ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

Syllabus for BCA-AIML

Semester 1

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**Theory Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS101	Fundamentals of IT	4	0	0	4	70	30	0	100
24CS102	C Programming	4	0	0	4	70	30	0	100
24MT101	Discrete Mathematical Structure	4	0	0	4	70	30	0	100
24EN102	Business Communication	3	1	0	4	70	30	0	100
24CM101	Accounting and Financial Management	4	0	0	4	70	30	0	100
Practical									
24CS191	IT Lab	0	0	2	2	0	30	70	100
24CS192	C Programming Lab	0	0	2	2	0	30	70	100
	Total				**24**	**350**	**210**	**140**	**700**

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Detailed Syllabus

FUNDAMENTALS OF IT

Code: 24CS101

Max Marks: 70

Course Objectives: The objective of the course is to understand basic computer hardware and software components, learn operating systems, networks, and data storage concepts and develop skills in using common IT tools and applications.

UNIT I **(10 Hrs)**

Fundamentals of Computers: Definition and Characteristics of Computer System. Computer Generation from First Generation to Fifth Generation. Classifications of Computers: Micro, Mini, Mainframe and super computers.

Computer Hardware: Major Components of a digital computer, Block Diagram of a computer, Input-output devices, Description of Computer Input Units, Output Units, CPU.

Computer Memory: Memory Hierarchy, Primary Memory – RAM and its types, ROM and its types, Secondary Memory, Cache memory. Secondary Storage Devices - Hard Disk, Compact Disk, DVD, Flash memory.

UNIT II **(10 Hrs)**

Interaction with Computers: Computer Software: System software: Assemblers, Compilers, Interpreters, linkers, loaders.

Application Software: Introduction to MS Office (MS-Word, MS Power point, MS-Excel).

Operating Systems: Elementary Operating System concepts, Different types of Operating Systems.

DOS: Booting sequence; Concepts of File and Directory, Types of DOS commands.

Computer Languages: Introduction to Low-Level Languages and High-Level Languages.

UNIT III **(10 Hrs)**

Computer Number System: Positional and Non-positional number systems, Binary, Decimal, Octal and Hexadecimal Number Systems and their inter-conversion.

Binary Arithmetic: Addition, subtraction, multiplication and division. Use of complement method to represent negative binary numbers, 1's complement, 2's complement, subtraction using 1's complement and 2's complement. Introduction to Binary Coded Decimal (BCD), ASCII Codes, EBCDIC codes.

UNIT IV **(10 Hrs)**

Computer Network & Internet: Basic elements of a communication system, Data transmission modes, Data Transmission speed, Data transmission media, Digital and Analog Transmission, Network topologies, Network Types (LAN, WAN and MAN), Basics of Internet and Intranet.

Internet: Terminologies related to Internet: Protocol, Domain name, Internet Connections, IP address, URL, World Wide Web. Introduction to Client-Server Model, Search Engine, Voice over Internet Protocol (VOIP), Repeater, Bridge, Hub, Switch, Router, Gateway, Firewall, Bluetooth technology.

Advanced Trends in IT Applications: Brief Introduction to Cloud Computing, Internet of Things, Data Analytics, AI and Machine Learning.

Text Book:

1. P. K. Sinha & Priti Sinha, "Computer Fundamentals", BPB Publications, 1992.
2. Anita Goel "Computer Fundamentals", Pearson.

Reference Books:

1. B. Ram, "Computer fundamentals Architecture and Organization", New Age Intl.
2. Alex Leon & Mathews Leon, "Introduction to Computers", Vikas Publishing.
3. Norton Peter, "Introduction to Computers", 4th Ed., TMH, 2001.
4. Vikas Gupta, "Comdex Computer Kit", Wiley Dreamtech, Delhi, 2004.

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C PROGRAMMING

Code: 24CS102

Max Marks: 70

Course Objectives: The objective of the course is to learn the syntax and structure of the C programming language, develop problem-solving and logic-building skills through coding and write, compile, debug, and execute C programs.

UNIT I **(8 Hrs)**

Computer Programming: Basic Programming concepts, Modular programming and structured programming, Problem solving using Computers, Concept of flowcharts and algorithms.

Overview of C: Introduction, Importance of C, Sample C Programs, Basic structure of C programs, Programming style, Executing a C Program.

Constants, Variables and Data types: C Tokens, keywords, and identifiers, constants, variables, datatypes, declaration of variables, assigning values to variables, defining symbolic constants.

Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, increment and decrement operators, conditional operator, bitwise operators, type conversion in expressions, operator precedence and associativity.

Mathematical functions.

UNIT II **(8 Hrs)**

Input and Output statements, reading a character, writing a character, formatted input, formatted output statements.

Decision-making, Branching and Looping : Decision making with IF statement, simple IF statement, The IF-ELSE statement, nesting of IF .. ELSE statements, The ELSE -IF ladder, The switch statement, The operator, The GOTO statement, The WHILE statement, The DO statement, The FOR statement, Jumps in loops.

UNIT III **(8 Hrs)**

Arrays: One dimensional arrays, Two-dimensional arrays, Initializing arrays, Programs based on arrays such as sorting, Fibonacci sequence, Matrix operations, etc.

Handling of Characters and Strings: Declaring and initializing string variables, Reading string from terminal, Writing string to screen, Arithmetic operations on characters, Putting strings together. Comparison of two strings, Character and string handling functions.

UNIT IV **(8 Hrs)**

User defined functions: Need for user-defined functions, A multi-functional program, The form of 'C' function, Return values and their types, Calling a function, Category of functions: No arguments and no return values, Arguments but no return values, Arguments with return values, Nesting of functions, Recursion, Functions with arrays as parameters.

UNIT V **(8 Hrs)**

Structure and Union: Structure definition, Giving values to members, Structure initialization; Comparison of structure variables, Array of structures, Array within structure, Union.

Pointers: Understanding pointers, Accessing the address of variables, Declaring and initializing pointers, Accessing a variable through its pointer.

Text Book:

1. Kamthane, Programming with ANSI and Turbo C; Pearson Education 2003

Reference Books:

1. E.Balaguruswamy. : Programming in ANSI C", Tata McGraw-Hill (1998)
2. Yeshvant Kanetkar: "Let us C"
3. V.Rajaraman.: "Programming in C", PHI (EEE) (2000)
4. Rajesh Hongal : "Computer Concepts & C language"
5. Brain Kernighan & Dennis M. Ritchie "ANSI C Programming" (PHI)

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DISCRETE MATHEMATICAL STRUCTURE

Code: 24MT101

Max Marks: 70

Course Objectives: The objective of the course is to understand fundamental concepts like logic, sets, relations, and functions, apply mathematical reasoning and proof techniques and use discrete structures in computer science applications.

UNIT I **(10 Hrs)**

SETS: Sets, Subsets, Equal Sets, Universal Sets, Finite and Infinite Sets, Operations on Sets: Union, Intersection difference and Complements of Sets, Algebra of sets, Cartesian product, Simple applications.

RELATION AND FUNCTIONS: Properties of Relations, Equivalence Relation, Partial Order Relation, Composition of relations and Representation of relations using digraph and Matrix, Function: Domain and Range, onto, into and One to One Functions, Composite and Inverse Functions, Hashing functions, Recursive function.

PROPOSITIONAL LOGIC: Introduction, Proposition, First order logic, Basic logical operations, Truth tables, Tautologies, Contradictions, Algebra of Propositions, Logical implications, Logical equivalence, Predicates, Universal and existential quantifiers.

UNIT II **(10 Hrs)**

PARTIAL ORDER RELATIONS AND LATTICES: Partial Order Sets, Totally ordered set, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal elements, Greatest lower bound, least upper bound, Lattices and Algebraic Structure, Principle of Duality, Elementary Properties of Lattices, Atoms. Sub lattices, Bounded lattice, Distributed & Complemented Lattices, Isomorphic lattices. Boolean lattice.

UNIT III **(10 Hrs)**

COMBINATORICS: Introduction, Basic Counting Principles, Permutations, Permutations of things not all different, Circular Permutations, Combinations, Restricted Permutations and Combinations, Derangement, Pascal's Triangle, Binomial Theorem (only for natural Numbers).

RECURRENCE RELATIONS: Introduction, Order of Recurrence Relations, Degree of Recurrence Relations, Linear Homogeneous Recurrence Relations, Non Homogeneous Recurrence Relations, Solution of linear homogeneous and non-non homogeneous recurrence relations.

UNIT IV **(10 Hrs)**

GRAPHS: Introduction, Degree of a vertex of a graph, Handshaking Theorem, Types of Graphs, Sub graph, Matrix representation of a graph: adjacent and incidence matrices, Isomorphic graphs, Path and circuit (Floyd's and Warshall algorithms), Connected graph, Hamiltonian graph, Euler graph, Graph coloring (Vertex, Edges and Map).

Text Book:

1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021
2. Kolman, Busby and Ross, "Discrete Mathematical Structures", Pearson, 10th edition 2015
3. Babu Ram, "Discrete Mathematics", Pearson Education, 1st edition 2010

Reference Books:

1. D. S. Malik, M. K. Sen, "Discrete Mathematics" Cengage Learning, 2012
2. RB2. S.K. Sarkar "A Text Book of Discrete Mathematics" S. Chand Publications, 9th edition 2019
3. RB3. Singh J. P. "Discrete Mathematics for Undergraduates" ANE Books, 1st edition, 2013
4. RB4. Tremblay J.P. and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science" Tata McGraw Hill

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BUSINESS COMMUNICATION

Code: 24EN102
Max Marks: 70

Course Objectives: The objective of the course is to develop effective verbal and written communication skills, understand professional communication in business settings and improve interpersonal and presentation skills.

UNIT I **(10 Hrs)**

Concepts and Fundamentals: Introduction to Technical Communication, Need and importance of communication, Channel, Distinction between general and technical communication, Nature and features of technical communication, Seven Cs of communication, Types of Technical communication, Style in technical communication, Technical communication skills, Language as a tool of Communication, History of development of Technical Communication, Computer Aided Technical Communication

UNIT II **(10 Hrs)**

Oral Communication: Principles of effective oral communication, Introduction of Self and others, Greetings, Handling Telephone Calls Interviews: Meaning & Purpose, Art of interviewing, Types of interview, Interview styles, Essential, Techniques of interviewing, Guidelines for Interviewer, Guidelines for interviewee. Meetings: Definition, Kind of meetings, Agenda, Minutes of the Meeting, Advantages and disadvantages of meetings/ committees, Planning and organization of meetings. Project Presentations: Advantages & Disadvantages, Executive Summary, Charts, Distribution of time (presentation, questions & answers, summing up), Visual presentation, Guidelines for using visual aids, Electronic media (power-point presentation). The technique of conducting Group Discussion and JAM session.

UNIT III **(10 Hrs)**

Written Communication: Overview of Technical Writing: Definition and Nature of Technical Writing, Basic Principles of Technical Writing, Styles in Technical Writing.
Note – Making, Notice, E-mail Writing.
Writing Letters: Business letters, Persuasive letters- Sales letters and complaint letters, Office memorandum, Good news and bad news letters.
Report Writing: Definition & importance; categories of reports, Elements of a formal report, style and formatting in report.
Special Technical Documents Writing: Project synopsis and report writing, Scientific Article and Research Paper writing, Dissertation writing: Features, Preparation and Elements.
Proposal Writing: Purpose, Types, characteristics and structure.
Job Application: Types of application, Form & Content of an application, Drafting the application, Preparation of resume.

