

## ARYAVART INTERNATIONAL UNIVERSITY

Tilthai, Dharmanagar, North Tripura-799250

### Syllabus for BCA

#### Semester 1

Theory										
S. No.	Course Code	Topic	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
1	BCA101	Fundamentals of IT	3	1	0	4	80	20	0	100
2	BCA102	C Programming	3	1	0	4	80	20	0	100
3	BCA103	Discrete Mathematical Structure	4	0	0	4	80	20	0	100
4	BM101	Principle of Management	4	0	0	4	80	20	0	100
5	BM102	Business Communication	3	1	0	4	80	20	0	100
		<b>Total of Theory</b>				20	400	100	0	500
Practical										
6	BCA191	C Programming Lab	0	0	6	6	0	20	80	100
7	BM191	Business Communication Lab	0	0	6	6	0	20	80	100
		<b>Total of Practical</b>				12	0	40	160	200
<b>Total</b>						<b>32</b>	<b>400</b>	<b>140</b>	<b>160</b>	<b>700</b>

**Detailed Syllabus**

**FUNDAMENTALS OF IT**

**Code: BCA101**

Max Marks: 80

**UNIT I**

(6 Hrs)

Introduction to Computers: Characteristics of computers, Evolution of computers, Generation of computers, Block diagram of computer & role of each block, classification of computers, applications of computers.

Input and Output Devices: Keyboard, pointing devices, speech recognition, digital camera, scanners, optical scanners. Classification of output devices, printers, plotters. computer output microfilm (COM), Classification of output devices, devices- monitors, audio output, projectors and terminals.

Primary and Secondary Memory: Memory hierarchy, Random access memory (RAM), types of RAM, Read only memory (ROM), types of ROM. Classification of secondary storage devices, magnetic tape, magnetic disk, optical disk.

**UNIT II**

(6 Hrs)

Number Systems: Introduction to number system, Binary, Octal, Hexadecimal, conversion between number bases, Arithmetic operations on binary numbers.

Alphanumeric- BCD, EBCDIC, ASCII, Unicode.

Computer Software: Software definition, relationship between software and hardware. software categories, system software, application software, utility software.

Computer Languages: Introduction, classification of programming languages, generations of programming languages, features of a good programming language.

**UNIT III**

(10 Hrs)

MS Word: Word processing, MS-Word features, creating saving and opening documents in Word, interface, toolbars, ruler, menus, keyboard shortcut, editing, previewing. printing & formatting a document, advance features of MS Word, find & replace. Using thesaurus, mail merge, handling graphics, tables, converting a Word document into various formats like-text, rich text format, Word perfect, etc.

**UNIT IV**

(10 Hrs)

MS Excel: Worksheet basics, creating worksheet, entering data into worksheet, data, text. dates, alphanumeric values saving & quitting worksheet, opening and moving around in an existing worksheet, Toolbars and menus, Keyboard shortcuts, working with single and multiple workbook, working with formula & cell referencing, Auto sum, coping formulas. absolute and relative addressing, formatting of worksheet, previewing & printing worksheet, Graphs and Charts, Database, macros, multiple worksheets-concepts.

**UNIT V**

(12 Hrs)

Power Point: Creating and viewing a presentation, managing Slide Shows, navigating through a presentation, using hyperlinks, advanced navigation with action setting and action buttons, organizing formats with Master Slides, applying and modifying designs, adding graphics, multimedia and special effects.

Microsoft Access: Planning a database (tables, queries, forms, reports), creating and editing database, customizing tables, linking tables, designing and using forms. modifying database structure, Sorting and Indexing database, querying a database and generating reports.

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**Text Book:**

1. Introduction to Computer, Peter Norton's, Tata McGraw Hill Publication

**Reference Books:**

1. Microsoft; 2007/2010 Microsoft Office System; PHI.
2. Microsoft; Microsoft Office 2007/2010: Plain & Simple; PHI.
3. Sanjay Saxena; A First Course in Computers 2003 Edition; Vikas Pub.
4. Computer Fundamentals by P.K. Sinha, BPB Publication.
5. Computer Fundamentals and Programming in C, Reema Thareja, OXFORD University Press.
6. MS-Office, Dr. S.S. Shrivastava, Published by Laxmi Publication.
7. Office 2019: In Easy Steps, Michal Price, BPB Publication.



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**C PROGRAMMING**

**Code: BCA102**

Max Marks: 80

**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** (12 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** (10 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** (5 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: BCA103**

Max Marks: 80

**UNIT I** (10 Hrs)

Set Theory : Relations and Functions : Set Notation and Description, subset, basic set operations, Venn Diagrams, laws of set theory, partitions of sets, min sets, duality principle, basic definitions of relations and functions, graphics of relations, properties of relations: injective, surjective and bijective functions, compositions.

**UNIT II** (8 Hrs)

Recurrence : Recurrence Relations and Recursive Algorithms – Linear-Recurrence Relations with Constant Coefficients; Homogeneous Solutions : Particular Solution, Total Solution, Solution by the Method of Generating functions.

**UNIT III** (8 Hrs)

Graph Theory : Graph and planar graphs – Basic Terminology, Multi-graphs, Weighted Graphs, Paths and Circuits, Shortest Paths, Eulerian Paths and Circuits.

Travelling Salesman Problem, Planar Graphs.

**UNIT IV** (10 Hrs)

Automata Theory : Finite State Machines–Equivalent Machines, Finite State Machines as language Recognizers; Analysis of Algorithms - Time Complexity, Complexity of Problems.

**UNIT V** (8 Hrs)

Propositional Logic: Logical Connectives, Well-formed Formulas, Tautologies, Equivalences, Inference Theory

**Text Book:**

1. Rosen, K.H., Discrete Mathematics and its Applications, McGraw Hill Education, 8th edition 2021

**Reference Books:**

1. Doerr, A. and Kenneth, L., Applied Discrete Structures for Computer Science, 1989, Galgotia Publications Pvt. Ltd.
2. Liu, C. L., 1985, Elements of Discrete Mathematics, McGraw Hill.
3. Seymour Lipschutz and Lipson, :2000 Solved Problems in Discrete Mathematics, McGraw- Hill., 1992

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**PRINCIPLE OF MANAGEMENT**

**Code: BM101**

Max Marks: 80

**UNIT I** (8 Hrs)

**Nature of Management:** Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System, Concepts of management-Administration Organization, Management Skills, Levels of Management.

