologies, such as Artificial Intelligence (AI), Machine Learning (ML), Big Data, Cloud Computing, Internet of Things (IoT), and Augmented/Virtual Reality (AR/VR).
3. Develop awareness of how digital tools and platforms work and their applications in real-world scenarios.
4. Equip students with the ability to select and apply appropriate digital technologies to solve basic real-life problems.
5. Foster analytical and problem-solving skills through practical, project-based learning approaches.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Understand computer hardware and software basics.	Understand (Level 2)
CO-2	Understand the concepts of various digital technologies.	Understand (Level 2)
CO-3	Explore contemporary tools and frameworks for digital technologies.	Understand (Level 2)
CO-4	Apply digital technologies for a given problem.	Apply (Level 3)
CO-5	Analyse a given problem to choose appropriate digital technology.	Analyse (Level 4)

Course Contents

Unit	Contents	Lectures required
1.	Computer Basics: Introduction, Components, Types of Computers, Number Systems, and Base Conversions	3
2.	Software Fundamentals: Introduction, System Software, Operating System, Application Software and its types, Algorithms, Flowchart, and Pseudocode	3
3.	Artificial Intelligence and Machine Learning: Introduction to AI, ML Fundamentals, ML Algorithms (Classification and Clustering), Training and Evaluation, Applications	5
4.	Data Analytics and Big Data: Introduction, Data Collection and Preprocessing, Exploratory Data Analysis, Data Analytics Techniques, Data Visualization Techniques, Data Storage and Management, Big Data Technologies and Ecosystem, Applications, and Future Trends	5

5.	Cloud, Fog, and Edge Computing: Introduction to Cloud, Fog, and Edge Computing, Cloud Service and Deployment Models, Use Cases and Applications, Cloud Computing Tools, Real-World Implementation, and Case Studies	4
6.	Internet of Things: Introduction, Features, Advantages, and Disadvantages IoT Devices, IoT Framework, IoT Applications, IoT Development Kit	4
7.	Augmented Reality and Virtual Reality, UI, UX: Introduction to Augmented Reality and Virtual Reality, UI and UX Design for AR and VR, Designing Interactions and Gestures in AR and VR, AR and VR Accessibility and Inclusivity, Design Challenges and Future Trends in AR and VR	4
Total Lectures		28

Suggested Textbook(s)

1. Rajaraman, V., and Neeharika Adabala. Fundamentals of computers. PHI Learning Pvt. Ltd., 2014.
2. Foster Provost and Tom Fawcett. Data Science for Business. O'Reilly Media, Inc, 2013.
3. Hyatt Saleh. Machine Learning Fundamentals. Packt Publishing, 2018.
4. Vecchiola, Christian., Selvi, S.Thamarai., Buyya, Rajkumar. Mastering Cloud Computing: Foundations and Applications Programming. Netherlands, Elsevier Science, 2013.

Suggested Reference Book(s)

1. Erin Pangilinan, Steve Lukas, Vasanth Mohan, Creating Augmented and Virtual Realities, O'Reilly Media, Inc.
2. Vijay Madiseti, Arshdeep Bahga, Internet of Things, "A Hands-on Approach", University Press, 2015.

Online Resources

1. https://www.youtube.com/watch?v=UF67Lc4YfrA&list=PLQsHvm_Zx66bbwJmTUMH01KwyiFr0jujg
2. <https://www.youtube.com/watch?v=m7R8aJg5esw&list=PLyqSpQzTE6M94dXgPKwm1oKrpM0igmT-7>
3. <https://www.youtube.com/watch?v=NzZXz3fJf6o&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J>

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Digital Technologies	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	1	0	2	1.57
CO-2	3	2	1	2	1	0	2	1.57
CO-3	2	2	2	3	1	1	2	1.86
CO-4	2	3	3	3	2	2	2	2.43
CO-5	2	3	3	3	2	1	3	2.43
Average	2.4	2.4	2	2.6	1.4	0.8	2.2	

Environmental Science

COURSE CODE: 25B11GE111

COURSE CREDITS: 2

CORE/ELECTIVE: CORE

L-T-P: 2-0-0

Pre-requisite: None

Course Objectives:

1. Identify environmental problems arising due to engineering and technological activities and the science behind those problems.
2. Estimate the population- economic growth, energy requirement and demand.
3. Analyze material balance for different environmental systems
4. Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
5. Identify the major pollutants and abatement devices for environmental management and sustainable development.
6. Recognizing the major concepts of environmental studies, developing problem solving ability, forecasting the global climate change

Course Outcomes

S.No.	Course Outcomes	Level of Attainment
CO-1	Introducing basic concept of environmental studies, interdisciplinary nature and scope of the subject	Familiarity
CO-2	Understanding ecosystem services and its functioning as well as equitable use of natural resources.	Assessment
CO-3	Understanding Pollution, A threat to the environment and finding its solutions, Pollutant sampling and monitoring of samples.	Assessment
CO-4	Correlating the concept of Biodiversity and its importance to human mankind	Usage
CO-5	Understanding social issues and their impact on environment.	Usage
CO-6	Role of Information Technology in environment and human health	Usage

Course Contents

Unit	Contents	Lectures required
1.	Unit 1: Multidisciplinary nature of environmental studies: The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles.	3

2.	Unit 2: Natural resources, their consumption & Protection: Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.	4
3.	Unit 3: Pollution- a threat to environment: Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains	4
4.	Unit 4: Environmental standards & Quality: Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems. Green Chemistry and its applications	3
5.	Unit 5: Biodiversity and its conservation: Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity	4
6.	Unit 6: Social Issues and the Environment: Waste land reclamation, consumerism and waste products, eco-consumerism, dematerialization, green technologies, eco-tourism. Water conservation, rain water harvesting, watershed management. Environment protection act, Air (prevention and control of pollution) act; Water (prevention and control of pollution) act, Wildlife protection act, Forest conservation act, Issues involved in enforcement of environmental legislation National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities.	4
7.	Unit 7: Human Population and the environment: Population growth, variation among nations. Population explosion—Family Welfare Programme. Environment and human health. Human rights. Value education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in environment and human health. Case Studies.	4
8.	Unit 8: Field work: Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	4
Total lectures		30

Suggested Text Book(s)

1. Environmental Studies By: M. P. Poonia and S.C. Sharma, Khanna Publishers
2. Textbook of Environmental Studies for UG Courses –ErachBharucha, University Press
3. Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India.

Suggested Reference Book(s)

1. Nebel, B.J. & Wright, R.T., 1993, Environmental Science, 8th Edition, Prentice

Hall, USA.

- Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6th ed. Jones &BarlettPublishers.
- David Laurance. 2003. Environment Impact assessment, Wiley publications.
- Chhokar KB, Pandya M & Raghunathan M. 2004. Understanding Environment. Sage publications, NewDelhi.

