



Bachelor of Computer Applications

SEMESTER I

1. English -I
2. Basics of Digital Electronics
3. Mathematics
4. Computer Fundamentals & Problem Solving
5. C Programming
6. C Programming Lab

1BCA3: Basics of Digital Electronics

Unit-I

Number Systems – Introduction- Decimal, Binary, Octal and Hexadecimal. Inter- Conversions, Addition, Subtraction, Multiplication and Division in Binary Number System.

1's and 2's Complement method in Binary Number System. Subtraction using 1's and 2's Compliment, Weighted Number System - Binary Coded Decimal (BCD), Addition of BCD Numbers.

Non-Weighted Number System – Applications, Excess-3, Gray code
- Conversions - Gray and Binary Codes

Fixed point and Floating point representation of numbers - Introduction

Unit-II

Boolean Algebra: Basic laws, DeMorgan's theorem, Duality theorem, Sum Of Product method and Products Of Sum method. Karnaugh map (Upto 4 Variables, Don't Care Condition).

Fundamentals of Gates: Basic gates, Derived gates and Universal gates (Design).

Unit-III

Combinational and Sequential logic circuits - Half adder, Full adder, Half -subtractor and Full-subtractor.

Flip-Flops - SR, D, JK, JK Master Slave, T Flip-flops, Decoders - 3 to 8 lines, Encoders-Octal to Binary

Multiplexer- 4 to 1 line, Counters-3 bit Binary Ripple counter,3 bit synchronous binary counter.

Shift registers- Serial-In-Parallel-Out, Parallel-In-Serial-Out, Serial-In-Serial-Out, Parallel-In-parallel-Out.

Reference Books:

1. Digital fundamentals-Thomas.D.Floyd.
2. Malvino Leach, digital principles and application (4th edition)
3. Morris Mano, Computer System Architecture (3rd edition) PHI.
4. Digital Logic- Thomas C Bartee.

1BCA5: Computer Fundamentals & Problem Solving

UNIT-I

Introduction to Computers

History, Generations of Computers

Computer as multipurpose tool - Overview of the Computer system, Applications of computer, looking inside the machine, parts of the computer, information processing cycle, computer shapes and types of computer.

Interacting with Computer

The Keyboard - the mouse - other input devices - The monitor - Printers - Sound systems - Connecting I/O devices to the Computer.

Storing information in a Computer

Types of storage devices - Magnetic storage devices, Optical Storage devices, measuring device performance.

UNIT-II

Processing Data

Transforming data into information - How a Computer processes data - factors affecting processing speed

Computer Software

Computer Languages, Types of Software, Operating System-Introduction, Types of Operating System. Translators

Problem solving aspects – Introduction, Problem definition, Problem analysis, Design of problem solution, Algorithm, Flowchart, Coding, Debugging, Program Documentation and Program maintenance, Basic programming constructs - sequence, selection and iteration.

UNIT-III

Information System

What is an information System - types of information Systems — System development life cycle.

Database Management systems

Data and Information - the database - DBMS relationship-working with a database - creating tables - Editing records -querying database - generating report.

Computers in Business

Why businesses need information — Types of business Software - Evolution of business computing

Security

The Need for Computer Security, Basic Security Concepts, Threats to Users, Threats to Hardware, Threats to Data, Taking protective measures – Protecting Yourself, Protecting your privacy, Keeping your Data Secure.

Reference Books:

1. Peter Norton's 'Introduction to Computers', Second edition, TMH.
2. Dromey – How to solve it by computer –PHI
3. Computer Concepts and C Programming – P.B.KOTUR
4. Computer Fundamentals - P K Sinha, BPB

1BCA6: C Programming

UNIT-1

Overview of C

Importance of C, Sample C programs, Basic structure of C Programs, Programming style, executing a C Program.

Constants, Variables, and Data Types

Character set, C tokens, Keywords and identifiers, Constants, Variables, Data types, Declaration of variables, Assigning values to variables, Defining symbolic constants

Operators and Expression

Arithmetic of Operators, Relational operators, Logical operators Assignment operators, Increment and decrement operators, Conditional operator, Bit wise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity, Mathematical functions.