**UNIT II** (8 Hrs)

**Evolution of Management Thought:** Contribution of F.W.Taylor, Henri Fayol, Elton Mayo, Chester Barhard & Peter Drucker to the management thought. Business Ethics & Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

**UNIT III** (10 Hrs)

**Functions of Management: Part-I**

Planning – Meaning- Need & Importance, types, Process of Planning, Barriers to Effective Planning, levels, advantages & limitations, Forecasting- Need & Techniques

Decision making-Types - Process of rational decision-making & techniques of decision-making

Organizing – Elements of organizing & processes: Types of organizations, Delegation of authority – Need, difficulties, Delegation – Decentralization

Staffing – Meaning & Importance, Direction – Nature – Principles, Communication – Types & Importance

**UNIT IV** (8 Hrs)

**Functions of Management: Part-II**

Motivation – Importance – theories

Leadership – Meaning –styles, qualities & function of leader Controlling - Need, Nature, importance, Process & Techniques, Total Quality Management Coordination – Need –Importance

**UNIT V** (8 Hrs)

**Management of Change:** Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.

Strategic Management: Definition, Classes of Decisions, Levels of Decision, Strategy, Role of different Strategist, Relevance of Strategic Management and its Benefits, Strategic Management in India

**Text Book:**

1. Principles & Practice of Management - Dr. L.M. Prasad, Sultan Chand & Sons - New Delhi

**Reference Books:**

1. Essential of Management - Horold Koontz and Iteinz Weibrich - McGraw hills International
2. Management Theory & Practice - J.N. Chandan
3. Essential of Business Administration - K. Aswathapa Himalaya Publishing House
4. Business Organization & Management - Dr. Y.K. Bhushan
5. Management: Concept and Strategies By J. S. Chandan, Vikas Publishing
6. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
7. Business organization and Management by Talloo by Tata McGraw Hill



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**BUSINESS COMMUNICATION**

**Code: BM102**

Max Marks: 80

**UNIT I** (8 Hrs)

**Means of Communication:**

Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication

**UNIT II** (12 Hrs)

**Types of Communication:**

Oral Communication: Meaning, nature and scope – Principle of effective oral communication – Techniques of effective speech – Media of oral communication (Face -to-face conversation – Teleconferences – Press-Conference – Demonstration – Radio Recording – Dictaphone – Meetings – Rumour –Demonstration and Dramatisation – Public address system – Grapevine – Group Discussion –Oral report – Closed circuit TV). The art of listening – Principles of good listening.

**UNIT III** (5 Hrs)

**Written Communication**

Purpose of writing, Clarity in Writing, Principles of Effective writing, Writing Techniques, Electronic Writing Process.

**UNIT IV** (12 Hrs)

**Business Letters & Reports:**

Need and functions of business letters – Planning & layout of business letter – Kinds of business letters – Essentials of effective correspondence, Purpose, Kind and Objective of Reports, Writing Reports.

Drafting of business letters: Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters –Circular letters Application for employment and resume

**UNIT V** (6 Hrs)

**Information Technology for Communication:**

Word Processor – Telex – Facsimile(Fax) – E-mail – Voice mail –Internet – Multimedia –Teleconferencing – Mobile Phone Conversation – Video Conferencing –SMS – Telephone Answering Machine – Advantages and limitations of these types.

**Text Book:**

1. Business Communication - M. Balasubrahmanyam - Vani Educational Books

**Reference Books:**

1. Business Communication - K. K. Sinha - Galgotia Publishing Company, New Delhi.
2. Media and Communication Management - C. S. Rayudu - Himalaya Publishing House, Bombay.
3. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli - Sultan Chand & Sons, New Delhi.
4. Business Communication (Principles, Methods and Techniques) Nirmal Singh - Deep & Deep Publications Pvt. Ltd., New Delhi.
5. Business Communication - Dr. S.V. Kadvekar, Prin. Dr. C. N. Rawal and Prof. Ravindra Kothavade - Diamond Publications, Pune.
6. Business Correspondence and Report Writing - R. C. Sharma, Krishna Mohan - Tata McGraw Hill Publishing Company Limited, New Delhi.
7. Communicate to Win - Richard Denny - Kogan Page India Private Limited, New Delhi.
8. Modern Business Correspondence - L. Gartside - The English Language Book Society and Macdonald and Evans Ltd.

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**COMPUTER LAB-1**

(BASED ON BCA102) C Programming:

**Part A**

1. To find the roots of the quadratic equation ( $ax^2+bx+c=0$ ) with different possible input values for a, b and c.
2. Write a program to take input of name, roll no and marks obtained by a student in 4 subjects of 100 marks each and display the name, roll no with percentage score secured.
3. To check whether the given integer is PALINDROME or NOT
4. To find Square Root of a given Number.
5. To check whether the given year is leap year or not.
6. To find the value of the polynomial Design and develop an algorithm for evaluating the polynomial  $f(x)=a_4 x^4+a_3 x^3+a_2 x^2+a_1 x+a_0$ , for a given value of x and its coefficients using Horner's method.
7. To arrange given N integers in ascending order using Bubble Sort.

**Part B**

1. To read two matrices A(m x n) and B(p x q) and Compute the product A and B.
2. To search a name in list of names using Binary Searching Technique
  - A) To execute a C program that Implements string copy operation STRCOPY(str1, str2) that copies a string str1 to another string str2 without using library function.
  - B) To Read a sentence and prints frequency of each of the vowels and total count of consonants.
3. Design and develop a function is prime (x) that accepts an integer argument and returns 1 if the argument is prime and 0 otherwise. The function must use plain division checking approach to determine if a given number is prime. Invoke this function from the main with different values obtained from the user and print appropriate messages
4. Draw the flow chart and write a Recursive C function to find the factorial of number n! defined by  $fact(n)=1$ , if  $n=0$ , otherwise  $fact(n)=n*fact(n-1)$ , using this function write a c program to compute the binomial co-efficient  $nCr$ . Tabulate the results for different values of n and r using suitable messages.
5. Given two university information files "studentname.txt" and "usn.txt" that contains students names and USN respectively. Write a C program to a new file called "output.txt" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence shows below. Display the content of output file "output.txt" on to the screen.
6. Write a C program to maintain a record of "n" student details using an array of structures with four fields (Roll number, Name, marks, and Grade). Each field is of an appropriate data type. Print the marks of the student given name as input.



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**BUSINESS COMMUNICATION LAB-1**

(BASED ON BM102) Business Communication:

1. **Communication:** Objectives & Process of Communication, Essential Components of the process of Communication, Importance and Objectives of Communication, Differences between general and technical communication. Types of Communication (Extrapersonal, Intrapersonal, Interpersonal, Organizational & Mass Communication)
2. **Verbal & Non-Verbal Communication:** listening, Speaking, Reading and Writing, Verbal and Non-Verbal Communication, Intra, inter-personal and group communication skills. Gestures, postures, Proxemics, Kinesics, Listening to Lectures, Discussion, Talk Shows, News Programs.
3. **Writing Skills:** Formal & Informal writings, report writing, creative writing. Composition, Resume writing, cover letters, Business Letter Writing, Persuasive Letters, Job Applications and Official Correspondence, E-mail etiquette, Precise writing
4. **Presentation Skills:** Elements of effective presentation, structure of presentation, external factors and content, Seminar, Speeches, Lectures, Interviews, Mock Interviews
5. **Group Discussion:** Structure of GD, Moderator led and other GDs, Strategies in GD, Team work body language, Mock GD, Problem solving, Reflective thinking, Critical Thinking, Negotiation skills
6. **Career Skills:** Goal Settings, Work ethics, Problem Solving skills, Active listening, Dressing etiquette and office etiquettes. SWOT Analysis, IQ, EQ and SQ, Art of giving feedback, Decision making, Time management, Team Management and Leadership Skills, Habits of Successful people.