Other useful resource(s)

- Issues of the journal: Down to Earth, published by Centre for Science and Environment.
- Audio visuals from: Discovery, National Geographic etc.
- Rachel Carson 1960. Silent springs

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1	T-1	15	1 Hour.	Syllabus covered up to T-1
2	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2)-10 Attendance -5

Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes (Environmental Science)	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	2	2	2	2	2	1	1	1	2	2	2	2	1.8
CO-2	2	3	3	3	3	1	1	1	2	2	1	2	2.0
CO-3	2	2	2	2	3	1	1	1	2	2	1	2	1.8
CO-4	2	3	3	3	2	1	1	1	2	3	2	2	2.1
CO-5	2	3	3	2	2	1	1	1	1	1	3	2	1.8
CO-6	2	2	2	2	1	1	1	2	2	2	2	2	1.8
Average	2.0	2.5	2.5	2.3	2.2	1	1	1.2	1.8	2.0	1.8	2	

Problem Solving Technique Using C Lab

COURSE CODE: 25BC7CI171

COURSE CREDITS:1

CORE/ELECTIVE: SEC

L-T-P: 0-0-2

Prerequisite: a foundation in basic computer fundamentals and programming principles.

Course Objectives

1. To introduce algorithmic and logical thinking through pseudocode and flowcharts for structured problem-solving.
2. To familiarize students with the syntax and semantics of the C programming language, including data types, operators, control structures, arrays, and structures.
3. To develop the ability to choose appropriate data structures such as arrays, structures, and unions for solving computational problems.
4. To enable students to implement modular programming concepts using functions with and without pointers.
5. To provide hands-on experience in applying searching and sorting algorithms for real-time problem-solving and efficiency comparison.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Introduce algorithmic thinking with pseudo code to solve Problem. Describe various data types, memory allocation schemes, arithmetic and logical operation precedence, and the need for arrays and structures. Introduce algorithmic thinking with pseudocode and flowchart to solve problems.	Understanding Level (C2)
CO-2	Represent and draw the flowchart and compose the high-level code for various problems. Describe various data types, memory allocation schemes, arithmetic and logical operator precedence, and the need for arrays and structures.	Understanding Level (C2)
CO-3	Apply critical thinking skills to choose the appropriate data types, i.e., Array, Structures, and Union for a given problem.	Applying Level (C3)
CO-4	Implement functions with and without pointers for different problems.	Applying Level (C3)
CO-5	Compare the solutions using various searching (Linear, Binary) and sorting (Bubble, Selection, and Insertion) algorithms.	Applying Level (C3)

Course Contents

Unit	Lab Module	Labs required
1.	Flow chart and Logic Building: Developing logic/flow-chart/pseudocode to solve problems, simple/logical games, puzzles.	2
2.	Data Type, Statements, Expressions, Operators: Data, variables and constants, data types, operators – binary, unary, ternary, operator precedence, associativity	2

3.	Array and String: Array initialization, reading and writing operations with array, one dimensional, two-dimensional array, strings, and related operations like addition, multiplication, traversal, transpose etc.	2
4.	Functions: User defined functions and inbuilt functions, Functions definition, declaration, calling, Pass by value, functions with array.	2
5.	Structures and Union: Struct keyword, Structure and Union, Structure variable, dot operator, arrow operator, Array of Structures, structure using functions.	2
6.	Pointers searching and sorting techniques: Pointers in C, 1D/2D array and structures, Arithmetical operations on pointers, implement searching and sorting techniques.	4
Total Labs		14

List of Experiments

S. No.	Description	Hours
1.	Draw a flowchart or write pseudocode to find the largest of three numbers	2
2.	Develop a C program for a number guessing game or simple puzzle using conditional logic	2
3.	Write a program to demonstrate all data types and perform operations using arithmetic, relational, and logical operators	2
4.	Write a program to demonstrate the use of operator precedence and associativity	2
5.	Write a program to perform insertion, deletion, and traversal in a one-dimensional array	2
6.	Write a program to perform matrix addition and multiplication using two-dimensional arrays	2
7.	Write a program to perform string operations like copy, concatenate, compare without using library functions	2
8.	Write a program using user-defined functions to calculate factorial or check for prime	2
9.	Write a program to demonstrate passing arrays to functions	2
10.	Write a program to declare and use structures to store and display student details	2
11.	Write a program using array of structures to manage employee data	2
12.	Write a program to demonstrate the use of unions vs structures	2
13.	Write a program using pointers to access array elements and perform arithmetic	2
14.	Implement Linear Search and Binary Search using pointers	2
Total Lab hours		28

Suggested TextBook(s)

1. Deitel, Paul; Deitel, Harvey, C: How to Program (8 Edition.). Pearson. ISBN 978-0133976892, 2015.
2. Perry, Greg; Miller, Dean, C Programming: Absolute Beginner's Guide (3 ed.). Que. ISBN 978-0789751980, 2013.
3. C Programming: The Definitive Beginner's Reference, Harry H. Chaudhary, First MIT-Createspace-Inc, 2014.
4. Programming in ANSI C, E Balagurusamy, 8th Edition, Mc Graw Hill 2019,
5. Stroustrup, Bjarne, The C++ Programming Language (Fourth ed.). Addison-Wesley. ISBN 978-0-321-56384- 2, 2013.

Suggested Reference Book(s)

1. David Griffiths, and Dawn Griffiths “Head First C 1/e Edition”, O’Reilly Publication, 2012.
2. D. S. Malik, “C++ Programming: From Problem Analysis to Program Design, 6th Edition, Course Technology, Cengage Learning, 2012
3. Peter Prinz, Tony Crawford, “C in a Nutshell, 2nd Edition, O’Reilly, 2016.
4. Mittal, Mandeep, & Porwal, Shardha, “C Programming”, Alpha Science International Limited, 2016

Online Resources

1. https://www.youtube.com/watch?v=t9WKOcRB63Q&list=PLJ5C_6qdAvBFzL9su5J-FX8x80BMhkPy1
2. https://ocw.mit.edu/courses/6-s096-effective-programming-in-c-and-c-january-iap-2014/resources/mit6_s096iap14_lecture1/

Evaluation Scheme

S. No	Exam	Coverage / Scope of Examination	Marks
1.	Mid Term Test	Viva and written exam	20
2.	End Term Test	Viva and written exam	20
3.	Lab Records		15
4.	Teacher Assessment	Quality and quantity of experiment performed, learning laboratory skills	30
5.	Attendance and discipline in lab		15
6.	Total		100

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Problem Solving Technique Using C Lab	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	2	1	0	2	0	0	2	1.75
CO-2	2	2	2	3	1	0	2	2
CO-3	2	2	3	3	1	0	2	2.17
CO-4	2	2	3	3	1	1	2	2
CO-5	2	1	0	2	0	0	2	1.75
Average	2	1.75	2	2.75	0.75	0.25	2	

Data Structures

COURSE CODE:25BC1CI211

COURSE CREDITS: 4

CORE/ELECTIVE: CC

L-T-P: 3-1-0

Prerequisite: Basic knowledge of programming concepts, algorithms, and Python or C language is required.