UNIT IV **(10 Hrs)**

Soft Skills: Business Etiquettes – Professional Personality, Workplace Protocols, Cubicle. Non-Verbal Communication: Kinesics and Proxemics, Paralanguage.
Interpersonal Skills.
Language Skills: Improving command in English, improving vocabulary, Choice of words, Common problems with verbs, Adjectives, adverbs, Pronouns, Tenses, Conjunctions, Punctuations, Prefix, Suffix, Idiomatic use of prepositions. Sentences and paragraph construction, Improve spellings, Common errors and misappropriation, Building advanced Vocabulary (Synonyms, Antonyms), Introduction to Business English.

Text Book:

1. Kavita Tyagi and Padma Misra , “Advanced Technical Communication”, PHI, 2011
2. P.D.Chaturvedi and Mukesh Chaturvedi, “Business Communication – Concepts, Cases and Applications”, Pearson, second edition.
3. Rayudu, “C. S- Communication”, Himalaya Publishing House, 1994.
4. Asha Kaul, “Business Communication”, PHI, second edition.

Reference Books:

1. Raymond Murphy, "Essential English Grammar- A self study reference and practice book for elementary students of English" , Cambridge University Press, second edition.
2. Manalo, E. & Fermin, V. (2007). Technical and Report Writing. ECC Graphics. Quezon City.
3. Kavita Tyagi and Padma Misra , "Basic Technical Communication", PHI, 2011.
4. Herta A Murphy, Herbert W Hildebrandt and Jane P Thomas, "Effective Business Communication", McGraw Hill, seventh edition.

ACCOUNTING AND FINANCIAL MANAGEMENT

Code: 24CM101

Max Marks: 70

Course Objectives: The objective of the course is to understand basic accounting principles and financial statements, analyze financial data for decision-making and learn budgeting, costing, and financial planning concepts.

UNIT I **(08 Hrs)**

Introduction – Principles – Concepts & Conventions – Double entry system of accounting – Journal – Ledger. Preparation of trial balance. Subsidiary Books with special reference to simple cash book and three column cash book.

UNIT II **(08 Hrs)**

Final accounts of sole trader: Adjusting entries, Including reserve for bad debts, Reserve for discount on debtors and creditors, Preparation of final accounts.

UNIT III **(08 Hrs)**

Introduction – Meaning, Scope, Functions of finance manager. Unit Costing: Preparation of cost sheet.

UNIT IV **(08 Hrs)**

Ratio analysis: Meaning of ratio – Advantages – disadvantages – types of ratio – usefulness – liquidity ratios – profitability ratios, Efficiency ratios, Solvency ratios.(Theoretical concepts) Funds Flow Statement: Meaning – concepts of funds flow. Cash flow statement :Meaning, Need – Simple problems on cash flow statement.

UNIT V **(08 Hrs)**

Marginal Costing: Meaning – Definition – Concepts in marginal costing – Marginal equations – P / V ratio – B.E.P – Margin of safety – Sales to earn a desired profit – Problems on above Budgetary control: Meaning – Definition – Preparation of flexible budget and cash budget.

Textbook:

1. Financial Accounting, Ashis Bhattacharya, Prentice-Hall India Publication.
2. Prasanna Chandra, Financial Management, Tata McGraw-Hill Publications

Reference Books:

1. "Book Keeping and Accountancy" Choudhari, Chopde.
2. "Cost Accounting": Choudhari, Chopde.
3. "Financial Management" Text and Problems: M.Y.Khan, P.K. Jain.
4. "Financial Management Theory & Practice" Prasanna Chandra Tata McGraw-Hill.
5. Managerial Economics & Financial Analysis, Siddiqui S.A. Siddiqui A.S. New Age.

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C PROGRAMMING LAB

(BASED ON 24CS102) C Programming:
Core Practicals (Implement minimum 8 out of 10 practical)

1. Write a program to convert temperature from Celsius to Fahrenheit by taking input from the user.
2. Write a program to find the greatest number among 3 numbers given by the user.
3. Write a program to check if a given number is a prime number or not.
4. Write a program to display the following pattern up to N rows, taking the value of N from the user:

```
1
2   3
4   5   6
7   8   9   10
```

5. Write a program to input marks of 50 students using an array and display the average marks of the class.
6. Write a program to search for a number entered by the user in a given array and display the array in ascending order.
7. Write a program to check if a string is palindrome or not.
8. Write a program to add, subtract, multiply and divide two numbers using pointers.
9. Write a program to create a structure for employees containing the following data members: Employee ID, Employee Name, Age, Address, Department and Salary. Input data for 10 employees and display the details of the employee from the employee ID given by the user.
10. Write a program to create two files with names EvenFile and OddFile. Input 20 numbers from the user and save even numbers in EvenFile and odd numbers in OddFile.

Application Based Practicals (Implement minimum 5 out of 10 practicals)

11. Write a menu driven program to construct a calculator for following arithmetic operations: addition, subtraction, multiplication, division, average and percentage.
12. Write a menu driven program to perform the following operations:
    (i) Print armstrong numbers upto N,
    (ii) Display prime numbers between 1 to N,
    (iii) Reverse of an integer
13. Write a program to convert a hexadecimal number into a binary number.
14. Write a program to calculate factorial of a number and display fibonacci series upto N terms using recursive functions.
15. Write a program to perform
    (i) matrix addition,
    (ii) matrix multiplication, and
    (iii) Matrix transpose on 2D arrays.
16. Write a program to make use of arrays with structures in the following ways:
    (i) Use array as a structure data member
    (ii) Create array of structure variables
17. Write a program to compare the contents of two files by taking names of the files through command line arguments.
18. WAP to perform I/O and make use of file positioning functions on Binary files. (using fseek, ftell, rewind functions)
19. Write a menu driven program to implement the following string operations:
    (i) Calculate length of a string
    (ii) Concatenate at the end of a given
    (iii) Copy one string to another
    (iv) Compare contents of two strings
    (v) Copy nth character string to another
20. Write a program to read time in string format and extract hours, minutes and second also check time validity

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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IT LAB

(BASED ON 24CS101) Fundamentals of IT:
Core Practicals (Implement minimum 10 out of 15 practicals)

1. To explore the System settings - Personalisation, System, Devices, Apps, Network & Internet.
2. To practice basic DOS commands like cd, md, dir, erase, cls, copy, date etc.
3. To explore Windows Explorer functionalities like create, rename, move, delete folder and files etc.
4. To practice the use of basic formatting features - Format Painter, Indentation, Line spacing, background color, find, replace, dictate commands.
5. To practice the use of Bullets, numbering, multilevel lists and use of Table Feature- Insert table with rows and columns, draw tables, excel spreadsheet and quick tables etc.
6. To practice the use of Insert Features – add picture, Chart, SmartArt, WordArt, Equation, Symbols, Header and Footer, Page Numbering etc. and the use of Design Features – Watermark, Page color, Page Border, Themes implementation etc.
7. To practice the use of Layout Features – Margins, Orientation, Size, Columns, Indent, Spacing etc.
8. To practice the use of Mail Merge Feature to generate Envelops and Labels.
9. To practice the use of Excel basic formatting features – Wrap Text, Insert and Delete (Cells, Sheet, Row or Column), Format – Cell Height, Cell Width, Hide, Un Hide Cell, Protection, Freeze and Unfreeze panes, Macros etc.
10. To practice the use of Insert Features- Pivot Table, Pivot Chart, Picture, Chart and its formatting and Design and the use of Page Layout Features- Margins, Orientation, Page Break , Background, Height and Width of Cells.
11. To practice the use of Formula Features – user defined function, pre-defined functions – Logical, Date, Time, Maths and the use of Data Manipulation Features – Sort, Filter, Advanced Filters, Whatif analysis.
12. To practice the creation of Blank presentation and Selecting Themes and the use of the basic design features – Adding New Slides, Reuse slides, Slides layout etc.
13. To practice the use of Insert Features – add pictures, screenshots, shapes, wordart, audio, video, date-time etc. and use of Design Features- Changing the theme of presentation, format background and design ideas.
14. To practice the use of Transition features to be applied on Slides content, setting sound, duration etc. and the use of Animation Features to be applied on presentation of Slide, set animation timings and rehearse etc.
15. To practice the use of Slide Show Features – Custom Slide Show, Rehearse Timing etc.

Application Based Practicals (Implement minimum 5 out of 8 practicals)

16. Create a Folder by your name in your system, store all the work done in this semester inside that folder.
17. Create your Resume using basic formatting features like : table, bullets, wordart etc.
18. Design an Invitation to Birthday Party using mail merge features send the invitation to 10 friends.
19. Write an Article for Magazine with 3 columns and hyperlink.
20. Create your own marksheet using basic formatting features.
21. Create a list of marks of 10 students create charts and pivot table.
22. Prepare a Sales summary and use features like sort, filter etc. to manipulate the data.
23. Create a Power Point Presentation on any topic of your choice using animation and transition features.

Note:

1. **In total 15 practical to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External : 70 Marks
10 Question (MCQ): 1 marks each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal : 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The average of the two scores will be considered and scaled to 15 marks for the final assessment. Additionally, 5 marks will be allotted for assignments submitted, 5 marks for attendance, and 5 marks for general proficiency, making a total of 30 internal assessment marks.

Lab

Practical: 100 Marks
External: 70 Marks
Internal:30 Marks

External (Two programs) : 70 Marks
- **Program Writing**: 10 + 10 Marks
- **Algorithm& Flowchart** : 5 + 5 Marks
- **Program Execution**: 15 + 15 Marks
- **Viva**: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
- **Record**: 5 Marks
- **Attendance**: 5 Marks
- **Program Writing**: 15 Marks
- **Program Execution**: 15 Marks
- **Viva**: 10 Marks

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Syllabus for BCA-AIML

Semester 2

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**External Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS201	Data Structure and Algorithm Using 'C'	4	0	0	4	70	30	0	100
24CS202	Database Management System	4	0	0	4	70	30	0	100
24CS203	Web Based Programming	4	0	0	4	70	30	0	100
24GN201	Human Values and Ethics	2	0	0	2	70	30	0	100
Skill Enhancement Course (SEC-1) (Choose any one)									
24CS211	Front End Design Tool Lab VB.Net	2	0	1	3	50	30	20	100
24CS212	Statistical Analysis using Excel	2	0	1	3	50	30	20	100
24CS213	Designing Lab Photoshop	2	0	1	3	50	30	20	100
Practical									
24CS291	Data Structures Using C Lab	0	0	2	2	0	30	70	100
24CS292	Database Management System Lab	0	0	2	2	0	30	70	100
24CS293	Web Technologies Lab	0	0	2	2	0	30	70	100
	Total				**21**	**330**	**210**	**160**	**700**

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Detailed Syllabus

DATA STRUCTURE AND ALGORITHM USING C

Code: 24CS201
Max Marks: 70

Course Objectives: The objective of the course is to learn fundamental data structures and their applications, implement algorithms for searching, sorting, and recursion in C and analyze algorithm efficiency and performance.

UNIT I **(14 Hrs)**
Linear Data Structures- Static: Introduction to Algorithms- Attributes, Design Techniques, Time Space Trade Off, Data Structures, Classification and Operations of Data Structures.
Arrays: Single Dimension, Two-Dimension and Introduction to Multi-Dimensional, Memory Representation, Address Calculation, Sparse Matrices- Types, Representation.
Searching and Sorting: Linear and Binary Search, Selection Sort, Bubble Sort, Insertion Sort, Merge Sort, Elementary Comparison of Searching and Sorting Algorithms.
Hashing: Hash Table, Hash Functions, and Collision Resolution.