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**Theory Paper**

Total: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External : 80 Marks**

15 Question (MCQ): 1 marks each ( $1 \times 15 = 15$ )

10 Question (Very Short 20-30 Words): 2 marks each ( $2 \times 10 = 20$ )

5 Question (Short 50-70 Words): 3 marks each ( $3 \times 5 = 15$ )

Answer any 5 out of 6 (Long 100 Words): 4 marks each ( $4 \times 5 = 20$ )

Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each ( $10 \times 1 = 10$ )

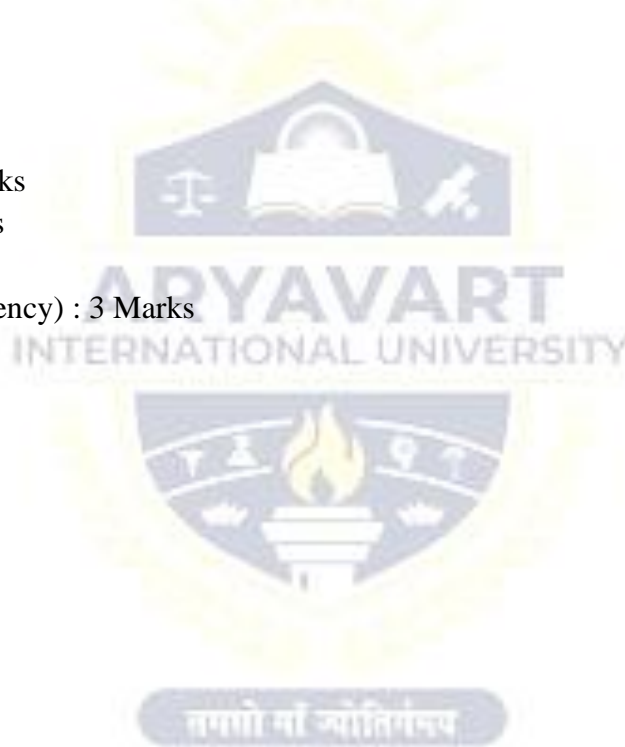
**Internal : 20 Marks**

Internal Exam: 8 Marks

Assignment : 6 Marks

Attendance : 3Marks

G.P. (General Proficiency) : 3 Marks



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**Programming Lab**

Practical: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External (Two programs) : 80 Marks**

Program Writing: 10 marks each (10x2 = 20)

Algorithm: 5 marks each (5x2 = 10)

Flowchart: 5 marks each (5x2 = 10)

Program execution: 15 marks each (15x2 = 30)

Viva: 10 marks

**Internal : 20 Marks**

Record: 4 Marks

Algorithm : 5 Marks

Flowchart : 5 Marks

Attendance : 3Marks

G.P. : 3 Marks



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**BUSINESS COMMUNICATION LAB**

Total: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External : 80 Marks**

Personal Grooming & Hygiene: 10 marks

Basic Etiquettes: 5 marks

Presentation Skills: 5 marks

Reading Skills: 10 marks

Listening Skills: 10 marks

Speaking Skills: 10 marks

Presentation (two): 10 marks each (10x2 = 20)

Viva: 10 marks

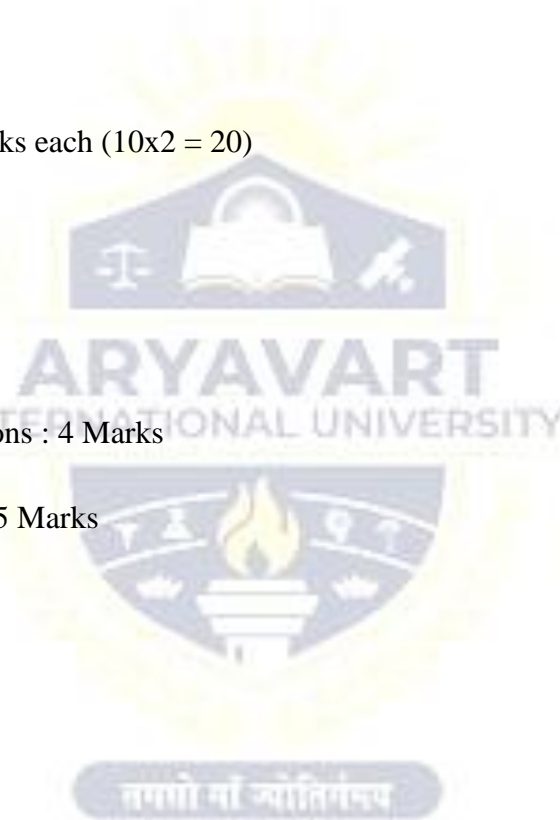
**Internal : 20 Marks**

Attendance : 3 Marks

Assignments & Presentations : 4 Marks

Class tests : 8 Marks

Projects and Field Work : 5 Marks



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Syllabus for BCA

Semester 2

Theory										
S. No.	Course Code	Topic	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
1	BCA201	Object Oriented Programming using C++	4	1	0	5	80	20	0	100
2	BCA202	Database Management System	4	1	0	5	80	20	0	100
3	BCA203	Computer Organization	3	1	0	4	80	20	0	100
4	BM201	Management Information System	3	1	0	4	80	20	0	100
5	ESC101	Environmental Studies	2	0	0	2	80	20	0	100
6	BCA291	C++ Lab	0	0	6	6	0	20	80	100
7	BCA292	Database Management System Lab	0	0	6	6	0	20	80	100
<b>Total</b>						<b>32</b>	<b>400</b>	<b>140</b>	<b>160</b>	<b>700</b>

तमसो मा ज्योतिर्गमय

**Detailed Syllabus**

**OBJECT ORIENTED PROGRAMMING USING C++**

**Code: BCA201**

Max Marks: 80

**Course Objectives:** This course on Object-Oriented Programming using C++ aims to equip students with a strong understanding of essential OOP concepts and practical skills in C++ syntax. Students will learn to design and implement classes, utilize inheritance and polymorphism, and apply OOP principles to real-world projects, preparing them for proficient software development in C++.

