# செ ன்னைப் பல்கலைக்கழகம்
## தொலைதூரக் கல்வி நிறுவனம்



# Bachelor of Computer Applications
# B.C.A
## கணினிப் பயன்பாடு

## *Syllabus for Core Subjects*

### Non-Semester
(Effective from the Academic Year 2005 - 2006)

# UNIVERSITY OF MADRAS
## INSTITUTE OF DISTANCE EDUCATION
CHENNAI - 600 005

# BACHELOR OF COMPUTER APPLICATIONS (B.C.A)
## SCHEME OF EXAMINATION

### FIRST YEAR

| Paper No. | Paper Title | Duration Hours | Max. marks |
|---|---|---|---|
| | **Core Courses - Main Subjects** | | |
| I | Mathematics | 3 | 100 |
| II | Digital Logic Fundamentals and Programming in C | 3 | 100 |
| III | Practical-I - P.C.Software and C Programming Lab. | 3 | 100 |

### SECOND YEAR

| | | | |
|---|---|---|---|
| IV | Programming in COBOL and C++ | 3 | 100 |
| V | Financial, Cost and Management Accounting | 3 | 100 |
| VI | Numerical and Statistical Methods, Data Structures & Algorithms | 3 | 100 |
| VII | Operating Systems and Microprocessors | 3 | 100 |
| VIII | Practical-II - Programming in COBOL and Microprocessors Lab | 3 | 100 |
| IX | Practical-III - Numerical and Statistical Methods and Data Structures using C & C++ | 3 | 100 |

# THIRD YEAR

| Paper No. | Paper Title | Duration Hours | Max. marks |
|---|---|---|---|
| X | Programming in Java and Data Communication and Networking | 3 | 100 |
| XI | Database Management Systems and Computer Graphics | 3 | 100 |
| XII | Visual Programming and Software Engineering | 3 | 100 |
| XIII | Resource Management Techniques and Web Technology | 3 | 100 |
| XIV | Practical - IV - RDBMS and Web Applications Lab. | 3 | 100 |
| XV | Practical - V Programming in Java and Mini Project | 3 | 100 |
| * Syllabus for foundation courses are to be followed as prescribed for common U.G. courses. | | | |

# INSTITUTE OF DISTANCE EDUCATION

## BACHELOR OF COMPUTER APPLICATIONS (B.C.A)

# SYLLABUS

### FIRST YEAR

### PAPER I

### BCA 103 - MATHEMATICS

**Unit - I**

Sets, Relations and functions: Sets   set operations – Cartesian products - Relation   equivalence relation partition - partial order relation - Functions Inverse functions Composition of functions - Properties of functions - Binary operation. -   Counting principles- The Pigeonhole principle - counting - permutations and combinations - combinatorial arguments - countable and uncountable sets – lattices. Boolean Algebra: Boolean functions   Normal forms.

**Unit - II**

Binary operations – Semigroups – product and quotients of  semigroups – Gropus – product and quotient groups.  Linear Algebra: Types of matrices - Matrix operations canonical forms - Inverse of a matrix - Geometric properties of plane linear transformation - Rotation - Reflection Expansion and compressions - Shears - translation successive transformation - Inverse transformation - Rank and nullity - Linear systems and matrices - Methods of solution to Linear systems (Cramer's Rule).

### Unit – III

Analytical Geometry: pairs of straight lines - circle system of circles - parabola - ellipse - hyperbola - polar equations. (standard equations and simple properties)Three dimensional Analytical Geometry: The plane - The straight line - the sphere - the cone - and the cylinders - (Standard equations and simple properties)

### Unit – IV

Calculus: Functions and limits - Differentiation successive differentiation - partial differentiation - maxima and minima - Tangents - normal - curvature and envelopes (simple problems). Integral calculus: Integration - Definite integrals - Reduction formulae - Geometric applications of integration area, volume are length. (simple problems)

### Unit – V

Fourier series of Periodic functions on the interval [c, c+2pi] – Half-range series in [0,2pi] – Fourier Transforms. Ordinary Differential equations: First order but of higher degree equations – Second order and non-homogeneous linear differential equations with constant coefficients - second – order linear differential equations with variable coefficients(Euler's form only).