Course Objectives

1. To provide fundamental knowledge of data structures – their necessity, types (linear, non-linear, and abstract data types), and memory allocation techniques (static and dynamic).
2. To develop proficiency in linear data structures such as arrays, stacks, and queues, along with their static/dynamic implementation, operations, and applications.
3. To enable students to design and implement linked list structures (singly, doubly, circular) and perform essential operations such as creation, insertion, deletion, searching, sorting, reversing, and merging.
4. To impart skills in searching, hashing, and sorting techniques including linear and binary search, hash tables with collision resolution strategies, and sorting algorithms (merge, quick, radix, bucket, count, insertion, selection, bubble).
5. To provide in-depth knowledge of non-linear data structures like trees and graphs, covering their notations, terminologies, traversals (recursive and non-recursive), and advanced structures such as AVL trees, B-trees, and binary heaps.
6. To develop problem-solving abilities by selecting appropriate data structures for real-world applications, analysing their efficiency, and applying suitable traversal and searching techniques (DFS, BFS).

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Explain the basics of data structures, their need and types viz. linear and non-linear, abstract data types.	Understand Level (Level 2)
CO-2	Build various linear data structures and their related operations to address diverse problems and applications.	Apply Level (Level 3)
CO-3	Develop various non-linear data structures and demonstrate operations like search, traverse, insertion, deletion, etc.	Apply Level (Level 3)
CO-4	Examine appropriate data structures to solve a given problem and develop an effective approach for the specified problems.	Analyse Level (Level 4)
CO-5	Appraise the most suitable data structures for solving real-world problems.	Evaluate Level (Level 5)

Course Contents

Unit	Contents	Lectures required
1.	Introduction Fundamentals of Linear and Non-Linear Data Structures, need of data structures, Memory Allocation—Static and dynamic, Introduction to Abstract Data Types.	8
2.	Linear Data Structures with Abstract Data Types Review of Arrays: One dimension, two-dimension, memory representation, address calculation, and related operations. Stack: Static and dynamic implementation, operations, applications like conversion between polish and reverse polish notations. Queue: Static and dynamic implementation, operations, types: linear, circular, doubly ended.	8
3.	Linked List Fundamentals: Linked List: Singly, Doubly, Circular, and related operations like Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.	8
4.	Searching and Sorting Searching: Review of Linear Search and Binary Search. Hashing – Hash Table, Chaining, Probing. Sorting – Merge, Quick, Radix, Bucket, and Count. Review of insertion, selection, bubble sort.	8
5.	Non-Linear Data Structures Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict. Tree Traversals (Recursive and non-recursive), Binary Search Tree and Basic Operations, Threaded Binary Tree. Balanced BST: AVL Tree, Introduction to B Tree. Priority Queue using Binary Heaps. Graphs: Notations and Terminologies, Memory Representation: Adjacency Matrix and List; Graph Traversal using DFS and BFS.	10
Total Lectures		42

Suggested Textbook(s)

1. Dinesh P. Mehta and Sartaj Sahni, Handbook of Data Structures and Applications, 2nd Ed., Chapman and Hall/CRC Computer and Information Science Series, CRC Press
2. R.F Gilberg, and B A Frouzan- “Data Structures: A Pseudocode Approach with C”, Thomson Learning, Second Edition, 2004.
3. Alfred V. Aho, J.E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Addison-Wesley Series in Computer Science and Information Processing, 1983

Suggested Reference Book(s)

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, MIT Press, 3rd Edition, 2009
2. E. Horowitz and S. Sahni, “Fundamentals of Data Structures in C”. Universities Press, Second edition, 2008.

Online Resources

1. <https://www.youtube.com/watch?v=zWg7U0OEAOE&list=PLBF3763AF2E1C572F>
2. https://www.youtube.com/watch?v=S47aSEqm_0I&list=PLD9781AC5EBC9FA16
3. https://www.youtube.com/watch?v=ZAtUyM_y7s&list=PLU14u3cNGP63EdVPNLG3ToM6LaEUuStEY

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Data Structures	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	–	–	2	1.7
CO-2	3	3	2	3	–	1	2	2.3
CO-3	3	3	2	3	–	1	2	2.3
CO-4	2	3	3	3	1	2	2	2.3
CO-5	2	3	3	2	1	2	3	2.3
Average	2.6	2.8	2.2	2.6	1	1.5	2.2	

Database Management Systems

COURSE CODE: 25BC1CI212

COURSE CREDITS: 4

CORE/ELECTIVE: CC

L-T-P: 3-1-0

Prerequisite: Basic knowledge of computer fundamentals, programming concepts, and data structures is required.

Course Objectives

1. To introduce the fundamental concepts of databases and database management systems (DBMS), including their architecture, data independence, data models, and the roles of database users and administrators.
2. To develop an understanding of the relational data model and entity–relationship (ER) modeling, enabling students to design conceptual schemas and map them to relational schemas.
3. To familiarize students with Structured Query Language (SQL) and PL/SQL, focusing on query formulation, constraints, joins, nested queries, stored procedures, triggers, and exception handling.
4. To impart knowledge of relational algebra and relational calculus for performing operations on data, and to apply normalization techniques for efficient logical database design.
5. To examine transaction management concepts such as ACID properties, concurrency control techniques, serializability, and protocols to ensure database consistency and reliability.
6. To understand the mechanisms of database recovery, backup, indexing, and storage, ensuring fault tolerance and system resilience.
7. To explore advanced database models and emerging technologies, such as NoSQL, cloud databases, graph databases, document-oriented and columnar databases, preparing students for modern database applications.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Define basic database concepts in the design of application software.	Remember (Level 1)
CO-2	Identify the data models for relevant problems and explain the basics of relational model.	Understand (Level 2)
CO-3	Implement logical database design principles like modelling and normalization, and use SQL commands for efficient query processing.	Apply (Level 3)
CO-4	Examine the usage of the concept of a database transaction and related database facilities, including concurrency control, storage and indexing, backup and recovery, and locking protocols.	Analyse (Level 4)

Course Contents

Unit	Contents	Lectures required
1.	Introduction to Databases: Overview of data, database, database management system, DBMS Architecture, Data Independence, Three Schema architecture, File system vs DBMS, Data models, Schema, Instances, Database states, Role of database, administrator, Designers and end users.	4
2.	Structured Query Language: Overview, Characteristics, Advantage of SQL- DDL, DML, DCL, SQL data type, specifying constraints, Basic SQL queries. Logical operators: BETWEEN, IN, AND, OR, NOT, ANY, ALL. Set Comparison operators, Group by and Having Clauses, Nested queries, Joins, NoSQL.	4
3.	Procedural Language: PL/SQL: Data types, Stored Procedures, Functions, Exceptions, Cursors and triggers.	4
4.	Relational database And ER Model: Entity and its types, Entity set, Notations for ER Diagram, Attributes, Keys, Relationships and its types, Mapping Constraints, Enhanced ER Diagram, Specialization and generalization. ER to relational mapping: Steps to map ER diagram to relational schema	4
5.	Relational Model: Relational Data Models: Relational model terminology domains, Attributes, Tuples, Relations, characteristics of relations, relational constraints domain constraints, key constraints and constraints on null, Relational DB schema. Codd's Rules. Relational algebra: Basic operations selection and projection. Set Theoretic operations: Union, Intersection, set difference and division (Order, Relational calculus: Domain, Tuple, Well Formed Formula, specification, quantifiers). Join operations: Inner, Outer, Left outer, Right outer, and full outer join.	5
6.	Database Design: Functional Dependencies, Armstrong's inference rule, Normalization, First Normal form, Second Normal form, Third Normal Form, BCNF, Fourth Normal Form, Fifth Normal Form.	4
7.	Transaction and Concurrency Control: Definition of Transactions, ACID properties, Schedules, Serializability, Concurrency Control, Lock-based protocols, Time-stamp based protocols.	4
8.	Database Recovery System: Failure, Backup and recovery Technique, checkpoints, rollback, Deadlock, Storage and Indexing.	4
9.	Advance Database Model: NoSQL Database, Cloud Database, Graph Database, Document and Columnar Database	4
Total Lectures		42

Suggested Textbook(s)

1. Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 6th Edition, McGraw-Hill, 2010
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.
3. Ramakrishnan, Gehrke, Database Management Systems, McGraw-Hill, 3rd Edition, Addison-Wesley, 2006.
4. Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design, Implementation and Management, 6th Edition, Pearson Education, 2015.