**UNIT I:** (14 Hours)

**Principles of Object Oriented Programming (OOP):** Introduction to OOP, Difference between OOP and Procedure Oriented Programming; Concepts: Object, Class, Encapsulation, Abstraction, Polymorphism and Inheritance, Applications of OOP. Special operators: scope resolution operator, Member Dereferencing operators, Memory management operators, Manipulators and Type cast operator

**Structure of a C++ Program and Classes and Objects:** Class Declaration : Data Members, Member Functions, Private and Public members, Creating Objects, Accessing class data members, Accessing member functions; Class Function Definition: Member Function definition inside the class declaration and outside the class declaration.

**UNIT II:** (14 Hours)

Friend function, inline function, Static members, Function Overloading, Arrays within a class. Arrays of Objects; Objects as function arguments: Pass by value, Pass by reference, Pointers to Objects.

**Constructors:** Declaration and Definition, Types of Constructors, (Default, Parameterized, Copy Constructors).  
**Destructors:** Definition and use.

**Operator Overloading & Type Conversion:** Conversion from basic type to user defined type, User defined to basic type and one user defined conversion to another user defined type.

**UNIT III:** (12 Hours)

**Inheritance:** Extending Classes Concept of inheritance, Base class, Defining derived classes, Visibility modes : Public, Private, Protected ;Types of Inheritance: Single inheritance : : 20 Privately derived, Publicly derived; Making a protected member inheritable, multilevel inheritance, multiple Inheritance and ambiguity of multiple inheritance, Hierarchal Inheritance, Hybrid, Nesting of classes.

**Polymorphism:** Definition, Application and demonstration of Data Abstraction, Encapsulation and Polymorphism. Early Binding, Polymorphism with pointers, Virtual Functions, Late binding, pure virtual functions.

**UNIT IV:** (6 Hours)

**Exception Handling:** Definition, Exception Handling Mechanism : Throwing mechanism and Catching Mechanism, Rethrowing an Exception

**File Processing:** Opening and closing of file, Binary file operations, structures and file operations, classes and file operations, Random file processing.



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**Text Book:**

1. E. Balaguruswamy, 2008 : Object Oriented Programming with C++, TMH.

**Reference Books:**

1. Bjarne Stroustrup, 2009 : The C++ Programming Language, Addison-Wesley Publishing Company.
2. Robert Lafore, 2003 : Object Oriented Programming in Turbo C++, Galgotia Pub.
3. Salaria, R. S. : Object Oriented Programming Using C++, Khanna Book Publishing Co. (P.) Ltd., New Delhi.

**C++ LAB**

**Code: BCA201P**

Max Marks: 80

**Programming Lab**

**PART A:**

1. Write a C++ program to reverse a given number
2. Write a C++ program to add two numbers using class
3. Write a C++ program to demonstrate the usage of scope resolution operator.
4. Write a C++ program to add two numbers using functions.
5. Write a C++ program to accept and display the details of a student using class.
6. Write a C++ program to accept and display the details of an employee using a class.
7. Write a C++ program to count the number of words and characters in a given text.
8. Write a C++ program to compare two strings using string functions
9. Write a C++ program to calculate the area of rectangle, square using function overloading.
10. Write a C++ program to add two numbers using pointers.

**PART-B**

11. Write a C++ program to create a class template to find the maximum of two numbers.
12. Write a C++ program to display the student details using pointers.
13. Write a C++ program to calculate total sales and average sales made by a salesman.
14. Write a C++ program to check whether the given matrix is a sparse matrix or not.
15. Write a program to add integer in array in sorted location like given array of integer. Then multiply multiple of 3 with 2 and display that array in descending order  
A={4, 7, 9, 17, 18, 17, 29, 30, 35, 40}
16. Write a C++ program to find the area of circle and rectangle using virtual function.
17. Write a C++ program to perform complex number subtraction by overloading an operator using friend function.
18. Write a C++ program to swap two numbers using call by reference.
19. Write a program to convert meter to centimeter and vice versa, using data conversions and operator overloading
20. Write a program to count digits, alphabets and spaces, stored in a text file, using streams

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**DATABASE MANAGEMENT SYSTEM**

**Code: BCA202**

Max Marks: 80

**Course Objectives:** The course objectives of a Database Management System (DBMS) typically aim to provide students with a fundamental understanding of database concepts, including data modeling, normalization, SQL querying, and database administration. Students are expected to gain hands-on experience in designing, implementing, and managing databases to support various applications and business requirements.

**UNIT -I** (6 Hours)

**Introduction To Database System:** What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management

**UNIT -II** (6 Hours)

**Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.

**UNIT-III** (12 Hours)

**Database Design, ER-Diagram and Unified Modeling Language:** Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML

**Relational database model:** Logical view of data, keys, integrity rules.

**Relational Database design:** features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).

**UNIT-IV** (10 Hours)

**Relational Algebra and Calculus:** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities

**UNIT-V** (10 Hours)

**Constraints, Views and SQL:** What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.

**UNIT-VI** (8 Hours)

**Transaction Management and Concurrency Control:** Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.

**Text Books**

1. A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill

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**Reference Books**

1. Abraham Silberschatz, Henry Korth, S. Sudarshan, "Database Systems Concepts", 7th Edition, McGraw Hill.
2. Rajesh Narang "Database management System" PHI.
3. Ramakrishnan and Gherke, "Database Management Systems", TMH.
4. R. Elmarsri and SB Navathe, "Fundamentals of Database Systems", Pearson, 5th Ed.
5. Singh S.K., "Database System Concepts, design and application", Pearson Education
6. Bipin Desai, "An Introduction to database Systems", Galgotia Publications.

**DATABASE MANAGEMENT SYSTEM LAB**

**Code: BCA202P**

Max Marks: 80

**Programming Lab**

**PART A:**

1. EMPLOYEES (Employee\_Id, First\_Name, Last\_Name, Email, Phone\_Number, Hire\_Date, Job\_Id, Salary, Commission\_Pct, Manager\_Id, Department\_Id)
  - a) Create Schema and insert at least 5 records for each table. Add appropriate database constraints
  - b) Find out the employee id, names, salaries of all the employees
  - c) List out the employees who works under Manager\_Id 100
  - d) Find the names of the employees who have a salary greater than or equal to 4800
  - e) List out the employees whose last name is 'AUSTIN'
  - f) Find the names of the employees who works in Department\_Id 60, 70 and 80
  - g) Display the unique Manager\_Id.
2. Create Client\_master with the following fields (ClientNO, Name, Address, City, State, bal\_due)
  - a) Create Schema and Insert five records
  - b) Find the names of clients whose bal\_due > 5000.
  - c) Change the bal\_due of ClientNO "C123" to Rs. 5100
  - d) Change the name of Client\_master to Client12.
  - e) Display the bal\_due heading as "BALANCE"
3. Create Teacher table with the following fields (Name, DeptNo, Date of joining, DeptName, Location, Salary)
  - a) Create Schema and Insert five records
  - b) Give Increment of 25% salary for Mathematics Department.
  - c) Perform Rollback command
  - d) Give Increment of 15% salary for Commerce Department
  - e) Perform commit command
4. Create Sales table with the following fields (Sales No, Salesname, Branch, Salesamount, DOB)
  - a) Create Schema and Insert five records
  - b) Calculate total salesamount in each branch
  - c) Calculate average salesamount in each branch.
  - d) Display all the salesmen, DOB who are born in the month of December as day in character format i.e. 21-Dec-09
  - e) Display the name and DOB of salesman in alphabetical order of the month.
5. (EmpNo, EmpName, Job, Basic, DA, HRA, PF, GrossPay, NetPay)  
(Calculate DA as 30% of Basic and HRA as 40% of Basic)
  - a) Create Schema and Insert Five Records and calculate GrossPay and NetPay.
  - b) Display the employees whose Basic is lowest in each department.