UNIT II **(10 Hrs)**
Linear Data Structures- Dynamic
Introduction: Dynamic Memory Allocation, Dynamic Memory versus Static Memory Allocation.
Linked List Types: Singly Linked List, Doubly Linked List, Header Linked List, Circular Linked List.
Operations: Creation, Insertion, Deletion, Modification, Searching, Sorting, Reversing, and Merging.

UNIT III **(6 Hrs)**
Abstract Data Types:
Stacks: Introduction, Static and Dynamic Implementation, Operations, Applications- Evaluation and Conversion between Polish and Reverse Polish Notations.
Queues: Introduction, Static and Dynamic Implementation, Operations, Types- Linear Queue, Circular Queue, Doubly Ended Queue, Priority Queue.

UNIT IV **(10 Hrs)**
Non-Linear Data Structures:
Introduction to Graphs: Notations & Terminologies, Representation of Graphs- Adjacency Matrix, Incidence Matrix and Linked Representation.
Trees: Notations & Terminologies, Memory Representation, Binary Trees Types- Complete, Full, Strict, Expression Binary Tree, Tree Traversals (Recursive), Binary Search Tree and Basic Operations.
Introduction and Creation (Excluding Implementation): AVL Tree, Heap Tree, M- Way Tree, and B Tree.

Text Book:

1. Schaum's Outline Series, "Data Structures", TMH, Special Indian Ed., Seventeenth Reprint, 2014.
2. Y. Langsam, M. J. Augenstein and A.M. Tanenebaum, "Data Structures using C and C++", Pearson Education India, Second Edition, 2015.
3. D. Samanta, "Classic Data Structures", PHI, Second Edition, 2009.

Reference Books:

1. Ashok N kamthane "Introduction to Data Structures in C", Pearson, Third Edition, 2009.
2. E. Horowitz and S. Sahni, "Fundamentals of Data Structures in C". Universities Press, Second edition, 2008.
3. D. Malhotra and N. Malhotra, "Data Structures and Program Design using C", Laxmi Publications, Indian adapted edition from Mercury Learning and Information-USA, First edition, 2018.
4. Y. Kanetkar "Data Structures through C", BPB Publication, Third Edition, 2019.
5. R.F Gilberg, and B A Frouzan- "Data Structures: A Pseudocode Approach with C", Thomson Learning, Second Edition, 2004.
6. A. K. Rath, and A.K. Jagadev, "Data Structures and Program Design Using C", Scitech Publications, Second Edition, 2011.

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DATABASE MANAGEMENT SYSTEM

Code: 24CS202
Max Marks: 70

Course Objectives: The objective of the course is to understand database concepts, models, and architectures, design and implement relational databases using SQL and learn normalization, indexing, and transaction management.

UNIT I **(10 Hrs)**

Introduction: An overview of database management system, Characteristics of database approach, DBMS architecture, client/server, data Models, Introduction to Distributed Data processing, schema and instances, data independence.

Data Modelling using Entity Relationship Model: Basic introduction about the terminologies like Entity, Entity types, Entity set, Notation for ER diagram, Attributes and keys, Types of attributes (composite, derived and multivalued attributes) and keys (Super Key, candidate key, primary key), Relationships, Relation types, Weak entities, Enhanced E-R, Specialization and Generalization.

UNIT II **(13 Hrs)**

Introduction to SQL: Overview, Characteristics of SQL. Advantage of SQL, SQL data types and literals.
Types of SQL commands: DDL, DML, DCL. Basic SQL Queries.
Logical operators: BETWEEN, IN, AND, OR and NOT.
Null Values: Disallowing Null Values, Comparisons Using Null Values.
Integrity constraints: Primary Key, Not NULL, Unique, Check, Referential key.
Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators, Aggregate Operators: The GROUP BY and HAVING Clauses.
Joins: Inner joins, Outer Joins, Left outer, Right outer, full outer joins.
Overview of other SQL Objects: Views, Sequences, Indexes, Triggers and stored procedure.

UNIT III **(10 Hrs)**

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.
ER to relational mapping: Steps to map ER diagram to relational schema.
Data Normalization: Functional dependencies, Armstrong's inference rule, & Normalization (Up to BCNF)

UNIT IV **(7 Hrs)**

Transaction Processing: Definition of Transaction, Desirable ACID properties.
Database recovery and Database Security: System failure, Backup & recovery Techniques, Authentication, Authorization.
Overview of Query by Language, No Sql databases.

Text Book:

1. R. Elmarsi and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
2. Singh S.K., "Database System Concepts, design and application", Pearson Education [TB3] TB3.
3. Ramakrishnan and Gherke, "Database Management Systems", TMH.
4. Bipin Desai, "An Introduction to Database Systems", Galgotia Publications, 1991.

Reference Books:

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 6th Edition, McGraw Hill, 2010.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan Kaufmann Publishers, 1993.
3. A. K. Majumdar, P. Battacharya, "Database Management Systems', TMH, 2017.

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WEB BASED PROGRAMMING

Code: 24CS203
Max Marks: 70

Course Objectives: The objectives of the course is to learn basics of HTML, CSS, JavaScript, and server-side scripting, build and deploy interactive web applications and understand client-server architecture and web protocols.

UNIT I **(8 Hrs)**

Introduction: World Wide Web, Client Server computing concepts. Web Client and Web Server, Client Side and server-side Scripting Languages.
HTML Overview: Introduction to HTML, HTML Document structure tags, HTML comments, Text formatting, inserting special characters, Anchor tag, Adding images and Sound, Lists types of lists, Tables, Frames and Floating frames, Developing Forms, Image maps.

UNIT II **(12 Hrs)**

Cascading Style Sheet: Types of Style Sheets – Internal, inline and External style sheets, creating styles, link tag, CSS Properties, CSS Styling, Style Selector- Id, class name and Pseudo Class.
Bootstrap Basics: Introduction to Bootstrap, Responsive web design, Linking with Bootstrap, container class, grids, tables, images, buttons, typography classes, jumbotron, glyphicons.
Introduction to Java Script: Data Types, Control Statements, operators, dialog boxes, Built in and User Defined Functions, Objects in Java Script, Handling Events, basic validations, Document Object Model, Browser Object Model.

UNIT III **(12 Hrs)**

Introduction to web applications, Client-Side Scripting Vs Server-Side Scripting, Web Servers: Local Servers and Remote Servers, Installation Process - WAMP, LAMP, XAMPP & MAMP Server, Static website vs Dynamic website development.
Introduction to PHP: Data types, Variables, Super Global Variables, Constants, Comments, Operators and Expressions, Regular Expression, Advantages of PHP.
Control statements: Conditional Statement -if else, if elseif else, nested if, switch case, PHP Loops – for, while, do while and foreach loop.
Arrays: Indexed Array, Associate Array, Multi-dimensional Array, Array pre-defined Functions.
Functions: Defining and Calling Functions, Passing by Value and passing by references, Inbuilt Functions, variable scope, Mail function, PHP Errors
Working with Forms: Get and Post Methods, HTML form controls and PHP, State Management: Cookies, Session, Query String, Hidden Field.

UNIT IV **(8 Hrs)**

PHP Database Connectivity: Using PHP to Access a Database, Relational Databases and SQL, PHP Data Objects, MySQLi Object Interface, SQLite, MongoDB.
Introduction to MYSQL, Creating database and other operations on database, Querying a MySQL database with PHP database, Connecting to a database, Parsing of the query results, Checking data errors.

Text Book:

1. The complete reference HTML and CSS, by Thomas A powell, TMH publication.
2. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Pearson
3. Internet and World Wide Web Deitel HM, Deitel, Goldberg, Third Edition.
4. Bootstrap: Responsive Web development, Jake Spurlock, O’reilly, First Edition
5. Programming PHP: Creating Dynamic Web Pages, Kevin Tatroe. Peter Macintyre, Rasmus Lerdorf, O'Reilly, Third Edition

Reference Books:

1. HTML Black Book, Stephen Holzner, Wiley Dreamtech.
2. Rajkamal, “Web Technology”, Tata McGraw-Hill, 2001.
3. Jeffrey C. Jackson, “Web Technologies: A Computer Science Perspective”, Pearson.
4. Professional PHP Programming, Jesus Castagnetto, Harish Rawat, Sascha Schumann, Chris Scollo, Deepak Veliath - Wrox Publications.
5. PHP 5 Advanced, Larry Ullman, Peachpit Press.
6. Core PHP Programming. Leon Atkinson (Prentice Hall, ISBN 0130463469).

7. Beginning PHP5 and MySQL: From Novice to Professional, W. Jason Gilmore, 2004, Apress, ISBN: 1-893115- 51-8.

HUMAN VALUES AND ETHICS

Code: 24GN201
Max Marks: 70

Course Objectives: The objective of the course is to understand the importance of ethics and human values in life and profession, develop moral reasoning and ethical decision-making and promote responsibility, respect, and integrity.

UNIT I **(5 Hrs)**

Introduction to human values:

- Understanding the need, Basic guidelines, Process of Value Education.
- Understanding the thought-provoking issues- Continuous happiness and Prosperity.
- Right understanding- relationship and physical facilities, Choice making- choosing, Cherishing and Acting.
- Understanding values- Personal Values, Social values, Moral values and Spiritual values, Self-Exploration and Awareness leading to Self-Satisfaction; Tools for Self-Exploration.

UNIT II **(5 Hrs)**

Harmony and role of values in family, society and human relations

- Understanding harmony in the Family- the basic unit of human interaction; Understanding values in human- human relationship; Understanding harmony in the society-human relations.
- Interconnectedness and mutual fulfilment; Coexistence in nature.
- Holistic perception of harmony at all levels of existence-universal harmonious order in society.
- Visualizing a universal harmonium order in society- undivided society (Akhand Samaj), universal order (SarvabhaumVyawastha)- from family to world family.

UNIT III **(5 Hrs)**

Coexistence and role of Indian Ethos:

- Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature.
- Ethos of Vedanta; Application of Indian Ethos in organizations in management; Relevance of Ethics and Values in organizations in current times.

UNIT IV **(5 Hrs)**

Professional ethics

- Understanding about Professional Integrity, respect and equality, Privacy, Building Trusting relationships, Co-operation, Respecting the competence of other profession.
- Understanding about taking initiative, Promoting the culture of openness, Depicting loyalty towards goals and objectives.
- Ethics at the workplace: - cybercrime, plagiarism, sexual misconduct, fraudulent use of institutional resources, etc.
- Ability to utilize the professional competence for augmenting universal human order.

Text Book:

1. A Textbook on Professional Ethics and Human Values by R S Naagarazan.
2. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria.
3. Indian Ethos and Modern Management by B L Bajpai New Royal Book Co., Lucknow., 2004, Reprinted 2008.

Reference Books:

1. A N Tripathy, 2003, Human Values, New Age International Publishers
2. Human Values and Professional Ethics by Vaishali R Khosla, Kavita Bhagat
3. I.C. Sharma. Ethical Philosophy of India Nagin & co Julundhar

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FRONT END DESIGN TOOLS LAB VB.NET

Code: 24CS211
Max Marks: 70

Course Objectives: The objective of the course is to learn to design user-friendly graphical interfaces using VB.Net, develop event-driven applications with forms and controls and implement basic logic and database connectivity in front-end design.

UNIT I **(6 Hrs)**

Introduction to Visual Basic .Net Framework: . Net Architecture, Features of .Net, Advantages of .Net, .Net Framework, CLR, CTS, CLS, Assemblies, Memory management issues – Garbage Collector and collection process. Introduction to Visual Basic.Net IDE: Creating a project, Types of project in .Net, Exploring and coding a project, Solution explorer, toolbox, properties window, Output window, Object Browser.
Programming Basics: Variable, Data Types, Conditional Constructs, Loop Statements, Creating Console Application.