Suggested Reference Book(s)

1. An introduction to database systems” by Bipin C. Desai, West Publishing Company, College & School Division, 1990 - Computers - 820 pages
2. Christopher J. Date, Database Design and Relational Theory: Normal Forms and All That Jazz, 2012.
3. Rajiv Chopra, Database Management System (DBMS): A Practical Approach, 5th Edition, 2016, 682 pages.

Online Resources

1. <https://www.youtube.com/@databasemanagementsystem-i4463>
2. <https://www.youtube.com/playlist?list=PLyvBGMFYV3auVdxQ1-88ivNFpmUEy-U3M>

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Database Management Systems	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	–	–	1	1.5
CO-2	3	2	2	2	–	–	2	1.8
CO-3	3	3	3	3	1	1	2	2.4
CO-4	2	3	3	3	1	2	2	2.3
Average	2.75	2.5	2.25	2.5	1	1.5	1.75	

Python

COURSE CODE:25BC1CI213

COURSE CREDITS: 2

CORE/ELECTIVE: SEC

L-T-P: 2-0-0

Prerequisite: Basic understanding of computer fundamentals, logical reasoning, and any programming language is required.

Course Objectives

1. To introduce the fundamentals of Python programming, highlighting its popularity, versatility, and role as a modern scripting language.
2. To develop problem-solving skills using Python constructs such as variables, operators, control statements, functions, and sequences.
3. To enable effective use of Python's built-in data structures (lists, tuples, sets, dictionaries) for solving real-world problems.
4. To train students in array-oriented programming and numerical computing using NumPy, along with advanced string-handling techniques for efficient data processing.
5. To impart knowledge of file handling, exception management, and error recovery for writing reliable and robust Python programs.
6. To equip learners with skills in data visualization using Matplotlib, enabling them to present data insights through effective charts and plots.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	List and explain key reasons for Python's popularity and versatility as a scripting language.	Understanding (level 2)
CO-2	Solve practical problems using variables, assignments, control structures, functions, and sequences.	Apply (level 3)
CO-3	Utilize data structures for effective problem-solving in real-world contexts.	Apply (level 3)
CO-4	Develop efficient Python scripts using array-oriented programming with NumPy and string-handling methods.	Apply (level 3)
CO-5	Write Python scripts that address problems through file operations and exception handling techniques, also creating data visualization using Matplotlib.	Analyze (level 4)

Course Contents

Unit	Contents	Lectures required
1.	Introduction to Python: Language features Current applications of Python Reasons for increasing popularity Variables and assignment statements	1
2.	Arithmetic Operators and Assignment statements: Operators (Arithmetic, Boolean, Relational) Augmented Assignments Function print and introduction to single and double quoted Strings Triple quoted strings Getting input from user Objects and dynamic typing	1
3.	Control Statements: if, else, if...elseif, else statements while statement for statement, Nested for Loop Iterables, list and Iterators Built in range	2

	function Sequence controlled Iteration Formatted Strings Built in function range: A deeper look Using type Decimal for monetary amounts break and continue Statements	
4.	Sequences: Arrays, Lists and Tuples Arrays and basic operations on Arrays Matrix Lists, Nested List Tuples Unpacking Sequences Sequence Slicing del Statement	3
5.	Dictionaries and Sets: Introduction to Dictionaries Creating a Dictionary Iterating through a Dictionary Basic Dictionary Operations Dictionary Methods keys and values Dictionary Comparisons Dictionary Method update Dictionary Comprehensions Introduction to Sets Comparing Sets Mathematical Set Operations Mutable Set Operators and Methods Set Comprehensions	3
6.	Functions: Defining functions Random Number Python Standard Library Math Module Functions Default Parameter Values Keyword Arguments Arbitrary Argument Lists Passing Lists to Functions Sorting Lists Searching Sequences Other List Methods Simulating Stacks with Lists List Comprehensions Generator Expressions Filter, Map and Reduce Other Sequence Processing Functions Two-Dimensional Lists Methods: Functions That Belong to Objects Scope Rules import: A Deeper Look Passing Arguments to Functions: A Deeper Look Recursion Functional-Style Programming	3
7.	Array-Oriented Programming with NumPy: Creating arrays from Existing Data array Attributes Filling arrays with Specific Values Creating arrays from Ranges List vs. array Performance: Introducing %timeit array Operators NumPy Calculation Methods Universal Functions Indexing and Slicing Views: Shallow Copies Deep Copies	3
8.	Strings: A Deeper Look: Formatting Strings Presentation Types Field Widths and Alignment Numeric Formatting String's format Method Concatenating and Repeating Strings Stripping Whitespace from Strings Changing Character Case Comparison Operators for Strings Searching for Substrings Replacing Substrings Splitting and Joining Strings Characters and Character-Testing Methods Raw Strings Replacing Substrings and Splitting Strings Other Search Functions; Accessing Matches	4
9.	Files and Exceptions: Writing to a Text File: Introducing the with Statement Reading Data from a Text File Updating Text Files Serialization with JSON Additional Notes Regarding Files Handling Exceptions Division by Zero and Invalid Input try Statements Catching Multiple Exceptions in One except Clause What Exceptions Does a Function or Method Raise? What Code Should Be Placed in a try Suite? Finally, Clause Explicitly Raising an Exception Stack Unwinding and Tracebacks	4
10.	Data Visualization: Introduction to matplotlib Data visualization Types of charts Steps for creating data visualization.	4
Total Lectures		28

Suggested Textbook(s)

1. Paul Deitel and Harvey Deitel: Python for Programmers, 1st Edition, Deitel Developer Series, 2020.
2. Yashwant Kanetkar and Aditya Kanetkar: Let us Python, 6 th Edition, Worldwide Publishing, 2023
3. Allen Downey: Think Python, 2nd Edition, O'Reilly, 2015.

Suggested Reference Book(s)

1. Paul Barry: Head First Python, 3rd Edition, O'Reilly, 2023.
2. Erric Matthes: Python Crash Course, 3rd Edition, No Starch Press, 2023.