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- c) If NetPay is less than <Rs. 10,000 add Rs. 1200 as special allowances.  
d) Display the employees whose GrossPay lies between 10,000 & 20,000  
e) Display all the employees who earn maximum salary .
6. Employee Database  
An Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas  
Dept (deptno, dname, loc)  
Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)  
a) Create Schema and insert at least 5 records for each table. Add appropriate database constraints  
b) Update the employee salary by 15%, whose experience is greater than 10 years.  
c) Delete the employees, who completed 30 years of service.  
d) Display the manager who is having maximum number of employees working under him?  
e) Create a view, which contain employee names and their manager
7. Employee Database  
Dept (deptno, dname, loc)  
Emp (empno, ename, job, mgr, hiredate, sal, comm, deptno)  
Perform the following queries  
a) Determine the names of employee, who earn more than their managers.  
b) Determine the names of employees, who take highest salary in their departments.  
c) Determine the employees, who are located at the same place.  
d) Determine the employees, whose total salary is like the minimum Salary of any department.  
e) Determine the department which does not contain any employees.
8. Consider the schema for College Database:  
STUDENT(USN, SName, Address, Phone, Gender)  
SEMSEC(SSID, Sem, Sec)  
CLASS(USN, SSID)  
COURSE(Subcode, Title, Sem, Credits)  
IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)  
Write SQL queries to  
a) List all the student details studying in fourth semester 'C' section.  
b) Compute the total number of male and female students in each semester and in each section.  
c) Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.  
d) Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.  
e) Categorize students based on the following criterion:  
If FinalIA = 17 to 20 then CAT = 'Outstanding'  
If FinalIA = 12 to 16 then CAT = 'Average'  
If FinalIA < 12 then CAT = 'Weak'  
Give these details only for 8th semester A, B, and C section students.
9. Consider the schema for 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)  
Write SQL queries to  
a) Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.  
b) Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.

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- c) Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
  - d) Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
  - e) For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.
10. Create two tables and insert atleast 5 data in each table: employees and departments. The employees table contains information about employees such as their employee\_id, name, department\_id, and salary. The departments table contains information about departments such as department\_id and department\_name. Write a SQL query to retrieve the names of employees along with their corresponding department names. Use an inner join to achieve this.
11. Create a table named sales that contains information about sales transactions. The table has columns for transaction\_id, customer\_id, product\_id, and amount. Insert atleast 5 data.  
Write SQL queries to perform the following tasks:
- a) Calculate the maximum amount of a single transaction.
  - b) Calculate the minimum amount of a single transaction.
  - c) Calculate the average amount of all transactions.
  - d) Count the total number of transactions.
12. Create two tables named students and teachers. Insert atleast 5 data in each table. The students table contains information about students including student\_id, student\_name, and class\_id. The teachers table contains information about teachers including teacher\_id, teacher\_name, and class\_id.  
Write a SQL query to perform a full join between the students and teachers tables to retrieve information about all students and teachers, including those who are not assigned to any class.

**COMPUTER ORGANIZATION**

**Code: BCA203**

Max Marks: 80

**Course Objectives:** To understand the basic organization of computers and the working of each component and CPU. To bring the programming features of 8085 Microprocessor and know the features of latest microprocessors. To understand the principles of Interfacing I/O devices and Direct Memory accesses

**UNIT -I**

(10 Hours)

**Computer Organisation:** Evolution of Computers, Von Neumann Architecture, Combinatorial Blocks : Gates, Half Adder, Full Adder, Multiplexers, Decoders, Encoders; Sequential Building blocks : Flip Flops, Registers, Counters, Information representation: codes, fixed and floating point representation Arithmetic: Addition and subtraction for sign magnitude and 2's complement numbers, integer multiplication using Booth's algorithms

**UNIT -II**

(10 Hours)

**Architecture of a Simple Processor:** Architecture of 8086/8088 microprocessor, instruction set, Addressing Modes. Instruction: Microinstructions: Register Transfer, Arithmetic, Logical and Shift, Types of Instructions, Instruction Cycle. Interrupt: Types, Interrupt Cycle I/O organization: Strobe based and Handshake based communication, DMA based data transfer.

**UNIT-III**

(10 Hours)

**Memory Organisation:** Memory Hierarchy, RAM (Static and Dynamic), ROM Associative memory, Cache memory organisation, Virtual memory organisation. Assembly Language : Features of Assembly Language,



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Machine Language vs Assembly Language, Pseudo Instruction; use of Assembly for programs: Addition, Subtraction, Multiplication using Subroutines and Basic Input/ Output.

**UNIT-IV**

(10 Hours)

**System Maintenance:** Introduction to various physical components of a computer, Physical Inspection and Diagnostics on PC, Functional description of various Internal and External cards; Viruses: Types of Computer Viruses, Detection, prevention and protection from Viruses

**Text Book:**

1. M. Morris Mano, 1993. : Computer System Architecture, Prentice Hall International, 3rd Ed.

**Reference Books:**

1. P. Pal Choudhri, 1994. : Computer Organisation and Design, Prentice Hall of India.
2. Biswal, Sadasiva, 2001 : Basic Electronics, Pub-Atlantic, New Delhi.
3. B. Govindarajalu, 1994. : IBM-PC and Clones - Hardware Troubleshooting and Maintenance, Tata-McGraw-Hill.

**MANAGEMENT INFORMATION SYSTEM**

**Code: BM201**

Max Marks: 80

**Course Objectives:** This course aims to provide students with a deep understanding of Management Information Systems (MIS) and their strategic importance in organizational decision-making. Students will learn to analyze business processes, assess information needs, and design MIS solutions, enabling them to contribute effectively to organizational success in today's digital business environment.

**UNIT -I**

(6 Hours)

**Introduction to system and Basic System Concepts:** Types of Systems, The Systems Approach, Information System: Definition & Characteristics, Types of information, Role of Information in Decision-Making, Sub-Systems of an Information system: EDP and MIS management levels, EDP/MIS/DSS.