Managing Input and Output Operations

Reading a character, writing a character, formatted input, formatted output

Unit-II

Decision Making and Branching

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.

Decision Making and Looping

The WHILE statement, The DO statement, The FOR statement, Jumps in loops

Arrays

One-dimensional arrays, Two-dimensional arrays, Initializing two-dimensional arrays.

Handling of character strings

Declaring and initializing string variables, Reading strings from terminal, Writing strings to screen, Arithmetic operations on characters, Putting strings together Comparison of two strings, String-handling functions, Table of strings

UNIT-III

User-Defined Functions

Need for user-defined functions, multi-function program, The form of C functions Return values and their types, Calling a function Category of functions, Handling of non-integer functions, Nesting of functions, Recursion, Functions with arrays, The scope and lifetime of variables in functions.

Structures and Unions

Structure definition, giving values to members, Structure initialization Comparison of structure variables, Unions, Size of structures

Pointers and File Handling

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

File Handling– Definition and need of file. Defining, Opening, and Closing a file. Input and output operations on files. Random access to files with example programs.

Reference Books:

1. Problem Solving with C, M.T. Somashekara, PHI Learning, New Delhi, 2009
2. Programming in ANSI C 2nd Edition by E Balaguruswamy Published by Tata McGraw Hill.

1BCA8: C Programming Lab

List of Experiments/Programs

Part A:

1. C program for given two numbers to perform arithmetic operations using switch statement.
2. C program to find biggest of three number using nested if statement.
3. C program to find sum of the $S=1^2+2^2+3^2+\dots+n^2$ indirect method using looping statement
4. C program to find sum of the $S=1-2+3-4+5+\dots+n$ series by indirect method using looping statement
5. C program to find sum of the $S=1+1/x+1/x^2+\dots$ series upto 4 decimal places of accuracy.
6. C program to check whether the given number is prime or not.
7. C program to print and count prime numbers from 2 to n.
8. C program to generate Fibonacci series up to n numbers
9. C program to check whether the given number is factorial of a number or not
10. C program to convert binary number to decimal number.
11. C program to convert decimal number to binary number.
12. C program to find the roots of the quadratic equation using else if statement.
13. C program to find the reverse of the given number. Also sum & count the number of digits and check whether the given number is palindrome or not palindrome
14. C program to find largest and smallest of n numbers
15. C program to find second largest and second smallest of n numbers

Part B:

1. C program for sorting given set of numbers using bubble sort technique.
2. C program to search given number using linear search technique
3. C program to accept two square matrix and find sum of two matrices.
4. C program to print difference of two matrices.
5. C program to accept two matrices of order $m*n$ and $p*q$ to find product of two matrices using function.
6. C program to check whether given number is Fibonacci or not.
7. C program to accept $m*n$ matrix. To find trace and norm of square matrix and to print principle diagonal elements.
8. C program to accept $m*n$ matrix to find sum of upper diagonal and lower diagonal elements.
9. C program to find factorial of a number using recursive function
10. C program to find NCR and NPR using function.
11. C program to find LCM and GCD of two numbers.
12. C program to display transpose of given $m*n$ matrix using function.
13. C program to swap two numbers using function and pointers.
14. C program to accept employee information and display the same using structure.
15. C program to create simple marks card assuming appropriate condition
16. C program to read and write information of an employee using a file.

1BCA2: General English

UNIT-1

1. **Grammar and Vocabulary:** Review of elements of grammar & usage for effective communication – Parts of speech, Phrases, Clauses, Sentences – Pattern, Complex and Compound sentences, Transformation of sentences, Direct and Indirect speech; Synonyms, Antonyms.

UNIT-2

2. **Reading & Writing Skills:** Reading passages from Books, News Papers, Journals and writing them in concise forms. Exercises on Reading and Writing skills.

UNIT-3

3. **Personality Development:** Exercises focusing on vocabulary and communication skills, art of public speaking, preparation of Resume, facing of interviews, group discussion.