### Books for study and Reference

1.    Bernard Kolman and Robert C. Busby: Discrete mathematical structures for Computer science 2.ed., Printice Hall, N.J. (1987)

2.    Olympia Nicodemi: Discrete Mathematics, CBS Pub. & Distributors, New Delhi, 1989.

3.  Vatssa B.S. : Discrete Mathematics, 3 ed. Wishwa Prakashan, New Delhi, 1986.

4.  Venkataraman, M. K.: Engineering Mathematics Vol 1 & 2, The National Pub. Co., Madras . ( 1993 and 1992)

5.  Alan Doerr and Kenneth Levasseur : Applied Discrete Structures for computer science, Galgotia publications pvt. Ltd., New Delhi, 1988.

6.  P.Duaripandian, S. Udayabaskaran and S. Rajalakshmi, Allied Mathematics, Muhil Publishers, 2002.

7.  M.K. Venkataraman, Advanced Mathematics for Engineers and Scientists, The National Pub. Co..

## PAPER  II

## BCA 104 – DIGITAL LOGIC FUNDAMENTALS AND PROGRAMMING IN C

### Unit - I

Number systems - Conversion from one number system to another -  compliments -  Binary codes - Binary logic - Logic gates - Truth tables.  Boolean Algebra - Axioms - Truth table simplification of Boolean function - map method (upto 5 Variables) -  Mc-Clausky tabulation method

### Unit - II

Sequential logic – RS, JK,D and T Flip flops - Registers –Shift Registers - Counters – Ripple Counters – Synchronous Counter – Design of Counters  - Adders – Subtractors – Decoders – Encoders – Multiplexer - Demultiplexer – Design of Circuits using decoders/Multiplexers – ROM – PLA – Designing circuits using ROM/PLA.

### Unit - III

Design of ALU – Design of Status Register - Design of accumulator – Introduction to Computer Design. Programming in C: C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary , Relational and logical , Assignment and Conditional Operators - Library functions.

### Unit - IV

Data input output functions - Simple C programs - Flow of control if, if else, while, do-while , for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator. Functions –Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables – Multi-file programs.

### Unit - V

Arrays - Defining and Processing - Passing arrays to functions – Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures – Unions - Bit wise operations. Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files : Creating , Processing ,Opening and Closing a data file.

### Books for study and Reference

1. M.M. Mano, Digital Logic and Computer Design, Prentice Hall of India, 1994.

2. T.C.Bartee, 'Computer Architecture and logical Design', McGraw Hill, 1991.

3.    B.W. Kernighan and D.M.Ritchie, The C Programming Language, 2nd Edition, PHI, 1988.

4.    H. Schildt, C: The Complete Reference, 4th Edition, TMH Edition, 2000

5.    Gottfried,B.S,  Programming with C,  Second Edition, TMH Pub. Co. Ltd., New Delhi 1996.

6.    Kanetkar Y., Let us C, BPB Pub., New Delhi, 1999.

## PAPER  III

## PRACTICAL  I -  PC – SOFTWARE AND C PROGRAMMING LAB

### MSWORD

1. Text Manipulations.
2. Usage of Numbering, Bullets, Footer and Headers.
3. Usage of Spell check, and Find & Replace.
4. Text Formatting.
5. Picture insertion and alignment.
6. Creation of documents, using templates.
7. Creation templates
8. Mail Merge Concepts
9. Copying Text & Pictures from Excel

### MS-EXCEL

10.    Cell Editing
11.    Usage of Formulae and Bulit-in Functions
12.    File Manipulations
13.    Data Sorting (both number and alphabets)
14.    Worksheet Preparation