Online Resources

1. https://www.youtube.com/watch?v=9MmC_uGjBsM&list=PLyqSpQzTE6M_Fu6l8irVwXkUyC9Gwqr6
2. https://www.youtube.com/watch?v=8ndsDXohLMQ&list=PLZ2ps__7DhBb2cXAu5PevO_mzgS3Fj3Fs
3. <https://www.youtube.com/watch?v=Y3Ri2GdYfYg&list=PLqftY2uRk7oXvERQEgATSr-KzAh8WLW>

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) -10 Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Python	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	–	–	2	2
CO-2	3	3	2	3	–	1	2	2.3
CO-3	3	3	2	3	–	1	2	2.3
CO-4	3	2	3	3	1	1	2	2.1
CO-5	2	3	3	3	1	2	3	2.4
Average	2.8	2.6	2.2	2.8	1	1,25	2.2	

Data Structures Lab

COURSE CODE: 25BC7CI271

COURSE CREDITS:1

CORE/ELECTIVE: CC

L-T-P: 0-0-2

Prerequisite: a foundation in basic computer fundamentals and programming principles.

Course Objectives

1. To introduce the fundamentals of C programming and develop the ability to write programs that utilize concepts like memory allocation, pointer arithmetic, and structures.
2. To build a strong foundation in linear data structures (arrays, linked lists, stacks, and queues), including their implementation, operations, and applications in solving computational problems.
3. To develop an understanding of searching, sorting, and hashing techniques and apply them for efficient problem-solving in diverse domains.
4. To familiarize students with non-linear data structures (trees and graphs), their representations, traversals, and advanced structures (AVL trees, B-trees, heaps, etc.) for effective data organization and retrieval.
5. To enable students to analyze and evaluate the suitability of different data structures for solving real-world problems based on performance, efficiency, and context.
6. To cultivate the ability to design and implement applications by integrating appropriate data structures, thereby enhancing problem-solving and application development skills.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Demonstrate concepts of C programming language.	Apply Level (C3)
CO-2	Apply various linear data structures and their related operations to solve the real- world problems.	Apply Level (C3)
CO-3	Apply various non-linear data structures and their related operations to solve the real-world problems.	Analyze Level (C4)
CO-4	Choose appropriate data structure to solve a given problem.	Evaluate Level (C5)
CO-5	Create an application that utilizes the data structures to efficiently solve real- world problems	Create Level (C6)

Course Contents

Unit	Lab Module	Labs required
1.	Introduction Lab1: Programs based on Memory Allocation–Static and dynamic, pointer arithmetic, structures	2
2.	Linear Data Structures Lab-2: Review of Arrays: One dimension, two-dimension, memory representation, address calculation, and related operations. Lab-3-4: Linked List: Singly, Doubly, Circular, and related operations like Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.	4
3.	Abstract data types Lab-5: Stack: Static and dynamic implementation, operations, applications like conversion between polish and reverse polish notations. Lab 6: Queue: Static and dynamic implementation, operations,	2

	types: linear, circular, doubly ended.	
4.	Searching and Sorting Lab 7: Searching–Review of Linear Search and Binary Search. Hashing – Hash Table, Chaining, Probing. Lab 8: Sorting – Merge, Quick, Radix, Bucket, and Count. Review of insertion, selection, bubble sort.	2
5.	Non-Linear Data Structures Lab 9-10: Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict. Tree Traversals (Recursive and non-recursive), Binary Search Tree and Basic Operations, Threaded Binary Tree. Balanced BST: AVL Tree, B Tree. Priority Queue using Binary Heaps. Lab 11-12: Graphs: Notations and Terminologies, Memory Representation: Adjacency Matrix and List; Graph Traversal using DFS and BFS.	4
Total Labs		14

List of Experiments

S. No.	Description	Hours
1.	Programs on static and dynamic memory allocation, and demonstration of pointer arithmetic	2
2.	Programs on arrays (1D & 2D): insertion, deletion, traversal, matrix operations	2
3.	Implementation of address calculation in arrays (row-major & column-major order)	2
4.	Programs on singly linked list with insertion, deletion, and traversal	2
5.	Programs on doubly and circular linked lists with operations	2
6.	Programs on linked list applications: searching, modification, reversing, merging	2
7.	Implementation of stack (array & linked list) and applications: infix to postfix, postfix evaluation	2
8.	Implementation of queues (linear, circular, linked list, deque)	2
9.	Programs on priority queues and hashing techniques (chaining, probing)	2
10.	Implementation of searching algorithms: linear search, binary search (iterative & recursive)	2
11.	Implementation of sorting algorithms: bubble, insertion, selection	2
12.	Implementation of advanced sorting: merge sort, quick sort, radix/bucket/counting sort	2
13.	Programs on trees: creation, traversal (recursive & non-recursive), BST operations	2
14.	Programs on advanced trees and graphs: AVL tree, B-Tree, binary heap, DFS & BFS traversals	2
Total Lab hours		28

Suggested TextBook(s)

1. Deitel, Paul; Deitel, Harvey, C: How to Program (8 Edition.). Pearson. ISBN 978-0133976892, 2015.
2. Perry, Greg; Miller, Dean, C Programming: Absolute Beginner's Guide (3 ed.). Que. ISBN 978-0789751980, 2013.
3. C Programming: The Definitive Beginner's Reference, Harry H. Chaudhary, First MIT-Createspace-Inc, 2014.
4. Programming in ANSI C, E Balagurusamy, 8th Edition, Mc Graw Hill 2019,

5. Stroustrup, Bjarne, The C++ Programming Language (Fourth ed.). Addison-Wesley. ISBN 978-0-321-56384-2, 2013.

Suggested Reference Book(s)

1. David Griffiths, and Dawn Griffiths “Head First C 1/e Edition”, O’Reilly Publication, 2012.
2. D. S. Malik, “C++ Programming: From Problem Analysis to Program Design, 6th Edition, Course Technology, Cengage Learning, 2012
3. Peter Prinz, Tony Crawford, “C in a Nutshell, 2nd Edition, O’Reilly, 2016.
4. Mittal, Mandeep, & Porwal, Shardha, “C Programming”, Alpha Science International Limited, 2016

Online Resources

1. <https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F>
2. https://www.youtube.com/watch?v=S47aSEqm_0I&list=PLD9781AC5EBC9FA16
3. https://www.youtube.com/watch?v=ZA-tUyM_y7s&list=PLU14u3cNGP63EdVPNLG3ToM6LaEUuStEY

Evaluation Scheme

S. No	Exam	Coverage / Scope of Examination	Marks
1.	Mid Term Test	Viva and written exam	20
2.	End Term Test	Viva and written exam	20
3.	Lab Records		15
4.	Teacher Assessment	Quality and quantity of experiment performed, learning laboratory skills	30
5.	Attendance and discipline in lab		15
6.	Total		100

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Data Structures Lab	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	2	1	0	2	0	0	2	1.75
CO-2	2	2	2	3	1	0	2	2
CO-3	2	2	3	3	1	0	2	2.17
CO-4	2	2	3	3	1	1	2	2
CO-5	2	1	0	2	0	0	2	1.75
Average	2	1.75	2	2.75	0.75	0.25	2	

Database Management Systems Lab

COURSE CODE: 25BC7CI272

COURSE CREDITS: 1

CORE/ELECTIVE: CC

L-T-P: 0-0-2

Prerequisite: Basic knowledge of computer fundamentals, data types, and programming concepts such as variables and control structures.