**UNIT -II**

(6 Hours)

**An overview of Management Information System:** Definition & Characteristics, Components of MIS, Frame Work for Understanding MIS: Information requirements & Levels of Management, Simon's Model of decision-Making, Structured Vs Un-structured decisions, Formal vs. Informal systems

**UNIT-III**

(6 Hours)

**Developing Information Systems:** Analysis & Design of Information Systems: Implementation & Evaluation, Pitfalls in MIS Development.

**UNIT-IV**

(10 Hours)

**Functional MIS:** A Study of Personnel, Financial and production MIS, Introduction to e-business systems, ecommerce – technologies, applications, Decision support systems – support systems for planning, control and decision-making



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**Text Book:**

1. Rajaraman, "Analysis and Design of Information System", PHI Publication, ISBN – 8120312270

**Reference Books**

1. J. Kanter, "Management/Information Systems", PHI.
2. Gordon B. Davis, M. H. Olson, "Management Information Systems – Conceptual foundations, structure and Development", McGraw Hill.
3. James A. O'Brien, "Management Information Systems", Tata McGraw-Hill.
4. James A. Senn, "Analysis & Design of Information Systems", Second edition, McGraw Hill.
5. Robert G. Murdick & Joel E. Ross & James R. Claggett, "Information Systems for Modern Management", PHI.
6. Lucas, "Analysis, Design & Implementation of Information System", McGraw Hill.

**ENVIRONMENTAL STUDIES**

**Code: ESC101**

Max Marks: 80

**Course Objectives:** Gain a comprehensive understanding of the natural world and human impact on it through this course. Explore topics such as ecosystems, biodiversity, climate change, and sustainability, and develop the skills to address complex environmental challenges.

**UNIT -I**

(4 Hours)

**The Multidisciplinary nature of environmental studies:** Definition, scope and importance. Need for Public awareness

**UNIT -II**

(8 Hours)

**Natural Resources:** Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation : deforestation, case studies, Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources : World food problems, changes caused by overgrazing and effects of modern agriculture fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

\* Role of an individual in conservation of natural resources .

\* Equitable use of resources for sustainable lifestyle.

**UNIT-III**

(8 Hours)

**Ecosystems:** Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposer. Energy flow in the ecosystem. Ecological succession. Food chains and ecological pyramids.

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Introduction, types, characteristic features, structure and function of the following eco-system: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (Ponds, streams, lakes, rivers, ocean, estuaries).

**UNIT-IV**

(8 Hours)

**Biodiversity and its conservation.** Introduction-Definition: Genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity : In-situ and ex-situ conservation of biodiversity.

**UNIT-V**

(6 Hours)

**Environmental Pollution:** Definition, Causes, effects and control measures of : Air pollution. Water pollution. Soil pollution. Marine pollution. Noise pollution. Thermal pollution. Nuclear hazards.

**Solid wastes management:** Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies.

**Disaster management:** floods, earthquake, cyclone and landslides.

**UNIT-VI**

(6 Hours)

**Social issues and the Environment:** From unsustainable to sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people : its problems and concerns. Case studies.

**Environmental ethics:** Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

**UNIT-VII**

(4 Hours)

Human population and the Environment. Population growth, variation among nations. Population explosion-Family Welfare programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Woman and Child Welfare Role of Information Technology in Environment and human health. Case Studies.

**Text Book:**

1. Trivedi R.K. and P.K. Goel, Introduction to air pollution, techno Science Publications (TB).

**Reference Books:**

1. Aggarwal, K.C. 2001 Environmental Biology, Nidi Pub. Ltd. Bikaner.
2. Bharucha, Frach, The Biodiversity of India. Mapin Publishing Pvt. Ltd., India.
3. Burner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480 p.
4. Clark R.S. Marine Pollution, Slanderson Press Oxford (TB).
5. Conningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico pub. House, Mumbai, 1196 P.
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Dawn to Earth, Centre for Science and Environment (R).
8. Gleick, H.P., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press 473 p.

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9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
10. Heywood, V.H. & Waston, R.T. 1995, Global Biodiversity Assessment. Cambridge Uni. Press 1140p.

**Theory Paper**

Total: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External : 80 Marks**

15 Question (MCQ): 1 marks each (1x15 = 15)

10 Question (Very Short 20-30 Words): 2 marks each (2x10 = 20)

5 Question (Short 50-70 Words): 3 marks each (3x5 = 15)

Answer any 5 out of 6 (Long 100 Words): 4 marks each (4x5 = 20)

Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

**Internal : 20 Marks**

Internal Exam: 8 Marks

Assignment : 6 Marks

Attendance : 3Marks

G.P. (General Proficiency) : 3 Marks

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**C++ Programming Lab**

Practical: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External (Two programs) : 80 Marks**

Program Writing: 10 marks each (10x2 = 20)

Algorithm: 5 marks each (5x2 = 10)

Flowchart: 5 marks each (5x2 = 10)

Program execution: 15 marks each (15x2 = 30)

Viva: 10 marks

**Internal : 20 Marks**

Record: 4 Marks

Algorithm : 5 Marks

Flowchart : 5 Marks

Attendance : 3Marks

G.P. : 3 Marks



Practical: 100 Marks

External: 80 Marks

Internal: 20 Marks

**External (Two programs) : 80 Marks**

Program Writing: 10 marks each (10x2 = 20)

Schema: 5 marks each (10x2 = 20)

Program execution: 15 marks each (15x2 = 30)

Viva: 10 marks

**Internal : 20 Marks**

Record: 4 Marks

Schema : 10 Marks

Attendance : 3Marks

G.P. : 3 Marks

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Syllabus for BCA

Semester 3

Theory										
S. No.	Course Code	Topic	L	T	P	Credit	Theory Marks	Internal Marks	Practical Marks	Total Marks
1	BCA301	Operating System Concepts	4	1	0	5	70	30	0	100
2	BCA302	Data Structure Using C	4	1	0	5	70	30	0	100
3	BCA303	Computer Networks	4	1	0	5	70	30	0	100
4	BM301	Accounting & Financial Management	2	0	0	2	70	30	0	100
5	BCA304	Basics of UNIX Operating System	4	1	0	5	70	30	0	100
6	BCA391	Data Structures Using C Lab	0	0	5	5	0	30	70	100
7	BCA392	Introduction to Unix/ Linux Laboratory	0	0	5	5	0	30	70	100
<b>Total</b>						<b>32</b>	<b>350</b>	<b>210</b>	<b>140</b>	<b>700</b>

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**Detailed Syllabus**

**OPERATING SYSTEM CONCEPTS**

**Code: BCA301**

Max Marks: 70

**Course Objectives:** The course objectives for Operating System Concepts include understanding process and memory management, storage and I/O systems, and concurrency and synchronization. Students will learn about resource allocation, security, and distributed systems, with a focus on performance evaluation and optimization. Practical applications and case studies provide hands-on experience with different operating systems, such as Windows and Unix/Linux, to build a solid foundation in OS design and implementation.