Reference Books:

1. Current English for colleges by N. Krishnaswamy.

1BCA4: Mathematics

UNIT-I

Partial fractions: Proper & improper fractions-all four types.

Logarithms: All problems, except common logarithms.

Mathematical Induction: Simple problems on all types.

Theory of equations:

- i) Solutions of cubic, bi quadratic equations when complex and irrational roots are given
- ii) Solutions of cubic, bi quadratic equations when roots are in AP, GP and HP.
- iii) Solutions of cubic, bi quadratic equations using synthetic division.
- iv) Operations on complex numbers.

Binomial Theorem: No proof.

- i) Expansion - problems thereon.
- ii) Finding middle terms.
- iii) Finding constant terms or terms independent of x.

Trigonometry:

- i) Definition of radian (no proof for constant angle)
- ii) Problems on conversion of radians to degree and vice versa
- iii) Problems on $s = r\theta$, $s = \frac{1}{2}r^2\theta$ (no proofs)

Trigonometric functions and identities:

Simple problems

Graphs of Trigonometric functions: for sine, cos and tan functions.

Allied angles: Problems thereon

Complex numbers:

- i) Finding modulus and amplitude of complex numbers
- ii) Solving problems using De Moivre's Theorem.

UNIT II

Analytical Geometry

- i) Problems on distance formula - Proving parallelogram, square, rhombus, equilateral triangle, Co linearity.
- ii) Problems on section formula - internal division, external division, mid point formula, centroid of a triangle.
- iii) problems on area of a triangle.

Straight lines:

- i) By finding slopes - show that lines are parallel and perpendicular.
- ii) Finding slopes - when two points are given
- iii) equation of straight lines - passing through given point, parallel and perpendicular to given line.
- iv) Problems on intercept form, slope form, normal form, two point form.
- v) Problems on angle between two lines.
- vi) Concurrency of three lines and point of concurrency.

Pair of lines

- i) Angle between two lines $ax^2 + 2hxy + by^2 = 0$. $ax^2 + 2hxy + by^2 + 2gx + 2fy + C = 0$.
- ii) Point of Intersection.
- iii) Condition for an equation to represent pair of lines.

Circles:

- i) Finding centre and radius.
- ii) Finding equation of a circle passing through three points, when different conditions are given, passing through x and y- axis.

Conics : Parabola -

Finding vertex, focus, tangent, normal, length of latus rectum, eccentricity. (no proofs)

UNIT III**Limits and continuity:**

- i) Simple direct problems on limits of the form $\left(\frac{x^n - a^n}{x - a} \right), \frac{\sin \theta}{\theta}, \frac{\tan \theta}{\theta}$ (no determinate forms).
- ii) Simple problems on continuity.

Differentiation:

- i) Problems on sum , product, quotient, chain rule (No parametric, logarithmic functions)

Differential Equations:

Solving problems by variable separable form.

Integration:

- i) By substitution
- ii) By parts
- iii) By partial fractions
- iv) Problems of types

$$\int \frac{dx}{a^2 + x^2}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{x^2 - a^2}, \int \frac{dx}{\sqrt{a^2 - x^2}}, \int \frac{dx}{\sqrt{a^2 + x^2}}, \int \frac{dx}{\sqrt{x^2 - a^2}}, \int \frac{dx}{x\sqrt{x^2 - a^2}}, \int \frac{dx}{x\sqrt{x^2 + a^2}}$$

$$\int \sqrt{a^2 - x^2} dx, \int \sqrt{a^2 + x^2} dx, \int \sqrt{x^2 - a^2} dx.$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}$$

Application of Integration:

Simple problems on area

- i) Find the area of circle, ellipse, parabola & the ordinate $x=a$ by integration
- ii) Find the area bounded by the parabola $y^2 = 4ax$, x - axis and $x = 1, x = y$.
- iii) Find the area bounded by $y = \sin x$, x - axis & $x = 0, y = z$.

Reference Books:

1. Theory and Problems in Mathematics – I By BOSCO Publications 2004.
2. Theory and Problems in Mathematics – II By BOSCO Publications 2005.
3. Engineering Mathematics, Volumes I–IV By S Chandrashekar.