Course Objectives

1. To introduce the fundamental concepts and constructs of Structured Query Language (SQL) and its role in database management.
2. To develop the ability to use Data Definition Language (DDL), Data Manipulation Language (DML), Data Control Language (DCL), and Transaction Control Language (TCL) commands for creating, modifying, and managing databases.
3. To enable students to formulate and execute simple to complex SQL queries using clauses, logical operators, aggregate functions, and subqueries for effective data retrieval and manipulation.
4. To impart knowledge of SQL joins, grouping, and set operations to handle multi-table queries and advanced query requirements.
5. To provide hands-on experience in writing stored procedures, stored functions, cursors, and triggers for solving real-world data management problems.
6. To enhance problem-solving skills by applying SQL concepts in practical case studies and projects, ensuring effective database design and management.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Discuss the basic constructs of Structured Query Language.	Understand (Level II)
CO-2	Use simple and complex queries using DDL, DML, DCL and TCL.	Apply (Level III)
CO-3	Exercise SQL Joins, Clauses, and Subqueries.	Apply (Level III)
CO-4	Practice stored procedures, stored functions, cursors, Triggers on different problem.	Apply (Level III)

Course Contents

Unit	Contents	Lectures required
1.	Introduction to MySQL commands: MySQL Create command, Data Types, Constraints, Alter, Drop, Rename Statements.	1
2.	SQL-DML: Select database, show and describe tables. DML Commands- Select, Insert, Update, Delete.	1

3.	Conditions and Logical Operators: Specifying conditions with Where keyword, AND, OR, NOT, BETWEEN, IN, NOT IN etc.	2
4.	SQL Aggregate Functions: Date and Time functions, Numeric, String, Conversion functions like Count, Min, Max, Avg, Sum etc.	2
5.	SQL Joins: Cross Join, Natural Join, Inner Join, Outer Join.	2
6.	SQL Clauses: Sorting Results (ORDER BY Clause), Grouping Results (GROUP BY Clause), ANY and ALL, Combining Result Tables (UNION, INTERSECT, EXCEPT).	2
7.	Subqueries: Basic Subqueries, multiple column subqueries, subqueries with Having and group by clause.	2
8.	Procedural Language: Write PL/SQL program for storing data using procedures. Write PL/SQL program for storing data using stored functions. Write PL/SQL program for storing data using cursors and Triggers	2
Total Labs		14

List of Experiments

S. No.	Description	Hours
1.	Programs on MySQL commands: Create database, Create table, using Data Types and Constraints; Alter, Drop, and Rename statements	2
2.	Programs on SQL DML: Selecting a database, showing and describing tables, Insert, Update, Delete, and Select commands	2
3.	Programs using conditions and logical operators: WHERE, AND, OR, NOT, BETWEEN, IN, NOT IN etc.	3
4.	Programs on SQL aggregate and built-in functions: COUNT, MIN, MAX, AVG, SUM, Date/Time, String, and Conversion functions	3
5.	Programs on SQL Joins: Cross Join, Natural Join, Inner Join, Left/Right Outer Join, Full Outer Join	3
6.	Programs on SQL Clauses: ORDER BY, GROUP BY, HAVING, ANY, ALL; combining result tables using UNION, INTERSECT, EXCEPT	3
7.	Programs on Subqueries: basic subqueries, multiple column subqueries, subqueries with HAVING and GROUP BY	3
8.	Programs in PL/SQL: writing procedures for storing and retrieving data	2
9.	Programs in PL/SQL: writing stored functions for computation and data retrieval	2
10.	Programs in PL/SQL: writing and using cursors for row-by-row processing	2
11.	Programs in PL/SQL: creating and implementing triggers (BEFORE/AFTER INSERT, UPDATE, DELETE)	3
Total Lab hours		28

Suggested Textbook(s)

1. Henry F Korth, Abraham Silberschatz, S. Sudurshan, Database system concepts, 6th Edition, McGraw-Hill, 2010
2. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.
3. Ramakrishnan, Gehrke, Database Management Systems, Mcgraw-Hill, 3rd Edition, Addison-Wesley, 2006.
4. Thomas Connolly, Carolyn Begg, Database Systems-A Practical Approach to design,

5. Implementation and Management, 6th Edition, Pearson Education, 2015.

Suggested Reference Book(s)

1. An introduction to database systems” by Bipin C. Desai, West Publishing Company, College & School Division, 1990 - Computers - 820 pages
2. Christopher J. Date, Database Design and Relational Theory: Normal Forms and All That Jazz, 2012.
3. Rajiv Chopra, Database Management System (DBMS): A Practical Approach, 5th Edition, 2016, 682 pages.

Online Resources

1. <https://www.youtube.com/playlist?list=PLyvBGMFYV3auVdxQ1-88ivNFpmUEy-U3M>
2. https://www.youtube.com/watch?v=IoL9Ve2SRwQ&list=PLIwC9bZ0rmjSkm1VRJR_OX4vP2YMif4Ebh
3. https://www.youtube.com/watch?v=OMHbGm9SQuE&list=PLZ2ps__7DhBYc4jkUk_yQAjYEVFzVzhdU

Evaluation Scheme

S. No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour	Syllabus covered up to T-1
2.	T-2	25	1.5 Hours	Syllabus covered up to T-2
3.	T-3	35	2 Hours	Entire Syllabus
4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Database Management Systems	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	–	–	1	1.5
CO-2	3	2	2	2	–	–	2	1.8
CO-3	3	3	3	3	1	1	2	2.4
CO-4	2	3	3	3	1	2	2	2.3
Average	2.75	2.5	2.25	2.5	1	1.5	1.75	

Python Lab

COURSE CODE: 25BC7CI213

COURSE CREDITS: 1

CORE/ELECTIVE: SEC

L-T-P: 0-0-2

Prerequisite: a foundation in basic computer fundamentals and programming principles.

Course Objectives

1. **To introduce** students to the fundamental features of Python as a programming language and highlight its versatility and applications.
2. **To develop** the ability to write, execute, and debug Python programs using variables, operators, control statements, and iterative constructs.
3. **To enable** students to implement and manipulate Python's built-in data structures such as lists, tuples, dictionaries, and sets.
4. **To provide** hands-on practice with modular programming using user-defined functions, recursion, and standard libraries.
5. **To train** students in array-oriented computing with NumPy for numerical problem-solving and performance optimization.
6. **To equip** students with skills in advanced programming concepts, including string manipulation, file handling, and exception handling.
7. **To enhance** students' ability to create meaningful visualizations using Python's data visualization libraries like matplotlib.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Demonstrate the use of Python fundamentals, including variables, operators, input/output statements, and string handling.	Understanding (Level 2)
CO-2	Apply conditional and iterative control structures to solve computational problems.	Applying (Level 3)
CO-3	Implement and manipulate data structures such as lists, tuples, dictionaries, and sets for problem-solving.	Applying (Level 3)
CO-4	Develop modular programs using user-defined functions, recursion, and Python standard libraries.	Applying/Analysing (Level 3–4)
CO-5	Utilize array-oriented programming with NumPy for efficient numerical computation and performance comparison with lists.	Analysing (Level 4)
CO-6	Perform advanced string manipulations, file operations, and exception handling in Python programs.	Applying/Analysing (Level 3–4)
CO-7	Design and visualize data using Python's matplotlib library for effective representation of information.	Creating (Level 6)