**UNIT I:** (14 Hours)

**Introduction:** Definition of Operating System, Computer-System Organization, Computer System Architecture, Operating-System Structure, Operating System Structures: Operating- System Services, System Calls, Types of System Calls.

**Process:** Process Concept, Process Scheduling, Operations on Processes, Inter process Communication, Threads: Overview, Multi core Programming, Multithreading Models, Threading Issues. CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms

**UNIT II:** (8 Hours)

**Process Synchronization:** Background, The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic Problems of Synchronization, Monitors.

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**UNIT III:** (10 Hours)

**Main Memory:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of the Page Table.

**Virtual Memory:** Background, Demand Paging, Page Replacement, Allocation of Frames, Thrashing, Memory-Mapped Files, Mass-Storage Structure, Overview of Mass- Storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Formatting, RAID Structure

**UNIT IV:** (12 Hours)

**File-System Interface:** File Concept, Access Methods, Directory and Disk Structure, Protection.

**File-System Implementation:** File-System Structure, File-System Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

**I/O Systems:** Overview, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Requests to Hardware Operations.

**UNIT V:** (04 Hours)

**Protection:** Goals of Protection, Principles of Protection, Domain of Protection Access Matrix, Implementation of the Access Matrix, Access Control, Revocation of Access Rights, Capability Based Systems.

**Security:** The Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication.



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**Text Book:**

1. A.Tanenbaum, "Modern Operation Systems", Third Edition, Pearson Education, 2008.

**Reference Books:**

1. William Stallings, "Operating Systems", Fifth Edition, Pearson Education, 2005.
2. Ida M.Flynn, "Understanding Operating Systems", Sixth Edition, Cengage, 2011.
3. D.M.Dhamdhere, "Operating systems a concept based approach", Second Edition, McGraw-Hill, 2007
4. Abraham Silberschatz, Peter Galvin, Greg Gagne, "Operating System Concepts", Ninth Edition, John Wiley and sons publication, 2013.

**DATA STRUCTURE USING C**

**Code: BCA302**

Max Marks: 70

**Course Objectives:** The course aims to familiarize students with fundamental data structures such as arrays, linked lists, stacks, queues, trees, and graphs, utilizing the C programming language. Students will learn to implement these data structures efficiently, analyze their time and space complexities, and apply them to solve real-world problems. Through programming assignments and projects, students will develop proficiency in C programming and algorithmic thinking essential for software development and computer science applications.

**UNIT -I** (02 Hours)

**Introduction to Data Structure and its Characteristics:** Array Representation of single and multidimensional arrays; Sprase arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

**UNIT -II** (12 Hours)

**Stacks and Queues:** Introduction and primitive operations on stack; Stack application; Infix, postfix, prefix expressions; Evaluation of postfix expression; Conversion between prefix, infix and postfix, introduction and primitive operation on queues, D- queues and priority queues.

**UNIT-III** (07 Hours)

**Lists:** Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

**UNIT-IV** (07 Hours)

**Trees:** Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

**B-Trees:** Introduction, The invention of B-Tree; Statement of the problem; Indexing with binary search trees; a better approach to tree indexes; B-Trees; working up from the bottom; Example for creating a B-Tree

**UNIT-V** (10 Hours)

**Sorting Techniques:** Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing

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**Text Book:**

1. Kamthane: Introduction to Data Structures in C. Pearson Education 2005

**Reference Books:**

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education.
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E.Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education
7. Tenenbaum, Data Structures Using C. Pearson Education

**DATA COMMUNICATION AND COMPUTER NETWORKING**

**Code: BCA303**

Max Marks: 70

**Course Objectives:** The course aims to equip students with a comprehensive understanding of data communication and computer networking principles, including protocols, architectures, and security measures. Through hands-on exercises and theoretical learning, students will gain practical skills in network design, configuration, and troubleshooting, preparing them for roles in designing, implementing, and managing modern networks.

**UNIT -I** (9 Hours)

**Introduction:** Data Communication: components – Networks: distributed processing, network criteria – Protocols and Standards.

**Basic Concepts:** Line Configuration – Topology: Mesh, Star, Tree, Bus, Ring – Transmission Mode – Categories of Networks: LAN, MAN, WAN– Internetworks. The OSI Model: The Model – Functions of the Layers.

**UNIT -II** (12 Hours)

**Transmission of Digital Data:** Digital data transmission: Parallel, Serial – DTE-DCE interface: EIA 232 interface: mechanical, electrical and Functional Specification, Null modem – MODEMS.

**Transmission media:** Guided media: twisted pair cable, coaxial cable and fiber optic cable: propagation modes – Unguided media: propagation of radio waves, terrestrial microwave, satellite communication, cellular telephony – Transmission impairment: attenuation, distortion, noise – performance: throughput, propagation speed, propagation time.

**UNIT-III** (12 Hours)

**Data Link Control:** Line Discipline: ENQ/ ACK, Poll/Select - Flow Control: Stop- and- wait, Sliding Window – Error Control: Stop and wait ARQ, Sliding Window ARQ: Go-back-n and Selective reject.

**Local Area Networks:** Ethernet: 10BASE5, 10BASE2, 10BASE-T, IBASE5, Other Ethernet networks –Token Bus – Token Ring - FDDI.

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**UNIT-IV**

(15 Hours)

**Switching:** Circuit Switching: Space division switching, Time division switches – Packet Switching: datagram approach, Virtual Circuit approach – Message Switching.

**Integrated Services Digital Network:** B, D, and H channels, User Interfaces, Functional Grouping-The ISDN Layers – Broadband ISDN.

**UNIT-V**

(12 Hours)

**Transport Layer:** Duties of the Transport Layer: End-to end delivery, Addressing, Reliable delivery, Flow control, Multiplexing – Connection – The OSI Transport Protocol: transport classes, TPDU, Connection- oriented and connectionless services.

**Upper OSI Layers:** Session Layer: Session and Transport Interaction, Synchronization points, Session Protocol data Unit – Presentation Layer- Functions: Translation, Encryption/ Decryption, Authentication, Compression – Application Layer: MHS, FTAM, VT, DS, CMIP

**Text Book:**

1. Stallings, Data and Computer Communications, 7/e, Pearson Education, 2003

**Reference Books**

1. Behrouz A. Forouzan. Data Communications and Networking. Tata McGraw-Hill Edition, Fourth Edition.
2. Andrew s. Tanenbaum .Computer Networks. Pearson Education .Fourth Edition.
3. Alberto Leon- Garcia and Indra Widjaja. Communication Networks- Fundamental Concepts and key Architectures. Tata Mcgraw-Hill. Second Edition.