15. Drawing Graphs

16. Usage of Auto Formatting

## POWER POINT

17. Inserting Clip arts and Pictures

18. Frame movements of the above

19. Insertion of new slides

20. Preparation of Organisation Charts

21. Presentation using Wizards

22. Usage of design templates

## C PROGRAMMING

23. Summation of Series :

   1. Sin(x), 2. Cos(x), 3. Exp(x) ( Comparison with built in functions )

24. String Manipulation :

   1. Counting the no. of vowels, consonants, words, white spaces in a line of text and array of lines

   2. Reverse a string & check for palindrome.

   3. Substring detection, count and removal

   4. Finding and replacing substrings

25. Recursion :

   1. $^nP_r$, $^nC_r$

   2. GCD of two numbers

   3. Fibonacci sequence

   4. Maximum & Minimum

   5. Towers of Hanoi.

**9**

26. Matrix Manipulation :
    1. Addition & Subtraction
    2. Multiplication
    3. Transpose, and trace of a matrix
    4. Determinant of a Matrix
27. Sorting and Searching :
    1. Insertion Sort
    2. Bubble Sort
    3. Linear Search
    4. Binary Search

## SECOND YEAR

## PAPER IV

## BCA 205 - PROGRAMMING IN COBOL AND C++

**Unit - I**

Introduction to COBOL - IDENTIFICATION Division – ENVIRONMENT Division - DATA Division - PROCEDURE Division. Debugging and Program Testing – Keyboard Input and Screen Display – Output Formatting – Arithmetic Operations.

**Unit - II**

Report Design and Coding – Conditional Operations – Designing and Writing Control Break Programs. Data validation Design and Coding – Processing Arrays / Tables - Processing Multi – Dimensional Tables. Sorting - Master – Transaction File Processing – Indexed File Processing – Program Management.

### Unit - III

Principles of Object Oriented Programming (OOP) – Software Evaluation – OOP Paradigm – Basic Concepts of OOP – Benefits of OOP - Application of OOP. Introduction to C++ - Tokens – Keywords – Identifiers – Variables – Operators – Manipulators – Expressions and Control Structures

### Unit - IV

Pointers – Functions – Function Prototyping Parameters Passing in Functions – Values Return by Functions – Inline Functions – Friend and Virtual Functions. Classes and Objects – Constructors and Destructors – Operator overloading – Type Conversions – Type of Constructors – Function Overloading.

### Unit - V

Inheritance – Types of Inheritance – Virtual Functions and Polymorphism Constructors in inheritance – Mapping Console I/O operations. Files – File Streams – File operations – File pointer – Error Handling during file operations – Command line arguments.

### Books for Study and Reference:

1. Tyler Welburn & Wilson Price – Structured COBOL (Fundamentals and Style) – Fourth Edition – McGraw Hill – 1995.

2. A.S.Philippakis and L.J. Kazmier – Advanced COBOL – McGraw Hill – 1991.

3. Roy, M.K and Ghosh Dastidar, COBOL Programming, TMGH, New Delhi, 1989.

4. E. Balagurusamy – Object Oriented Programming with C++ - TMH.

5. Robert Lafore – Object Oriented Programming in Microsoft C++ - Galgotia.

# PAPER  V

## BCA 206 –  FINANCIAL, COST AND MANAGEMENT ACCOUNTING

### Unit -  I

The Accounting structure: Basic accounting concepts and conversions - Accounting equation - Meaning of accounting - Groups interested in accounting information  trial balance, final accounts (emphasis to be given to important adjustments) - Rectification of errors   Suspense account . Depreciation accounting - Meaning of depreciation - Methods of providing depreciation - Fixed percentage on original cost - Fixed percentage on diminishing balance (including change in the method of depreciation). Single entry : Definition and salient features Statement of affairs method - Conversion method.  Average due date - Account current and investment accounts

### Unit - II

Branch Accounts: Debtors system - profit and Loss Accounts - Stock and debtors system - Distinction between wholesale profit and retail profit - Independent branch ( foreign branch excluded) - Departmental Accounts: Basis for allocation of expenses - Inter departmental transfer at cost or selling price - Treatment of expenses which cannot be allocated.  Hire purchase and Instalment purchase: Meaning and legal position - Accounting aspects - Default and re possession - Hire purchase trading account - Instalment system - Accounting

aspect. Sale or Return: Meaning and legal position Accounting procedure under different circumstances.