UNIT II **(4 Hrs)**

Introduction to GUI Environment and understand the working of commonly used controls - their properties, methods and events.

UNIT III **(5 Hrs)**

Introduction to Data Structures: Array, ArrayList, Structure and Enumeration. Introduction of Exception handling - structured and unstructured.

UNIT IV **(5 Hrs)**

Procedure and function. Introduction to Object Oriented Programming: OOPS Concepts, Creation of Class, Interface and Namespace.

List of Practicals

Core Practicals (Implement minimum 10 out of 15 practicals)

1. Create console application showing the use of conditional constructs - if, if-else, if-elseif-else, nested if, select case.
2. Create console application showing the use of loops –Do While..Loop, Do Until … Loop, While... Wend, For … Next, For Each … Next.
3. Create a simple windows application showing the use of TextBox, Button, Label Controls, Radio Button, Check Box, Combo Box and List Box Controls
4. Create a windows application showing the use of Image, Timer, Panel, Scroll bar, Status Bar Controls.
5. Create an MDI application showing the use of multiple forms, toolbar, menu, status bar, RichText Box, Dialog Controls.
6. Create console/windows application to showing the use of Structured Exception handling- try..end try, catch, finally.
7. Create console/windows application to showing the use of Unstructured Exception handling- On Error, Resume Next etc.
8. Create console/windows application showing the use of Array class - its methods and properties.
9. Create console/windows application showing the use of Array List - its methods and properties.
10. Create console/windows application showing the use of Enumeration, Constants and Structures.
11. Create console/windows application showing the declaration and use of user defined functions.
12. Create console/windows application showing the use of different argument passing mechanism – ByVal, ByRef, Optional and Paramarray.
13. Create console/windows application showing the declaration and use of Class with Data members, Function Member, Constructor Member, Destructor Member, Event Member, Property Member, Shared Member, Type Member.
14. Create console/windows application showing the implementation of Inheritance.
15. Create console/windows application showing the use of Polymorphism.

Application Based Practicals (Implement minimum 5 out of 10 practicals)

16. Write a Program to find diameter, circumference and area of circle using procedure.
17. Write a Program to find maximum between three numbers using select case and if--else.
18. Create Basic calculator with all the functionalities.
19. Create a basic Digital or Analog Clock using Timer, Image, Button, ComboBox and other relevant controls.
20. Write a Program to find second largest element and second smallest element in an array.

21. Write a program to create an arraylist of 10 elements. Create a procedure to add new element at the specific location in the arraylist and display the updated arraylist.
22. Write a program to validate the username and password entered by user and create userdefined exception to prompt message on three consecutive wrong password entries.
23. Create a Class Box with following private data members length, breadth, height andfunction getVolume, and public member functions input and output. Create an object of class and call appropriate functions.
24. Create a class Rectangle, with protected members width and height, public procedure setWidth and setHeight, getArea. Inherit it in another Class ShrinkRectangle with a data member shrink factor. Create object of the class and call appropriate member functions. Create appropriate class to demonstrate overloading of function 'area' for finding area of a circle, square, rectangle and a triangle.
25. Create a class Book with data members: BookId, BookName, Cost, Pages. Member property to add data to all its data members, function to find cost per page. Create five objects of 5 books and find total cost.

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirements of the course.**

STATISTICAL ANALYSIS USING EXCEL

Code: 24CS212
Max Marks: 70

Course Objectives: The objective of the course is to apply Excel functions for statistical data analysis, use charts, pivot tables, and descriptive statistics tools and perform regression, correlation, and hypothesis testing.

UNIT I **(5 Hrs)**

Introduction to Statistics: Defining statistics, Importance of Statistics, application of statistics in real life scenarios. The skills and characteristics needed to deal with the data. The importance of IT tools in the usage of statistical data. MS Excel as the IT tool for dealing with statistical data. Features of MS Excel.

UNIT II **(5 Hrs)**

Introduction to MS Excel. Basic structure of MS Excel. Cells, range, Tabs and the importance of formulae in MS Excel for dealing with statistical data. Introduction to Data analysis tab and the various statistical features available in data analysis tab. Installing Data analysis tab. using statistical functions of MS Excel for data analysis.

UNIT III **(5 Hrs)**

The application of Measures of central tendency by using MS Excel. Frequency distribution, Graphical representation of data along with formatting features of various graphs. Measures of Central Tendency with its illustration in MS Excel.

UNIT IV **(5 Hrs)**

The measures of Dispersion by using MS Excel. The consolidation of data by using Pivot table, the Data table, Scenarios, and Goal seek functions by using data to predict future scenarios. The illustration of correlation and regression in predicting.

Textbook:

1. Understanding Educational Statistics Using Microsoft Excel and SPSS. Edition No. 1, Martin Lee Abbott, John Wiley and Sons. Ltd, 2011.
2. Statistics for Management Using Microsoft Excel, Ash Narain Sah, John Wiley, 2018.

Reference Books:

1. Statistics with Microsoft Excel by Dretzke, Beverly Jean, Prentice Hall, 2019.
2. Applied Statistics with Microsoft Excel, Gral Keller, Cengage, 2015.

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List of Practicals

1. Enter the marks of 20 students in the given order:
   - Serialnumber
   - Nameofthe student
   - Nameofthe college
   - Class
   - Subject-1
   - Subject-2
   - Subject-3
   - Subject-4

In a separate column, perform the following operations. Calculate the following:

a. Total marks of all the subjects
b. Percentage of marks for each of the students
c. Allotment of grades based on the criterion:
   - If the marks are more than 75% then the result is "Pass" else "Fail"
d. Now in other column allot the grades based on the following criterion:
   - If the marks are more than 90% then grade is "A"
   - If the marks are more than or equal to 75 and less than 90% then the grade is "B" else the grade if "C" provided that the result is "Pass".

2. From the following table, calculate the following:

City	Number of Schools	Number of candidates
New Delhi	300	30000
Mumbai	450	45000
Bengaluru	500	48000
Chennai	480	67000
Trivandrum	459	77000

   - The average number of students in the entire distribution
   - The standard deviation of the distribution
   - The correlation coefficient between the number of schools and the number of candidates
   - The regression equation between the number of students and the number of candidates

3. From the following table, calculate the following:

Base City	Department	Client	Location	Nationality
New Delhi	Marketing	Adidas	New York	American
Mumbai	Advertising	Hilfiger	London	English
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Dutch
Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese
New Delhi	Quality Control	Adidas	New York	American
Mumbai	Advertising	Hilfiger	Seoul	Korean
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Dutch
Trivandrum	Advertising	Armani	Frankfurt	Russian
New Delhi	Marketing	Adidas	New York	American
Mumbai	Production	Hilfiger	Copenhagen	English
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Russian
Trivandrum	Advertising	Gucci	Frankfurt	Japanese
New Delhi	Quality Control	Adidas	New York	American
Mumbai	Advertising	Hilfiger	London	Korean
Bengaluru	Human Resource	Woodland	Paris	Spanish
Chennai	Human Resource	Nike	Sydney	Dutch
Trivandrum	Advertising	Allen Solley	Frankfurt	Japanese

Using Pivot table, determine

- The number of Nationality per Location
- The number of Department/location/ client
- The number of client/location/ nationality

4. From the following table, calculate the following:

Qty↓/Price→	**10**	**20**	**30**	**40**
25	**250**	**500**	**750**	**1000**
35	**350**	**700**	**1050**	**1400**
45	**450**	**900**	**1350**	**1800**
55	**550**	**1100**	**1650**	**2200**
65	**650**	**1300**	**1950**	**2600**

Using Datatable, prepare the above tabular distribution

5. Using the Goal seek function of Excel, prepare the following table for calculating the amount based on the simple interest formula.

Principal Amount	
Rate	
Time	2
Amount	1040

Simulate the amount by differing values of

- Principle amount
- Rate
- Time

DESIGNING LAB PHOTOSHOP

Code: 24CS213
Max Marks: 70

Course Objectives: The objective of the course is to learn basic tools and features of Adobe Photoshop, create and edit digital graphics and layouts and apply design principles to produce visually appealing content.

UNIT I **(5 Hrs)**
Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Raster Images, Vector Images, Measurement Units & Conversion, Introduction to Adobe suite & Photoshop.

UNIT II **(5 Hrs)**
Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Raster Images, Vector Images, Measurement Units & Conversion, Introduction to Adobe suite & Photoshop.

UNIT III **(5 Hrs)**
Introduction to Shapes & Shape Tools, Path & Direct Selection Tools, Pen Tool, Image Editing Tools, Layers Style, Filters, Blend Modes, Image Adjustment Options, Window Menu Options, Layer Mask.

UNIT IV **(5 Hrs)**
Introduction to Photoshop Filter: Blur, Distort, Noise, Render, Sharpen, Stylize, Exporting Images & PDF, Introduction to GIF & Timeline Window, Importing/Exporting CorelDraw Files from Photoshop.

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List of Practicals
Core Practicals (Implement minimum 8 out of 10 practicals)

1. Create a file to demonstrate the use of layers, groups & smart objects.
2. Create a photo frame in Photoshop.
3. Take an image of basic shape (square, triangle, circle, rectangle and parallelogram) in Photoshop & extract these shapes from the image to different layers using marquee
4. Create a custom brush preset in Photoshop.
5. Create a custom pattern preset in Photoshop.
6. Create a visiting card for yourself in Photoshop. (size=3.5 x 2 inch., color coding: CMYK)
7. Create a file having two images (rename the layer as foreground & background image) in two different layers. Blur the background image & place the foreground image over the background image in a way both layers are visible.
8. Create a border design using a brush tool.
9. Create basic shapes (square, triangle, circle, rectangle and parallelogram) in Photoshop on a single layer using the shape tools.
10. Create a simple GIF in Photoshop.

Application Based Practicals (Implement minimum 5 out of 10 practicals)

11. Create a digital invitation card in Photoshop and export it in PDF Format. Use the Photograph (Practical 7) or GIF (Practical 10) and border (Practical 8) along with other features of Photoshop as per your requirements. (size=A8 or A4, color coding: RGB)
12. Create a custom Desktop background in Photoshop.
13. Create a water drop and heart shape in Photoshop using the shapes tools or Pen Tool.
14. Create a "Save Water" Poster from the shapes created in Practical 13. (size=A8 or A4, color coding: CMYK)
15. Perform Digital Makeup on the Photograph of some celebrity in Photoshop.
16. Create a cartoon character in Photoshop using the Shape and Pen Tools.
17. Create a chocolate bar with the brand name in Photoshop. The individual cube of the chocolate must have a 3D Visual Effect.
18. Create your company logo in Photoshop.
19. Create a magazine Cover in Photoshop.
20. Create a Thanks Giving card & export it in Pdf (size=A8 or A4, color coding: RGB)

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

1. Make following five different web pages:
   i. Formatting Styles and Headings: Include Bold, italics, Underline, Strike, Subscript, superscript and all six type of headings
   ii. Font Styles and Image tag
   iii. Marquee: Move text, image and hyperlink
   iv. Other tags: br, hr, pre, p

   Include following specifications:
   - In all these web pages only mention about use, attributes apply them.
   - Insert a background image on homepage.
   - Make all the topics as hyperlinks and go to some other page for description.
   - Insert a marquee showing HTML Tutorial as moving text.
   - Use different font style for different topics.
   - On every page, make a hyperlink for going back to home page and internal link also.