Course Contents

Unit	Lab Module	Labs required
1.	Introduction to Python: Language features, applications, variables and assignment statements	1
2.	Arithmetic Operators and Assignment statements, Strings (single, double, triple quotes), print(), input(), objects and dynamic typing	1
3.	Control Statements: if, else, elif, while, for, nested loops, range, break, continue, formatted strings	1
4.	Sequences: Arrays, Lists, Tuples, slicing, unpacking, nested lists, del statement	1
5.	Dictionaries and Sets: creation, operations, methods, comprehensions, set operations	1
6.	Functions: defining, parameters, recursion, standard libraries, list operations, comprehensions, functional-style programming	1
7.	Array-Oriented Programming with NumPy: creating arrays, attributes, operators, indexing, slicing, deep vs shallow copies	2
8.	Strings (advanced): formatting, searching, replacing, splitting/joining, string methods	2
9.	Files and Exceptions: text file I/O, JSON, exception handling, raising exceptions	2
10.	Data Visualization: introduction to matplotlib, creating charts (line, bar, pie, histogram etc.)	2
Total Labs		14

List of Experiments

S. No.	Description	Hours
1.	Programs on Python basics: printing messages, variables, dynamic typing, simple calculations	2
2.	Programs using arithmetic, relational, logical operators, augmented assignments, input () and string literals (single, double, triple quotes)	2
3.	Programs on control structures: if, if-else, if-elif-else with real-life examples	2
4.	Programs on iterative statements: while, for, nested loops, range (), break and continue	2
5.	Programs on sequences: list operations, slicing, nested lists, tuples, sequence unpacking	2
6.	Programs on dictionaries: creating dictionaries, accessing/updating values, iterating, dictionary methods, comprehensions	2
7.	Programs on sets: creating sets, performing union, intersection, difference, set methods, set comprehensions	2
8.	Programs on user-defined functions, recursion, keyword/variable-length arguments	2
9.	Programs on using Python Standard Libraries: math, random, list operations, searching and sorting	2
10.	Programs on array-oriented computing with NumPy: array creation, attributes, slicing, indexing, universal functions	2

11.	Programs on shallow vs deep copies, vectorized operations, performance comparison with lists using NumPy	2
12.	Programs on string manipulations: formatting, case conversion, substring search, replace, split, join	2
13.	Programs on file handling: writing to text files, reading, updating, JSON serialization, exception handling with try-except-finally	2
14.	Programs on data visualization with matplotlib: creating line, bar, pie, and histogram charts	2
Total Lab Hours		28

Suggested Textbook(s)

1. Paul Deitel and Harvey Deitel: Python for Programmers, 1st Edition, Deitel Developer Series, 2020.
2. Yashwant Kanetkar and Aditya Kanetkar: Let us Python, 6 th Edition, Worldwide Publishing, 2023
3. Allen Downey: Think Python, 2nd Edition, O'Reilly, 2015.

Suggested Reference Book(s)

1. Paul Barry: Head First Python, 3rd Edition, O'Reilly, 2023.
2. Erric Matthes: Python Crash Course, 3rd Edition, No Starch Press, 2023.

Online Resources

1. https://www.youtube.com/watch?v=9MmC_uGjBsM&list=PLyqSpQzTE6M_Fu6l8irVwXkUyC9Gwqr6
2. https://www.youtube.com/watch?v=8ndsDXohLMQ&list=PLZ2ps_7DhBb2cXAu5PevO_mzgS3Fj3Fs
3. <https://www.youtube.com/watch?v=Y3Ri2GdYfYg&list=PLqftY2uRk7oXvERQEgATSr-KzAh8WLW>

Evaluation Scheme

S. No	Exam	Coverage / Scope of Examination	Marks
1.	Mid Term Test	Viva and written exam	20
2.	End Term Test	Viva and written exam	20
3.	Lab Records		15
4.	Teacher Assessment	Quality and quantity of experiment performed, learning laboratory skills	30
5.	Attendance and discipline in lab		15
6.	Total		100

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Python Lab	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	2	1	2	1	1	2	1.71
CO-2	3	3	2	2	1	1	2	2

CO-3	3	3	2	2	1	1	2	2
CO-4	3	3	2	2	2	2	2	2.2
CO-5	3	3	2	3	1	1	3	2.2
CO-5	3	3	2	3	2	2	3	2.5
Average	3	2.8	1.8	2.3	1.3	1.3	2.3	

LIFE SKILLS & PROFESSIONAL COMMUNICATION LAB

COURSE CODE:25B17HS271

COURSE CREDITS: 0 (AUDIT)

CORE/ELECTIVE: CORE

L-T-P: 0-0-2

Pre-requisite: None

Course Objectives:

1. Improve spoken and written communication in English.
2. Develop students' interpersonal communication ability in the professional settings.
3. Learn to design effective resume and cover letter
4. Understand how to make effective and impressive presentations using digital media.
5. Develop the confidence to perform well in interviews.

Course Outcomes:

SNo	Course Outcomes	Level of Attainment
CO-1	Improved spoken and written communication in English.	Familiarity
CO-2	Develop the ability to interact effectively in the professional setting.	Familiarity
CO-3	Design a good resume and be able to update it from time to time.	Assessment and Usage
CO-4	Make effective and impressive presentations using digital media	Usage
CO-5	Develop the confidence to perform well in interviews.	Usage

Course Contents:

Unit	Contents	Lab Hours required
1	Professional Communication and CV/Resume Writing (W) (Language Lab): Introduction to CV writing, difference between a CV and a Resume, samples of good CVs/Resumes and cover letters, Drafting Resumes in Language Lab	3
2	Discover your personality (GD class) SWOC analysis and understanding your goals	2

3	Developing Writing Skills (GD Class) Discussing the nature of professional and technical writing, giving students a hands-on experience with report writing, suggesting topics for report writing, helping students improve their final reports before submission	4
5	Study Skills Success (Language Lab): Independent Learning, Critical Thinking, Working with Visuals Students will practice exercises which will enhance their self-learning, critical-thinking and visual presentation skills.	3
6	Creative and Critical Thinking Development (GD class) Topical and Case Study Group Discussion, Assertion vs Aggression	3
7	Creating a LinkedIn Profile (Language Lab) Students will create a Linked In profile and work on it to make it professional and up to the industry requirements throughout the semester.	1
8	Developing Presentation Skills (GD class) Dividing students in small groups, suggesting topics for presentation, conducting mock presentations, providing suggestions and feedback after mock presentations, conducting final presentations	5
9	Road to IELTS (Language Lab): Listening, Speaking, Reading and Writing Students will learn how to enhance their communication skills in various departments to make it at par with the global standards.	7
Note:	Report writing and Linked In profile will be a part of continuous evaluation and hence should be discussed throughout the semester.	
Total lectures		28

Evaluation Scheme:

S. No	Exam	Marks
1	PPT Presentation	20
2	Report	20
3	LinkedIn Profile	10
4	GD	10
5	Resume	10
6	Lab File	05
7	LSRW evaluation in Lab- (Continuous)	20