## Unit - III

Partnership Accounts: Section 13 of Indian Partnership Act - Fixed and fluctuating capital - Final accounts of firms Admission of a partner - Retirement of a partner - Death of a partner - dissolution of - partnership - Insolvency of a partner (Garner Vs Murray) - Insolvency of all partners Gradual realization of assets and piecemeal distribution. Cost Accounting: Definition, Meaning and objectives - Distinction between Cost and Financial Accounting. Elements of cost and preparation of cost sheets and tender. Management Accounting – Definition and objectives – Distinction between management and financial accounting.

## UNIT - IV

Materials: Stores Records – Purchase Order – Goods Received. Note Bin Card – Stores Ledger – Purchase, Receipt and Inspection – Inventory Control – ABC Analysis Economic Ordering Quantity – Maximum, Minimum and Reordering levels   Methods of Pricing Issued.

Labour: Importance of Labour Cost Control – Various Methods of Wage Payment – Calculation of wages  Methods of Incentive for Schemes

Overheads: Factory, Administration, Selling and Distribution of overheads – Classification – Allocation and Apportionment Redistribution (Secondary Distribution) Absorption of Over heads including 'Machine Hour Rate'

**Unit - V**

Funds Flow and Cash Flow Analysis: Schedule of changes in working capital – Preparation of 'funds flow statement' Preparation of 'Cash Flow Statement' Importance of funds flow and cash flow Analysis   Difference between funds flow and cash flow. Ratio Analysis : Utility and limitations of Accounting Ratios  calculation of Accounting Ratios  Ratio Analysis for Liquidity, Solvency, Profitability and Leverage.

Marginal Costing: The Concept – Break Even Analysis Break – Even Chart – Importance and assumptions Application of Profit Volumes Ratio – Different types of problems (with special emphasis on decision making problems). Budget and Budgetary Control : Procedure and Utility – Preparation of different types of Budget including Flexible Budget.

**Books for study and Reference**

1.    Gupta R.L. Advanced Accountancy, S.Chand, Delhi.

2.    Agarwala A.N.  Higher Science of Accountancy, Kitab Mahal,Allahabad.

3.    S.P. Jain, and K.L. Narang, Financial Accounting

4.    M.C.Shukla and T.S.Grawel, Adavnced Accounts(Vol. I)

5.    Gillespie  Accounting system, Procedure & methods, Prentice Hall India Ltd., Delhi.

6.    Wheldon A.J., Cost Accounting and Costing Methods.

7.    Iyengar S.P., Cost Accounting : Principles and Practice.

8.    Bhar B.K., Cost Accounting : Methods and problems.

9.    Bigg W.W., Cost Accounts.

10. Prasad N.K, Cost Accounting : Principles and Problems.

11. Jain S.P. and Narang K.L., Advanced Cost Accounting.

12. Agarwal M., Theory and Practices of Cost Accounting

13. Robert Anthony : Management Accounting : Text and cases.

14. Maheswari S.N., Principles of Management Accounting.

## PAPER VI

## BCA 207 – NUMERICAL AND STATISTICAL METHODS, AND DATA STRUCTURES AND ALGORITHMS

### Unit - I

Roots of Equations: Graphical Method – Bisection Method – False-Position Method – Fixed-Point Iteration – Newton-Raphson Method – Secant Method – Roots of Polynomials: Conventional Methods – Muller's Method – Bairstow's Method. Algebraic Equations: Gauss Elimination – Gauss-Jordan – LU Decomposition – Matrix Inverse –Gauss-Seidel. Numerical Differentiation - Integration: Trapezoidal Rule – Simpson's Rule – Romberg Integration – Differential equations: Taylor's method – Euler's method – Runge-Kutta $2^{nd}$ and $4^{th}$ order methods – Predictor – corrector methods.