2. Create an unordered list nested inside ordered list and apply the following :
   - Insert an image of Main item on top right corner of web page.
   - Display heading as a marquee.
   - Use different font styles and colors for different ordered list items.
   - Insert horizontal line after each ordered item.

3. Design a table with row span and column span and make use of attributes colspan, rowspan, width, height, cellpadding, cellspacing etc.
4. Design following frame:

<table>
<tr><td rowspan="4">MAIN MENU
Topic 1
Topic 2
Topic 3</td><td>Explanation

View Example</td></tr>
<tr><td>Example</td></tr>
</table>

5. Make an image map showing the usage of shape, coords, href attributes in mapdefinition. Link each hotspot to their respective details. All the web pages should be designed with proper background color, images, font styles and headings.
6. Design Student registration form for admission in college.
7. Create a webpage and show the usage of inline and internal style sheet and external style sheet?
8. Create a webpage containing a background image and apply all the background styling attributes?
9. Create a webpage showing the usage of font styling attributes
10. Create a webpage and apply all Text styling attributes use Id and class selector.
11. Create a webpage and implement all list styling attributes.
12. Create a Webpage with three equal columns.
13. Create a webpage containing bootstrap table.
14. Create a webpage containing various types of images.
15. Create a webpage containing various types of buttons
16. Create a webpage containing various typography classes.
17. Create a webpage to display the heading using. Jumbotron.
18. Write a program to show the usage of built-in functions and dialog boxes.
19. Write a program to show the usage of the alert box and confirm box
20. Write a program to implement event handling using onclick, onmouseover, and onmouseout events.
21. Write a program to show the usage of all the date, math, and string object functions
22. WAP to display the bookstore details in XML with CSS and internal DTD.
23. WAP to format the Teacher details in XML with CSS using an external DTD

Application-Based Practical

24. Design the registration form for a website, and when the user clicks on the submit button, the login form should appear on the screen (use an external JavaScript file).
25. Design a website and apply all the features of HTML, CSS, JavaScript, and Bootstrap to make the website attractive.
26. Write a JavaScript function that creates a table, accepts row, column numbers from the user, and inputs row-column numbers as content (e.g. Row-0 Column-0) of a cell.
27. Zebra-striped Tables: Setting different background colors for alternate rows is a popular technique to improve the readability of tables that have a large amount of data. This is commonly known as zebra-striping a table. Make use of pseudo classes to create zebra zebra-striped Table.
28. Create a Questionnaire related to any topic of your choice by using Form Elements.

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**

This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.

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DATA STRUCTURE LAB

(BASED ON 24CS201) Data Structure and Algorithm Using 'C':
Core Practicals (Implement minimum 8 out of 10 practicals)

1. WAP to implement following operation on one dimensional array (i) Insertion (ii)Deletion (iii) Traversal (iv) Reverse (v) Merge.
2. WAP to Sort an array using menu driven:
   (i) BUBBLE SORT (ii) MERGE SORT (iii) INSERTION SORT (iv) SELECTION SORT.
3. WAP to implement a Singly Linked List.
4. WAP to implement a Circular Linked Lists.
5. WAP to implement Doubly Linked Lists.
6. Write a menu driven program to implement (i) Static Stack (ii) Dynamic Stack.
7. WAP to implement a: (i) Static (ii) Dynamic Circular Queue.
8. WAP to implement a: (i) Static (ii) Dynamic De-Queue..
9. Implement recursive algorithms for the following operations on Binary SearchTree.
(i) Insertion
(ii) Searching
10. Implement recursive algorithms for BST traversal- Inorder, Preorder, Postorder.

Application Based Practicals (Implement minimum 5 out of 8 practicals)

11. WAP to search & display the location of an element specified by the user, in anarray using: (i) Linear Search (ii) Binary Search technique.
12. WAP to accept a matrix from user, find out matrix is sparse or not and convertinto triplex matrix.
13. WAP to implement Polynomial addition operation using linked list.
14. Write a C program to create two linked lists from a given list in following way:
    INPUT List:- 1 2 3 4 5 6 7 8 9 10 OUTPUT:-
    First List:- 1 3 5 7 9
    Second List:- 2 4 6 8 10
15. WAP to implement Student Database using Linked List with the following structure:
    - Name
    - Rollno
    - Marks of 5 subjects
    - Average
    - Result, If the average < 50, then print 'Fail', otherwise 'Pass'
16. Write a program to convert Infix to equivalent (i) Prefix expression (ii) Postfix expression
17. Write a program to evaluate (i) Prefix Expression (ii) Postfix Expression using stack.
18. Let us assume a Patient's coupon generator for the Doctors' clinic. The patients are given the coupons on first-come-first-serve basis. After the visit of a patient, patient-ID is kept stack-wise. At the end of the day, the count is generated from the stack. Construct a menu-based program for patients' coupons generator using an approprotae data structure.
19. WAP to implement an expression tree. (For example: (a + b / (c * d) – e)).
20. Sometimes a program requires two stacks containing the same type of items. Suppose two stacks are stored in separate arrays, then one stack might overflow while there is considerable unused space in the other. A neat way to avoid this problem is to put all spaces in one stack and let this stack grow from one end of the array, and the other stack starts from the other end and grows in the opposite direction, i.e., toward the first stack. In this way, if one stack turns out to be large and the other small, then they will still both fit, and there will be no overflow until all space is used. Declare a new structure that includes these two stacks and perform various stack operations.

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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DBMS LAB

(BASED ON 24CS202) Database Management System:
Core Practicals (Implement All the mentioned practicals)

The following are two suggestive databases. The students may use any one or both databases for their core practicals. However, the instructor may provide any other databases for executing these practical.

1.COLLEGE DATABASE:
STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec)
CLASS (USN, SSID)
SUBJECT(Subcode,Title,Sem,Credits)
IA MARKS (USN, Subcode, SSID, Test1, Test2, Test3, Final IA)

2.COMPANY DATABASE:
EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)
DLOCATION (DNo, DLoc)
PROJECT (PNo, PName, PLocation, DNo)
WORKS_ON (SSN, PNo, Hours)

1. Draw an E-R diagram from given entities and their attributes.
2. Convert the E-R diagram in to a Relational model with proper constraints.
3. Write queries to execute following DDL commands:
   CREATE: Create the structure of a table with at least five columns
   ALTER: Change the size of a particular column.
   Add a new column to the existing table.
   Remove a column from the table.
   DROP: Destroy the table along with its data.
4. Write queries to execute following DML commands:
   INSERT: Insert five records in each table.
   UPDATE: Modify data in single and multiple columns in a table.
   DELETE: Delete selective and all records from a table
5. Write queries to execute following DML command:
   SELECT: Retrieve the entire contents of the table.
   Retrieve the selective contents (based on provided conditions) from a table.
   Retrieve contents from a table based on various operators i.e. string operators, logical operators, conditional operators and Boolean operators.
   Sort the data in ascending and descending order in a table on the basis of one column or more than one column.
6. Create table using following integrity constraints:
   - PrimaryKey
   - Unique Key
   - Not Null
   - Check Default
   - Foreign Key
7. Write queries to execute following Aggregate functions:
   Sum, Avg, Count, Minimum and Maximum value of a numeric column of a table using aggregate function.
8. Retrieve data from a table using alias names.
9. Retrieve data of a table using nested queries.
10. Retrieve data from more than one table using inner join, left outer, right outer and full outer Joins.
11. Create view from one table and more than one table.
12. Create index on a column of a table.

Application Based Practicals

13. Consider the Insurance company's Database given below. The primary keys are underlined and the data types are specified.
    PERSON (driver_id#: string, name: string, address: string)
    CAR (reg no : string, model: string, year: int)
    ACCIDENT (report_number:int, acc_date: date, location: string)
    OWNS (driver_id#: string, reg no: string)

PARTICIPATED (driver_id#: string, reg no: string, report_number: int, damage_amount: number (10, 2))

(i) Create the above tables by properly specified the primary key and the foreign key
(ii) Enter at least five tuples for each relation
(iii) Demonstrate how you can
  a) Update the damage amount for the car with a specific reg no, the accident with report number 12 to 25000.
  b) Add a new accident to the database.
(iv) Find the total number of people who owned cars that were involved in accident in 2002.
(v) Find the number of accident in which cars belonging to a specific models were involved.

14. Consider the following schema of a library management system. Write the SQL queries for the questions given below:
Student (Stud_no: integer, Stud_name: string)
Membership (Mem_no: integer, Stud_no: integer)
Book_(book_no: integer, book_name: string, author: string)
lss_rec_(iss_no: integer, iss_date: date, Mem_no: integer, book_no: integer)
(i) Create the tables with the appropriate integrity constraints.
(ii) Insert around 10 records in each of the tables.
(iii) Display all records for all tables.
(iv) List all the student names with their membership numbers.
(v) List all the issues for the current date with student and Book names.
(vi) List the details of students who borrowed book whose author is Elmarsi & Navathe.
(vii) Give a count of how many books have been bought by each student.
(viii) Give a list of books taken by student with stud_no as 1005.
(ix) Delete the List of books details which are issued as of today.
(x) Create a view which lists out the iss_no, iss_date, stud_name, bookname.

15. Use the relations below to write SQL queries to solve the business problems specified.
CLIENT (clientno#, name, client_referred_by#)
ORDER (orderno#, clientno#, order_date, empid#)
ORDER_LINE (orderno#, orderlinenumber#, item_number#, no_of_items, item_cost, shipping_date)
ITEM (item_number#, item_type, cost)
EMPLOYEE (empid#, emp_type#, deptno, salary, first name, last name)
Notes:
a. Column followed by # is the primary key of the table.
b. Each client may be referred by another client. If so, the client number of the referring client is stored in referred_by.
c. The total cost for a particular orderline=no_of_items*item_cost.c.

16. Write queries for the following:
(i) Create all the above tables.
(ii) Insert at least five records.
(iii) Display all the rows and columns in the CLIENT table. Sort by client name in reverse alphabetical order.
(iv) Display the item number and total cost for each order line (total cost = no of items X item cost). Name the calculated column TOTAL COST.
(v) Display all the client numbers in the ORDER table. Remove duplicates.
(vi) Display the order number and client number from the ORDER table. Out put the result in the format. Client <clientno> ordered <orderno>
(vii) Display full details from the ORDER_LINE table where the item number is (first condition) between 1 and 200 (no > or < operators) OR the item number is greater than 1000 AND (second condition) the item cost is not in the list 1000, 2000, 3000 OR the order number is not equal to 1000.
(viii) Display the client name and order date for all orders.
(ix) Repeat query (6) but also display all clients who have never ordered anything.
(x) Display the client name and order date for all orders using the join keywords.
(xi) Display the client name and order date for all orders using the JOIN method.
(xii) Display the client number, order date and shipping date for all orders where the shipping date is between three and six months after the order date.

(xiii) Display the client number and name and the client number and name of the person who referred that client.
(xiv) Display the client name in upper case only and in lower case only.
(xv) Display the second to fifth characters in each client name.