8	Attendance	05
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Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course outcomes	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	Average
CO-1	1	2	1	2	1	3	1	2	3	x	3	1.9
CO-2	1	2	1	2	1	3	1	3	3	x	3	2
CO-3	x	x	x	1	x	3	x	2	3	x	2	2.2
CO-4	1	2	1	2	1	3	1	3	3	x	2	1.9
CO-5	x	x	1	2	1	3	x	1	3	x	3	2
Average	1	2	1	1.8	1	3	1	2.2	3	x	2.6	2

UNIVERSAL HUMAN VALUES

COURSE CODE: 25B11HS211

COURSE CREDITS: 3

CORE/ELECTIVE: VAC

L-T-P: 2-1-0

Pre-requisite: None

Course Objectives

1. Development of a holistic perspective based on self-exploration about themselves (human beings), family, society, and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Outcomes

S. No.	Course Outcomes	Level of Attainment
CO-1	Self-Awareness, Social Awareness (family, society, nature). Sustainability in relationships and Critical thinking	Familiarity
CO-2	Introspection and self-reflection	Assessment
CO-3	Sensitive to commitment towards human values, human relationship and human society	Usage
CO-4	Developing commitment and courage	Usage

Course Contents

Unit	Contents	Lectures required
1.	Course Introduction - Need, Basic Guidelines, Content and Process for Value Education 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I 2. Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration 3. Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	6

2.	Understanding Harmony in the Human Being - Harmony in Myself! 7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' 8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility 9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 10. Understanding the characteristics and activities of 'I' and harmony in 'I' 11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.	4
3.	12. Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship 13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship 14. Understanding the meaning of Trust; Difference between intention and competence 15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship 16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals 17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	6
4.	Understanding Harmony in the Nature and Existence – Whole existence as Coexistence 18. Understanding the harmony in the Nature 19. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self regulation in nature 20. Understanding Existence as Co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	6
5.	Implications of the above Holistic Understanding of Harmony on 6 Professional Ethics 22. Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct 24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations	6
Total lectures		28

Suggested Text Book(s)

1. Text Book 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004

Suggested Reference Book(s)

1. The Story of Stuff (Book).
3. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
4. Small is Beautiful - E. F Schumacher.
5. Slow is Beautiful - Cecile Andrews
6. Economy of Permanence - J C Kumarappa
7. Bharat Mein Angreji Raj - Pandit Sunderlal
8. Rediscovering India - by Dharampal
9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
10. India Wins Freedom - Maulana Abdul Kalam Azad
11. Vivekananda - Romain Rolland (English)
12. Gandhi - Romain Rolland (English)

Evaluation Scheme

S.No	Exam	Marks	Duration	Coverage / Scope of Examination
1.	T-1	15	1 Hour.	Syllabus covered upto T-1
2.	T-2	25	1.5 Hours	Syllabus covered upto T-2
3.	T-3	35	2 Hours	Entire Syllabus
	Teaching Assessment	25	Entire Semester	Assignment (2) – 10, Quizzes (2) - 10, Attendance - 5

Course Outcomes (COs) Contribution to the Programme Outcomes (POs)

Course Outcomes Universal Human Values	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	Average
CO-1	3	3	3	3	3	3	3	3
CO-2	3	3	3	3	3	3	3	3
CO-3	3	3	3	3	3	3	3	3
CO-4	3	3	3	3	3	3	3	3
Average	3	3	3	3	3	3	3	

Discrete Computational Mathematics

COURSE CODE: 25B11MA213

COURSE CREDITS: 4

CORE/ELECTIVE: MDE

L-T-P: 3-1-0

Pre-requisite: Basic Mathematics Algebra

Course Objectives

1. To simplify and evaluate any logical expression and to express logical statements in terms of logical connectives, predicates, and quantifiers.
2. Use of various set operations, relations and functions concept to solve applied problems.
3. To solve counting problems using elementary counting techniques.
4. To learn and perform various graphs and trees terminologies, traversals & their applications.
5. Problem solving using recursion and recurrence relations, by analyzing algorithms.

Course Outcomes

S.No.	Course Outcomes	Level of Attainment
CO-1	Explain partial order relations, Hasse diagrams, lattices, and recursive functions.	Understanding (C2)
CO-2	Solve the difference equations using the generating function and Z transform.	Applying (C3)
CO-3	Explain the propositional and predicate calculus to check the validity of arguments.	Understanding (C2)
CO-4	Demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory.	Applying (C3)
CO-5	Illustrate various algebraic structures and their properties.	Understanding (C2)
CO-6	Explain the theory of formal languages and solve the related problems of automata.	Applying (C3)

Course Contents:

Unit	Contents	Lectures required
1.	Relations & Lattices: Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagrams. Lattices.	6
2.	Functions: Functions and recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform	6
3.	Propositional Calculus: Propositions-simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	6

4.	Graphs: Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg 7 problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs- Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem.	6
5.	Trees & Directed Graphs: Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. Shortest path. Linked representation of directed graphs. Binary trees.	6
6.	Algebraic Structures: Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples.	6
7.	Languages & Grammars: Strings (words) and languages, grammars, types of grammars, Finite state machines, finite state automata, regular languages and regular expressions.	6
Total lectures		42

Suggested Text Book(s):

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, TMH
2. C.L. Liu & D.P. Mohapatra, "Elements of Discrete Mathematics: A Computer Oriented Approach", 4th Edition, TMH

Suggested Reference Book(s):

1. B. Kolman, R. Busby & S.C. Ross, "Discrete Mathematical Structures", 6th Edition, Pearson Education.
2. S. Lipschutz & M. Lipson, "Discrete Mathematics", 3rd Edition, TMH.
3. J.P. Tremblay & R. S. Manohar, "Discrete Mathematical Structures with Applications to Computer Science, TMH, New York 1997.
4. Richard Hammack, "Book of Proof", 2nd Edition, VCU Mathematics Text Book Series

Other useful resource(s):

1. Link to NPTEL course contents: https://onlinecourses.nptel.ac.in/noc18_cs53/preview
2. Link to topics related to course:
 - i. <https://www.youtube.com/watch?v=xIUfkMKSB3Y>
 - ii. <https://www.youtube.com/watch?v=RMLR2JHHeWo>
 - iii. <https://www.youtube.com/watch?v=9AUCdsmBGmA>
 - iv. <https://www.youtube.com/watch?v=7cTWe9Y>

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4.	Teaching Assessment	25	Entire Semester	Assignment (2) - 10 Quizzes (2) - 10 Attendance - 5
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Course Outcomes (COs) contribution to the Programme Outcomes (POs)

Course Outcomes Discrete Computational Mathematics	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	Average
CO-1	3	3	2	1	2	2	2	1	2	3	3	2	2.2
CO-2	3	3	3	2	2	2	3	2	2	1	2	2	2.3
CO-3	3	3	2	1	1	3	3	3	3	3	1	1	2.3
CO-4	3	2	2	1	2	2	2	2	1	2	1	2	1.8
CO-5	3	2	2	1	2	3	3	2	1	3	2	1	2.1
CO-6	3	2	3	1	1	3	2	1	1	3	2	1	1.9
Average	3	2.6	2.3	1.1	1.6	2.6	2.6	1.7	1.9	2.6	2	1.4	