**ACCOUNTING AND FINANCIAL MANAGEMENT**

**Code: BM301**

Max Marks: 70

**Course Objectives:** The course objectives for Accounting and Financial Management are to provide students with a comprehensive understanding of financial accounting principles, financial statement analysis, and managerial accounting techniques. Students will learn to prepare and interpret financial statements, develop budgeting and forecasting skills, and understand cost management and performance evaluation. Additionally, the course covers financial decision-making, investment analysis, and the impact of financial policies on business strategy and operations.

**UNIT -I**

(18 Hours)

**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**

(12 Hours)

**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 Hours)

**Introduction:** Meaning, scope, Functions of finance manager. Unit Costing: Preparation of cost sheet

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**UNIT-IV**

(12 Hours)

**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**

(10 Hours)

**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

**Text Book:**

1. T.S Grewal - “Introduction to accounting”, S. Chand & Company Limited

**Reference Books:**

1. M.C Shukla, T.S. Grewal, S.C. Gupta - “Advanced Accounts”, S. Chand & Company Limited, 2006
2. S.N Maheshwari - “ An introduction to Accountancy”, Vikas Publishing House Pvt Limited, 2009
3. S.P Basu & M. Das: “Practice in Accountancy”
4. Rajasekaran V. – ”Financial Accounting”, Pearson Education India, 2011

**BASICS OF UNIX OPERATING SYSTEM**

**Code: BCA304**

Max Marks: 70

**Course Objectives:** The course aims to introduce students to the fundamental concepts of the UNIX operating system. Students will learn about the UNIX architecture, basic commands, file system structure, and shell scripting. The course also covers essential system administration tasks, providing a solid foundation for further studies in UNIX and Linux environments.

**UNIT -I**

(10 Hours)

**Working with UNIX-like Systems:** Brief history of UNIX and LINUX, strengths and weaknesses of UNIX-like operating systems Basic concepts in UNIX-like systems: the kernel, shells, multiuser multitasking operation, remote access, file system, processes, environment and environment variables, the command line, online manual Using the vi editor – modes of operation and switching between them, text navigation, editing text, saving and quitting, using buffers (cut-copy-paste), pattern searching and replacement, undoing and repeating commands Basic commands related to handling files and the file system

**UNIT -II**

(10 Hours)

**The Bourne Again Shell (bash)** Prompts, the command line, quoting and escaping, internal and external commands, the path, shell variables, basic command line processing Using the echo command A quick introduction to basic filters – cat and cut The building blocks approach Input/output redirection Command substitution

**UNIT-III**

(10 Hours)

**Introduction to Shell Scripting Shell scripts** Fundamental shell programming constructs – conditional execution, loops, input and output, turning debugging on and off, etc.

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**UNIT-IV**

(10 Hours)

**Shell Scripting using Filters** Definition of a filter Basic filters like the grep family, expr, sed, etc. Processing the output of commands like ls, ps, who, etc. Processing data in text files (fixed-width format and delimited format)

**Text Book:**

1. Das S. : Your UNIX – The Ultimate Guide, Tata McGraw-Hill, 2001.

**Reference Books:**

1. Kernighan B. W. and Pike R. : The Unix Programming Environment, Prentice-Hall of India, 1994.
2. Prata S. : Advanced Unix – A Programmer's Guide, BPB Publications, 1986

**Theory Paper**

Total: 100 Marks

Time: 3 hours

External: 70 Marks

Internal: 30 Marks

**External : 70 Marks**

10 Question (MCQ): 1 marks each (1x10 = 10)

5 Question (Fill in the blanks): 1 marks each (1x5 = 5)

5 Question (Short 30-40 Words): 3 marks each (3x5 = 15)

Answer any 4 out of 6 (Long 50-75 Words): 4 marks each (4x4 = 16)

Answer any 2 out of 4 (Long 75-100 Words): 7 marks each (7x2 = 14)

Answer any 1 out of 2 (Very Long 150-200 Words): 10 marks each (10x1 = 10)

**Internal : 30 Marks**

Internal Exam: 15 Marks

*(There will be two internal exams, each carrying 30 marks. The final mark will be determined by selecting the highest score from these two exams.)*

Assignment : 8 Marks

Attendance : 4 Marks

G.P. (General Proficiency) : 5 Marks

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**Data Structure Using C Lab**

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

**External (Two programs) : 70 Marks**

Program Writing: 10 marks each (10x2 = 20)

Algorithm & Flowchart : 10 marks each (10x2 = 20)

Program execution: 10 marks each (10x2 = 20)

Viva: 10 marks

**Internal : 30 Marks**

Program Writing: 5 marks

Algorithm & Flowchart : 5 marks

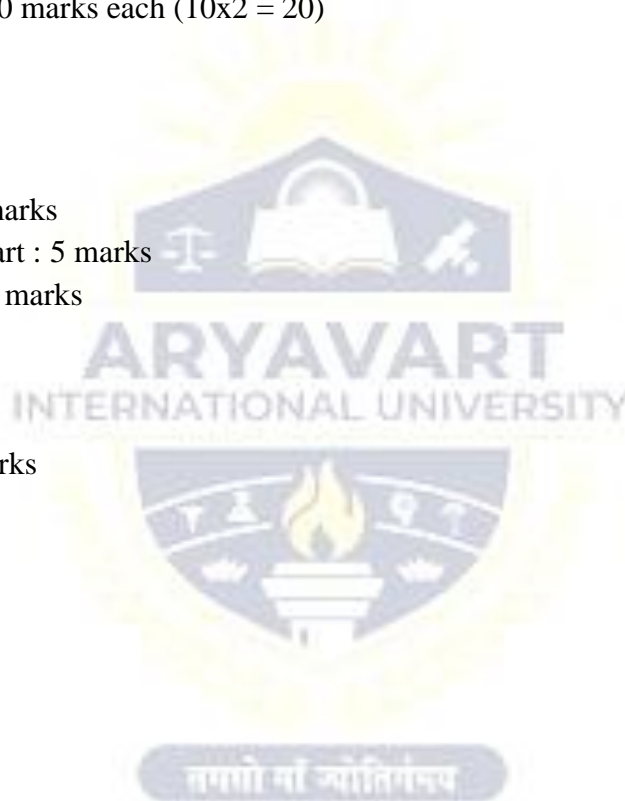
Program execution: 5 marks

Viva: 5 marks

Record: 5 marks

Attendance : 2 marks

Lab Discipline : 3 marks





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**Introduction to Unix/Linux Lab**

Practical: 100 Marks

External: 70 Marks

Internal: 30 Marks

**External (Two programs) : 70 Marks**

Program Writing: 10 marks each (10x2 = 20)

Schema: 5 marks each (10x2 = 20)

Program execution: 15 marks each (15x2 = 30)

Viva: 10 marks

**Internal : 30 Marks**

Record: 10 Marks

Practical Assessments/Lab Work : 10 Marks

Attendance : 5 Marks

G.P. : 5 Marks