Note:

1. **In total 15 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirements of the course.**

Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 mark each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 6 out of 8 (Long 100-120 Words): 5 marks each (5x6 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The average of the two scores will be considered and scaled to 15 marks for the final assessment. Additionally, 5 marks will be allotted for assignments submitted, 5 marks for attendance, and 5 marks for general proficiency, making a total of 30 internal assessment marks.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs): 70 Marks
Program Writing: 10 + 10 Marks
Algorithm& Flowchart: 5 + 5 Marks
Program Execution: 15 + 15 Marks
Viva: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
Record: 5 Marks
Attendance: 5 Marks
Program Writing: 15 Marks
Program Execution: 15 Marks
Viva: 10 Marks

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Syllabus for BCA-AIML

Semester 3

Theory									
Course Code	**Topic**	**L**	**T**	**P**	**Credit**	**External Marks**	**Internal Marks**	**Practical Marks**	**Total Marks**
24CS301	Object Oriented Programming with C++	4	0	0	4	70	30	0	100
24CS321	Basics of Python Programming	2	0	0	2	70	30	0	100
24CS303	Computer Networks	3	1	0	4	70	30	0	100
24GN101	Environmental Studies	2	0	0	2	70	30	0	100
Skill Enhancement Course (SEC-2) (Choose any one)									
24CS311	Designing Lab Corel Draw	0	2	0	2	70	30	0	100
24CS811	Natural Language Processing	0	2	0	2	70	30	0	100
Discipline Specific Elective (DSE-1) (Choose any one)									
24CS323	SAD (System Analysis & Design)	2	0	0	2	70	30	0	100
24CS322	Cyber Ethics	2	0	0	2	70	30	0	100
Generic Elective-1 (Choose any one)									
24MG101	Principles of Management & Organizational Behavior	2	0	0	2	70	30	0	100
24MT106	Probability & Statistics	2	0	0	2	70	30	0	100
Practical									
24CS391	C++ Lab	0	0	2	2	0	30	70	100
	Total				**20**	**490**	**240**	**70**	**800**

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Detailed Syllabus

OBJECT-ORIENTED PROGRAMMING WITH C++

Code: 24CS301
Max Marks: 70

Course Objectives: The objective of the course is to understand the Fundamentals of Object-Oriented Programming (OOP), master C++ Language Syntax and Semantics, design and Implement Classes and Objects, apply Object-Oriented Concepts in Program Design, handle Data Using Advanced Features, develop Reusable and Modular Code, build Real-World Applications and understand the Standard Template Library (STL

UNIT I **(10 Hrs)**

Object Oriented Paradigm: Procedural vs. object-oriented development, Basic concepts of object-oriented programming, Applications and benefits of OOP, Comparison between C and C++.

Beginning with C++: Stream based I/O, Literals- constant qualifiers, Operators in C++, Reference variable, Functions, Default arguments, Parameter passing by value, Reference and pointer, Inline functions, Type conversion, Basic C++ programs, New, Delete operators- basic use and dynamic memory allocation for arrays.

UNIT II **(10 Hrs)**

Classes and Objects: C++ class declaration, Access specifiers, Member functions, Arrays within a class, Array of objects, Memory allocation of objects, Passing objects as arguments, Returning objects from functions, Function overloading, Static data and member functions, Friend function and friend class, This pointer.

Constructors & Destructors: Introduction to constructor and destructor, Parameterized constructor, Constructor with default arguments, Multiple constructors in a class, Copy constructor.

UNIT III **(10 Hrs)**

Inheritance: Types of inheritance, Derivation – public, private & protected, Ambiguity resolution (function overriding), Aggregation, Composition v/s Classification, Virtual base class, Constructor and destructor in derived classes.

Polymorphism: Types of polymorphism, early v/s late binding, Virtual Functions: Need for virtual functions, Pointer to derived class objects, Pure virtual functions, Abstract classes.

Operator Overloading: Overloading unary operators, Nameless objects, Overloading binary operators, Overloading with friend functions, Conversion between basic types and user-defined types.

UNIT IV **(10 Hrs)**

Parametric polymorphism: Generic Programming with Templates, Introduction, Function templates/generic functions, Characteristics, Overloading of template functions, Class templates, Template arguments.

Exception Handling: Exception-handling model, Types of exception, Catching and Handling exceptions, Generic catch, Rethrowing an exception, Specifying exceptions for a function.

Streams & Files: C++ Streams, Basic stream classes, C++ predefined streams, I/O operations, Unformatted console I/O operations, Manipulators, Opening and closing a file- different modes and methods, Error handling during file operations, File pointers and their manipulations, Sequential access to file, Random input and output operations, Persistent objects, Command line arguments.

Text Book:

1. K. R. Venugopal, Rajkumar, T. Ravishanker, “Mastering C++”, TMH
2. E. Balagurusamy, “Object Oriented Programming with C++”, McGraw-Hill Education

Reference Books:

1. Ashok N. Kamthane, “Object-Oriented Programming with ANSI And Turbo C++”, Pearson Education.
2. Schildt Herbert, “C++: The Complete Reference”, Tata McGraw Hill.
3. R. Lafore, “Object Oriented Programming using C++”, Galgotia Publications.

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BASICS OF PYTHON PROGRAMMING

Code: 24CS321
Max Marks: 70

Course Objectives: The objectives of the course is to understand Python Fundamentals, write and Execute Python Programs, work with Control Structures, use Functions and Modules, Manipulate Data Structures, Handle Files and Exceptions, Work with Strings and Regular Expressions, Introduce Object-Oriented Concepts, Foster Problem-Solving and Debugging Skills and Prepare for Advanced Topics

UNIT I: Introduction to Python **(5 Hrs)**

Installing Python, basic syntax, interactive shell, editing saving and running a script; The concept of data types, variables, assignments; Immutable variables; Numerical types, Operators (Arithmetic Operator, Relational Operator, Logical or Boolean Operator, Assignment Operator, Ternary Operator, Bitwise Operator, Increment or Decrement Operator) and expressions; Comments in the program, Understanding error messages.

UNIT II: Creating Python Programs **(4 Hrs)**

Input and Output Statements, Control Statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass).

Function: Defining a function, calling a function, types of function, Function Arguments, Anonymous Functions, global and local variables, Recursion.

UNIT III: Data Structures of Python **(5 Hrs)**

Manipulating files and directories, os and sys modules, text files: reading/writing text and numbers from/to a file, creating and deleting a formatted file (csv or tab-separated).

String Manipulations: subscript operator, indexing, slicing a string; strings and number system: converting string to numbers and vice-versa, Binary, octal and hexadecimal numbers.

Basic list operators, replacing, inserting and removing an element, searching and sorting lists, accessing tuples, Operations, Working Functions and Methods, dictionary literals, Adding and Removing keys, accessing and replacing values, traversing dictionaries.

Data Structures using Lists: Elementary Data Representation- Linear List Array, Stacks, Queues, Linked Lists, and Trees.

UNIT VI: Modules **(4 Hrs)**

Importing module, Math module, Random Module, Packages, Composition.

Exception Handling: Exception, Exception Handling, except clause, try, finally clause, User-Defined Exceptios.

TEXT BOOKS:

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to think like a computer scientist: Learning with Python", Freely available online, 2012
3. Luca Massaron John Paul Mueller, Python for Data science For Dummies, Wiley,2ed,2019

REFERENCE BOOKS:

1. https://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/pythonds

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COMPUTER NETWORKS

Code: 24CS303
Max Marks: 70

Course Objectives: The objectives of the course is to Understand Basic Networking Concepts, Explain Network Models and Architecture, Understand Data Communication Fundamentals, Explore Network Devices and Components, Study IP Addressing and Subnetting, Understand Routing and Switching Concepts, Learn About Transport Layer Protocols, Explore Application Layer Protocols and Services, Understand Network Security Basics and Develop Practical Skills in Networking.

UNIT I **(10 Hrs)**

Basic Concepts: Components of data communication, Distributed processing, Line configuration, Topology, Transmission mode and Categories of networks.

OSI and TCP/IP Models: Layers and their functions, Comparison of models.

Transmission Media: Guided and unguided, Attenuation, Distortion, Noise, Throughput, Propagation speed and time, Wavelength, Shannon Capacity.

UNIT II **(10 Hrs)**

Telephony: Multiplexing, WDM, TDM, FDM, Circuit switching, Packet switching and Message switching. Data Link Layer.

Types of errors, Framing (character and bit stuffing), Error detection & Correction methods; Flow control; Protocols: Stop-wait ARQ, Go-Back- NARQ, Selective repeat ARQ.

UNIT III **(10 Hrs)**

Network Layer: Internetworking & Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway, Modems; **Addressing:** IPv4 and IPv6 addressing, IPv4 subnetting; Routing: Unicast Routing Protocols: RIP, OSPF, BGP; **Routing:** Routing Methods- Static and Dynamic Routing, Routing basic commands, Distance vector protocol, Link state protocol.

UNIT IV **(10 Hrs)**

Transport and upper layers in OSI Model: Transport layer functions and Protocols, Connection management, Functions of session layers, Presentation layer and Application layer.

TEXT BOOK:

1. A. S. Tenanbaum, “Computer Networks”; Pearson Education Asia, 4th Ed., 2003.
2. Behrouz A. Forouzan, “Data Communication and Networking”, 2nd edition, Tata Mc Graw Hill.

REFERENCE BOOKS:

1. D. E. Comer, “Internetworking with TCP/IP”, Pearson Education Asia, 2001.
2. William Stallings, “Data and computer communications”, Pearson education Asia, 7th Ed., 2002.

Leinwand, A., Pinsky, B. (2001). Cisco router configuration. United Kingdom: Cisco Press.

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ENVIRONMENTAL STUDIES

Code: 24GN101
Max Marks: 70

Course Objectives: The objective of the course is to Understand the Fundamentals of the Environment, Create Awareness of Environmental Issues, Promote Sustainable Development, Understand the Importance of Natural Resource Management, Learn about Biodiversity and its Conservation, Examine Environmental Legislation and Policies, Explore the Human-Environment Relationship, Encourage Environmental Ethics and Responsibility, Develop Skills for Environmental Problem-Solving and Promote Community Engagement and Environmental Action.

UNIT I **(5 Hrs)**

Introduction to Environmental Studies:

- Environmental studies: Nature, Scope and Importance; Components of environment: atmosphere, hydrosphere, lithosphere, and biosphere; Concept of sustainability and sustainable development.
- Emergence of environmental issues: Climate change, Global warming, Ozone layer depletion, Acid rain etc.; International agreements and programmer: Earth Summit, UNFCCC, Montreal and Kyoto protocols, Convention on Biological Diversity (CBD), Ramsar convention, UNEP, CITES, etc.

UNIT II **(5 Hrs)**

Ecosystems and Natural Resources:

- Definition and concept of Ecosystem; Structure of ecosystem (biotic and abiotic components); Functions of Ecosystem: Physical (energy flow), Biological (food chains, food web, ecological succession), ecological pyramids and homeostasis; Types of Ecosystems: Tundra, Forest, Grassland, Desert, Aquatic (ponds, streams, lakes, rivers, oceans, estuaries); importance and threats with relevant examples from India.
- Ecosystem services (Provisioning, Regulating, Cultural, and Supporting); Ecosystem preservation and conservation strategies; Basics of Ecosystem restoration.
- Energy resources: Renewable and non-renewable energy sources; Use of alternate energy sources; Growing energy needs; Energy contents of coal, petroleum, natural gas and bio gas; Agro-residues as a biomass energy source.

UNIT III **(5 Hrs)**

Biodiversity and Conservation

- Definition of Biodiversity; Levels of biological diversity: genetic, species and ecosystem diversity.
- India as a mega-biodiversity nation; Biogeographic zones of India; Biodiversity hotspots; Endemic and endangered species of India; IUCN Red list criteria and categories.
- Value of biodiversity: Ecological, economic, social, ethical, aesthetic, and informational values of biodiversity with examples.
- Threats to biodiversity: Habitat loss, degradation, and fragmentation; Poaching of wildlife; Man-wildlife conflicts; Biological invasion with emphasis on Indian biodiversity; Current mass extinction crisis.
- Biodiversity conservation strategies: in-situ and ex-situ methods of conservation (National Parks, Wildlife Sanctuaries, and Biosphere reserves.

UNIT IV **(5 Hrs)**

Environmental Pollution and Control Measures:

- Environmental pollution (Air, water, soil, thermal, and noise): causes, effects, and controls; Primary and secondary air pollutants; Air and water quality standards.
- Nuclear hazards and human health risks.
- Solid waste management: Control measures for various types of urban, industrial waste, Hazardous waste, E-waste, etc.; Waste segregation and disposal.

TEXT BOOK:

1. Sanjay Kumar Batra, Kanchan Batra, Harpreet Kaur; Environmental Studies; Taxmann's, Fifth Edition.
2. M.M. Sulphey; Introduction to Environment Management; PHI Learning, 2019
3. S.P. Mishra, S.N. Pandey; Essential Environmental Studies; Ane Books Pvt. Ltd. ; Sixth Edition.

REFERENCE BOOKS:

1. Asthana, D. K. (2006). Text Book of Environmental Studies. S. Chand Publishing.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India
3. Bharucha, E. (2013). Textbook of Environmental Studies for Undergraduate Courses. Universities Press.
4. Mahapatra, R., Jeevan, S.S., Das, S. (Eds) (2017). Environment Reader for Universities, Centre for Science and Environment, New Delhi.
5. Masters, G. M. & Ela, W. P. (1991). Introduction to environmental engineering and science. Englewood Cliffs, NJ: Prentice Hall.
6. Odum, E. P., Odum, H. T. & Andrews, J. (1971). Fundamentals of Ecology. Philadelphia: Saunders.
7. Sharma, P. D. & Sharma, P. D. (2005). Ecology and Environment. Rastogi Publications

DESIGNING LAB COREL DRAW

Code: 24CS311
Max Marks: 70

Course Objectives: The objective of the course is to Understand the Core Concepts of Vector Graphics, Develop Proficiency in CorelDRAW Tools and Interface, Create and Manipulate Graphic Objects, Apply Colors, Fills, and Outlines, Work with Typography and Text Effects, Design Professional Layouts and Compositions, Use Advanced Features for Graphic Design, Understand File Management and Output Formats, Develop Creative and Practical Design Projects and Promote Industry-Relevant Skills and Creativity:

UNIT I **(5 Hrs)**
Introduction to graphic designing, Input/Output Technologies, Color Coding: RGB, CMYK, Grayscale, Bitmap, Color Channel, Resolution, Printing Templates, Rastar Images, Vector Images, Measurement Units & Conversion, Introduction to CorelDraw.

UNIT II **(8 Hrs)**
Introduction to Layers and Groups, Color Picker & Gradients, Status bar, Toolbar, Menu bar, Property bar, Shapes & Shape Tools, Pick & Transform Tools, 3-D Effects: Shadow, Bevel Effects, Extrusion Effects, Perspective Effects, Text Formatting, Colors Styles & Palette, Alignment Controls.

UNIT III **(8 Hrs)**
Importing Images in CorelDraw, Transform Controls, Basics of Printing.
Generating Barcode & QR Code, Calendar, Web Objects, Workspace Customization, Importing/Exporting Objects, Quick Trace, Manual Image Tracing.

TEXT BOOK:

1. Gary David Bouton, "CorelDRAW X7: The Official Guide", Corel Press.
2. DT Editorial Services (Author), "CorelDRAW 2018 in Simple Steps", Dreamtech Press.

REFERENCE BOOKS:

1. Prof. Satish Jain, M. Geetha, "Corel DRAW Training Guide", BPB Publication.
2. Deke McClelland, "CorelDRAW! 7 For Dummies", Hungry Minds Inc,U.S.
3. Roger Wambolt, "Bring It Home with CorelDRAW: A Guide to In-House Graphic Design", Delmar Cengage Learning.

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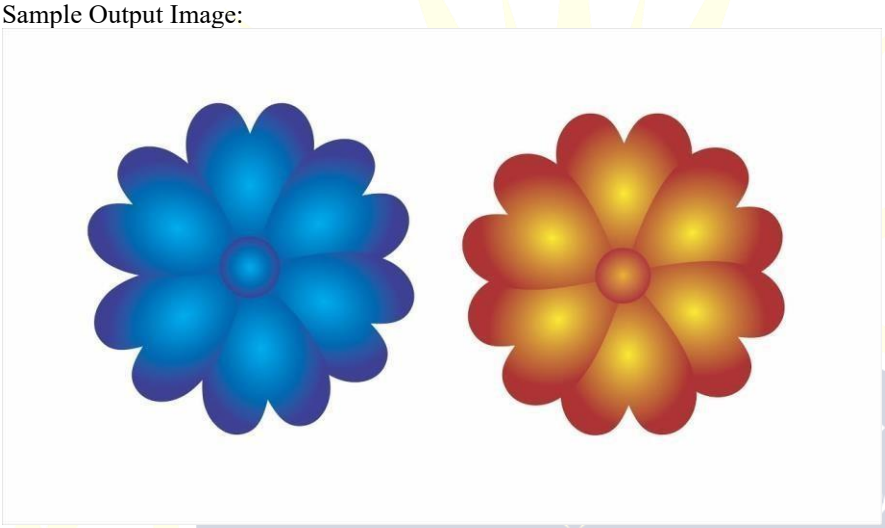
List of Practicals

Core Practicals (Implement minimum 8 out of 10 practicals)

1. Create a file to demonstrate the use of layers, groups.
2. Create a photo frame in CorelDraw.
3. Take an image of basic shape (square, triangle, circle, rectangle and parallelogram) in Corel Draw & extract these shapes from the image to different layers.
4. Create a QR Code in Corel Draw.
5. Create a flower in Corel Draw with gradient.
   Sample Output Image:



6. Create a visiting card for yourself in CorelDraw. (size=3.5 x 2 inch., color coding: CMYK)
7. Create a Tri-Fold Brochure in CorelDraw for Tours & Travels Company.
8. Create a border design in CorelDraw.
9. Create basic shapes (square, triangle, circle, rectangle and parallelogram) in CorelDraw shape tools.
10. Trace an image of some cartoon character in Corel Draw. (Do not use Quick Trace feature of CorelDraw)

Application Based Practicals (Implement any one out of the suggestive list)

11. Create a digital invitation card in CorelDraw Format. (size=A8 or A4, color coding: RGB)
12. Create a banner for a college event in CorelDraw. (Size: A3, Color Code: CMYK)
13. Create a Calendar for the current year in Corel Draw.
14. Create a Book cover in CorelDraw.
15. Create a Birthday Wishing card in CorelDraw (size=A8 or A4, color coding: RGB)

Note:

1. **In total 10 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

ARYAVART INTERNATIONAL UNIVERSITY
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NATURAL LANGUAGE PROCESSING

Code: 24CS811
Max Marks: 70

Course Objectives: This course aims at teaching the basics about processing of Natural Languages. Natural language processing is the feature of 5th Generation Computer and is part of Artificial intelligence. It teaches about the different phases of natural language processing, methodologies, algorithms, data structures used for Natural Language Processing.

UNIT I **(10 Hrs)**

Introduction: Basic concepts of Natural Language Processing, evolution of NLP, issues and challenges in NLP, basic concepts of phases of natural language processing, morphological analysis, syntactic analysis, semantic analysis, pragmatic analysis, tools and techniques used for performing these analyses, ambiguities, Types of ambiguities.

UNIT II **(10 Hrs)**

Syntactic analysis: Concept of Grammars, Chomsky hierarchy of grammars, concept of parsing, top-down parsing, bottom-up parsing, bidirectional parsing, generating parse tree, data structures and algorithms used for parsing, tokenizer, Case study of parsers of NLP systems like ELIZA, LUNAR.

UNIT III **(10 Hrs)**

Semantic Analysis: understanding meaning, CASE grammars, and transformational grammars used for performing semantic analysis. Resolving ambiguities to generate correct meaning, Word Sense Disambiguation Case Study of the Toolkit of word sense disambiguation used in WORDNET.

UNIT IV **(10 Hrs)**

Software tools for performing NLP: English WORDNET, components of WordNet, understanding the NLTK tool for using WordNet, HINDI wordnet, an Indian Govt initiative for language analysis and machine translation.

Textbook:

1. Allen, James, "Natural Language Understanding", Second Edition, Benjamin/ Cumming, 1995.
2. Jurafsky, Dan and Martin, James," Speech and Language Processing", Second Edition, Prentice Hall, 2008.

Reference Books:

1. Bharati Akshar, Chaitanya Vineet, Sangal, Rajeev, "Natural Language Processing: A Paninian Perspective", Prentice Hall India Learning Private Limited; EASTERN ECONOMY ed. edition, 1995.
2. Philipp Koehn, Statistical Machine Translation, Cambridge University Press; 1st edition, 2009.
3. U.S. Tiwari and Tanveer Siddiqui, Natural Language Processing and Information Retrieval, Oxford University Press, 2008.

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SYSTEM ANALYSIS & DESIGN

Code: 24CS323
Max Marks: 70

Course Objectives: The primary objective of this course is to provide students with a comprehensive understanding of the processes and techniques involved in the analysis and design of information system. System development life cycle, solving and analytical skills.

UNIT I **(5 Hrs)**

Basic Concept of Systems: Definition and Concepts; Elements of a System: Input, Output Processor, Control, Feedback, Environment, Boundaries and Interface; Characteristics of a System; Types of systems -Physical and Abstract System, Open and Closed Systems, Man-made Systems; Information and its categories

UNIT II **(7 Hrs)**

Information System and System Analyst Information systems: TPS, OAS, MIS, DSS, ESS; System Analyst: Role and need of system analyst, System Analyst as an agent of change. System Development Life Cycle Introduction to SDLC, Various phases: study, analysis, design, development, testing, implementation, maintenance; System documentation: Types of documentation and their importance.

UNIT III **(8 Hrs)**

System Planning and Information Gathering: Initial Investigations, Identification of user needs, Project Identification and Selection; Needs of Information Gathering, Determination of requirements, Information gathering tools: interviews, group communication, questionnaires, presentations and site visits. Feasibility Study Definition, Importance of feasibility study, Types of feasibility study, System selection plan and proposal, Prototyping, Cost-Benefit Analysis: Tools and Techniques.

UNIT IV **(8 Hrs)**

Tools for System Analysis & System Design: Data Flow Diagram (DFD), Logical and Physical DFDs, Developing DFD; System Flowcharts and Structured charts, Structured English, Decision trees and Decision tables. Module specifications, Module Coupling and cohesion, Top-down and bottom-up design; Logical and Physical design, Structured design.

UNIT V **(8 Hrs)**

Maintenance, Testing & System Security: Input and Output Input design: Input data, Input media and devices; Output design; Form Design: Classification of forms, Requirements of Form design. Need of System Testing, Types of System Testing, Quality Assurance; System Conversion, Conversion methods, procedures and controls, System evaluation and performance, Maintenance activities and issues, Audit System Security, Security Threats, Risk Analysis, Control measures, System Audit, Disaster Recovery Planning

TEXT BOOK:

1. "System Analysis and Design" by Kenneth E Kendall.
2. "System Analysis & design" by Shelly Cashman.

REFERENCE BOOKS:

1. "System Analysis and Design" by Elias m. Awad.
2. "System Analysis & design" by Perry Edwards.

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CYBER ETHICS

Code:24CS322
Max Marks: 70

Course Objectives: The objective of the course is to Understand the Foundations of Cyber Ethics, Recognize Ethical Issues in Cyberspace, Study Legal and Regulatory Frameworks, Promote Responsible Digital Citizenship, Explore Intellectual Property Rights (IPR), Analyze Cybercrime and Its Ethical Implications, Examine Ethical Issues in Emerging Technologies, Foster Critical Thinking and Ethical Decision-Making, Encourage Professional Integrity and Accountability and Prepare Students for Real-World Ethical Challenges in Technology.

UNIT I **(5 hours)**

Emergence of cyber space. Cyber Jurisprudence, Cyber Ethics, Ethics for IT Workers and IT Users, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics.

UNIT II **(5 hours)**

Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access. Cyberattacks and Cybersecurity, Privacy Issues.

UNIT III **(5 hours)**

Freedom of Expression, Intellectual Property Issues, Ethical Decisions in Software Development, Social Media Ethical issues, Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.

UNIT IV **(5 hours)**

Discussion on articles, companies or legal cases that deal with an ethical issue. Students are required to analyze and present at least one multinational company and investigate its ethical policies and practices. These polices can normally be found using any search engine.

TEXT BOOK:

1. Cyber Ethics 4.0 Serving Humanity with Values Editors Christoph Stückelberger / Pavan Duggal e-book by Globalethics.net available for download from https://repository.globethics.net/handle/20.500.12424/169317

REFERENCE BOOKS:

The students may refer free e-books or online latest articles, news and legal cases dealing cyber ethical issues for understanding the importance of cyber ethics.

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PRINCIPLES OF MANAGEMENT AND ORGANIZATIONAL BEHAVIOUR

Code: 24MG101
Max Marks: 70

Course Objectives: The objective of the course is to Understand the Fundamentals of Management, Analyze Organizational Structures and Functions, Study the Decision-Making Process, Gain Knowledge of Organizational Behavior (OB), Examine Individual Behavior in Organizations, Explore Group Behavior and Team Dynamics, Learn Motivation Theories and Leadership Models, Understand Organizational Culture and Change, Develop Managerial and Interpersonal Skills and Apply Management and OB Concepts to Real-World Scenarios.

UNIT I **(8 hours)**

Introduction: Meaning, Objectives, Differences between Administration and Management, Levels of Management, Kinds of Managers, Managerial roles, History of Management, Recent trends in Management.

UNIT II **(9 hours)**

Planning: Importance, Process, Benefits of Planning, Types of Plans, Planning tools and techniques.

Organizing: Meaning, Types of organizational structures, Traditional structures, Directions in organization structures.

Leading: Meaning, Nature, Traits and Behaviour, Contingency approaches to Leadership, Transformational leadership.

Controlling: Meaning, Importance, Steps in the control process, Types of Control.

UNIT III **(9 hours)**

Organizational Behavior: Introduction, Meaning, History of Organizational Behavior, Organizational effectiveness, Organizational learning process, Stakeholders, Contemporary challenges for Organizations.

UNIT IV **(9 hours)**

Behavioral Dynamics: MARS Model of individual behavior and performance, Types of Individual behavior. Personality in Organization, Values in the workplace, Types of values, Perception, Meaning, Model of Perceptual process. Motivation: Meaning, Maslow's Hierarchy of Needs, Four Drive Theory of Motivation. (9 hours)

Teams: Advantages of Teams, Model of Team Effectiveness, Stages of Team Development. Power: Meaning, Sources, and Contingencies of Power, Consequences of Power.

REFERENCE BOOKS:

1. MGMT, Chuck Williams & Manas Ranjan Tripathy, 5/e, Cengage Learning, 2013.
2. Organizational Behavior, Steven L. McShane & Mary Ann Von Glinow, 6/e, McGraw Hill Education, 2015.
3. Management & Organisational Behaviour, Laurie J. Mullins, 7/e, Prentice Hall, 2005.
4. Essentials of Management, Koontz, McGraw Hill, 8/e, 2014.
5. Management, John R. Schermerhorn, Jr., 8/e, Wiley India, 2010.
6. Organizational Behaviour, Fred Luthans, 12/e, McGraw Hill International, 2011.

ARYAVART INTERNATIONAL UNIVERSITY
Tilthai, Dharmanagar, North Tripura

PROBABILITY AND STATISTICS

Course code: 24MT106
Max. Marks: 70

Course Objectives: The course "Probability and Statistics" is designed to provide students with a strong foundation in both probability theory and statistical methods. The course covers key topics such as probability distributions, random variables, statistical inference, hypothesis testing, correlation, regression analysis, and sampling methods. Students will learn how to apply probability concepts to model uncertainty and how to use statistical techniques to analyze and interpret data. Emphasis is placed on understanding concepts like mean, variance, standard deviation, and confidence intervals, as well as mastering the use of statistical tools for data-driven decision-making.

UNIT I **(4 Hrs)**

Algebra of Sets: sets and classes, limit of a sequence of sets, rings, sigma-rings, fields, sigma-fields, monotone classes. Probability: Classical, relative frequency and axiomatic definitions of probability, addition rule and conditional probability, multiplication rule, total probability, Bayes' Theorem and independence, problems.

UNIT II **(8 Hrs)**

Random Variables: Discrete, continuous and mixed random variables, probability mass, probability density and cumulative distribution functions, mathematical expectation, moments, probability and moment generating function, median and quantiles, Markov inequality, Chebyshev's inequality, problems.
Special Distributions: Discrete uniform, binomial, geometric, negative binomial, hypergeometric, Poisson, continuous uniform, exponential, gamma, Weibull, Pareto, beta, normal, lognormal, inverse Gaussian, Cauchy, double exponential distributions, reliability and hazard rate, reliability of series and parallel systems, problems.
The function of a random variable, problems.

UNIT III **(6 Hrs)**

Joint Distributions: Joint, marginal and conditional distributions, product moments, correlation and regression, independence of random variables, bivariate normal distribution, and problems.
Transformations: functions of random vectors, distributions of order statistics, distributions of sums of random variables, problems.
Sampling Distributions: The Central Limit Theorem, distributions of the sample mean and the sample variance for a normal population, Chi-Square, t and F distributions, problems.

UNIT IV **(6 Hrs)**

Descriptive Statistics: Graphical representation, measures of locations and variability.
Estimation: Unbiasedness, consistency, the method of moments and the method of maximum likelihood estimation, confidence intervals for parameters in one sample and two sample problems of normal populations, confidence intervals for proportions, problems.
Testing of Hypotheses: Null and alternative hypotheses, the critical and 8 acceptance regions, two types of error, power of the test, the most powerful test and Nyman-Pearson Fundamental Lemma, tests for one sample and two sample problems for normal populations, tests for proportions, Chi-square goodness of fit test and its applications, problems.

TEXTBOOKS:

1. "An Introduction to Probability and Statistics" by V.K. Rohatgi & A.K. Md.E.Saleh.
2. "Introduction to Probability and Statistics" by J.S. Milton & J. C. Arnold.
3. "Introduction to Probability Theory and Statistical Inference" by H. J. Larson.

REFERENCE BOOKS:

1. "Introduction to Probability and Statistics for Engineers and Scientists" by S.M. Ross.
2. "A First Course in Probability" by S.M. Ross.

"Probability and Statistics in Engineering" by W.W. Hines, D.C. Montgomery, D.M. Gpldsman & C. M.

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C++ LAB

(BASED ON 24CS301) Object Oriented Programming with C++

Core Practicals (Implement minimum 8 out of 10 practicals)

1. WAP to implement 'Inline function'.
2. WAP to implement call by reference and return by reference using class. [Hint. Assume necessary functions].
3. WAP to implement friend function by taking some real life example.
4. WAP to implement 'Function Overloading'.
5. WAP to implement Parameterized Constructor, Copy Constructor and Destructor.
6. WAP to show the usage of constructor in base and derived classes, in multiple inheritance.
7. WAP to show the implementation of 'containership'.
8. WAP to show swapping using template function (Generic).
9. WAP to implement 'Exception Handling'.
10. WAP to read and write values through object using file handling.

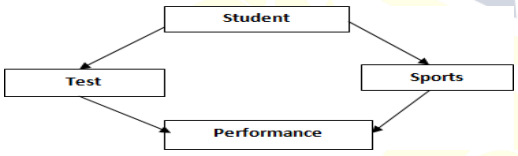
Application Based Practicals (Implement minimum 5 out of 10 practicals)

11. Create a class employee which have name, age and address of employee, include functions getdata() and showdata(), getdata() takes the input from the user, showdata() display the data in following format:

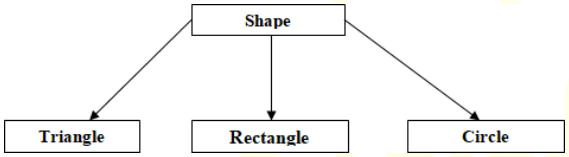
    Name:
    Age:
    Address:

12. Write a class called **C Account** which contains two private data elements, an integer **Account Number** and a floating-point **account Balance** and three-member functions:
    - A constructor that allows the user to set initial values for **Account Number** and **Account Balance** and a default constructor that prompts for the input of the values for the above data numbers.
    - A function called **Input Transaction**, which reads a character value for **Transaction Type** ('D' for deposit and 'W' for withdrawal) and a floating point value for **Transaction Amount**, which updates **Account Balance**.
    - A function called **Print Balance**, which prints on the screen the **Account Number** and **Account Balance.**

13. Define a class *Counter* which contains an int variable *count* defined as static and a static function Display () to display the value of *count*. Whenever an o b j e c t of this class is created *count* is incremented by 1. Use this class in main to create multiple objects of this class and display value of count each time.
14. WAP to add and subtract two complex numbers using classes.
15. Write program to overload Binary + to add two similar types of objects. (Both with and without using friend functions)
16. WAP to implement += and = operator
17. Implement the following class hierarchy considering appropriate data members and member functions:



18. Implement the following hierarchy considering appropriate data members and member functions (use Virtual functions).



19. WAP to convert meter to centimeter and vice versa, using data conversions and operator overloading
20. WAP to count digits, alphabets and spaces, stored in a text file, using streams.

Note:

1. **In total 10 practicals to be implemented. 2 additional practicals may be given by the course instructor.**
2. **This is a suggestive list of programs. However, the instructor may add programs as per the requirement of the course.**

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Theory Paper

Total: 100 Marks
External: 70 Marks
Internal: 30 Marks

External: 70 Marks
10 Question (MCQ): 1 mark each (1x10 = 10)
Answer any 6 out of 8 (Very Short 20-30 Words): 2 marks each (2x6 = 12)
Answer any 6 out of 8 (Short 50-70 Words): 3 marks each (3x6 = 18)
Answer any 3 out of 5 (Long 240-300 Words): 10 marks each (5x3 = 30)

Internal: 30 Marks
Two Internal Assessment Examinations will be conducted, each carrying 50 marks. The average of the two scores will be considered and scaled to 15 marks for the final assessment. Additionally, 5 marks will be allotted for assignments submitted, 5 marks for attendance, and 5 marks for general proficiency, making a total of 30 internal assessment marks.

Lab

Practical: 100 Marks
External: 70 Marks
Internal: 30 Marks

External (Two programs) : 70 Marks
Program Writing: 10 + 10 Marks
Algorithm & Flowchart : 5 + 5 Marks
Program Execution: 15 + 15 Marks
Viva: 10 Marks

Internal Assessment (30 Marks)
Internal Assessment Examinations will be conducted, carrying 50 marks
Record: 5 Marks
Attendance: 5 Marks
Program Writing: 15 Marks
Program Execution: 15 Marks
Viva: 10 Marks