### Unit - II

Diagrammatic and Graphical representation of Numerical Data – Formation of frequency distribution Histogram, Cumulative Frequency – Polygon and Ogives Measures of central tendencies   Mean, Median, Mode Measures of dispersion   Mean deviation, Standard deviation, variance, Quartile deviation and coefficient of variation

Moments (upto 4<sup>th</sup>) Measures of Skewness and Kurtosis for grouped and ungrouped data. Sample space – Events Definition of probability combinatorial problems conditional probability and independence – Random variables, distributions and Mathematical expectations – Discrete distributions – Binomial, Poisson, Continuous distributions Normal and Exponential distributions – Moments and Moment generating functions.

## Unit - III

Correlation and Regression analysis: product moment correlation coefficient rank correlation coefficient simple regression method of least squares for estimation of regression coefficient. Concept of sampling and Sampling distributions Sampling from Normal distributions – Standard error – Tests of significance – Large sample test for population mean and proportions – Test for populations means: single two sample and paired t–test Chi square tests for goodness of fit and test for independence of attributes in contingency table.

## Unit - IV

Definition of a Data structure primitive and composite Data Types, Asymptotic notations, Arrays, Operations on Arrays, Order lists. Stacks - Applications of Stack Infix to Postfix Conversion, Recursion, Maze Problems - Queues Operations on Queues, Queue Applications, Circular Queue. Singly Linked List Operations, Application Representation of a Polynomial, Polynomial Addition; Doubly Linked List Operations, Applications Ordering of Books in Library (Alphabetical Ordering).

**Unit - V**

Trees and Graphs: Binary Trees Conversion of Forest to Binary Tree, Operations – Tree Traversals; Graph Definition, Types of Graphs, Hashing Tables and Hashing Functions, Traversal Shortest Path; Dijkstra's Algorithm. Algorithm - Definition - Examples - Complexity - Divide and Conquer - Binary Search - Maximum and Minimum - Merge Sort.

**Books for study and Reference**

1.   Snedecor G.W. and Cochran W.G. (1989): Statistical methods, 8 ed., Affiliated East West.

2.   Trivedi K.S. (1994): Probability and Statistics with Reliability, Queueing and computer Science applications, Prentice Hall of India.

3.   Balaguruswamy E. (1988): Computer oriented Statistical and Numerical methods, Macmillan India Ltd.,

4.   S. C. Chopra and R. P.Canale – Numerical Methods for Engineers – Third Edition – McGraw Hill International Edition – 1998.

5.   S.S. Sastri, Introductory Methods of Numerical Analysis, Prentice Hall

6.   E.Horowitz and S.Shani Fundamentals of Data Structures in C++ , Galgotia Pub. 1999.

7.   Horowitz, S. Sahni, and S. Rajasekaran, Computer Algorithms, Galgotia Pub. Pvt. Ltd., 1998.

8.   R. Kruse C.L. Tondo and B. Leung , Data Structures and Program design in C, PHI, 1997.

# PAPER VII

# BCA 208 – OPERATING SYSTEMS AND MICROPROCESSORS

## Unit - I

Introduction: Views- Goals – Types of System – OS Structure - Components – Services – System Structure – Layered Approach - Virtual Machines – System Design and Implementation. Process Management: Process – Process Scheduling – Cooperating Process – Treads – Inter-process Communication. CPU Scheduling: CPU Schedulers – Scheduling Criteria – Scheduling Algorithms. Process Synchronization: Critical-Section Problem – Synchronization Hardware – Semaphores – Classical Problems of Synchronization – Critical Region – Monitors. Deadlocks: Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Avoidance – Detection – Recovery.

## Unit - II

Memory Management: Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space – Contiguous Allocation – Internal & External Fragmentation. Non-Contiguous Allocation: Paging and Segmentation Schemes – Implementation – Hardware-Protection – Sharing – Fragmentation.  Virtual Memory: Demand Paging – Page Replacement – Page Replacement Algorithms – Thrashing.  File System: File Concepts – Access Methods – Directory Structures – Protection Consistency Semantics – File System Structures – Allocation Methods – Free Space Management.

## Unit - III

I/O System: Overview – I/O Hardware – Application I/O Interface – Kernel I/O Subsystem – Transforming I/O

Requests to Hardware Operations – Performance. Secondary Storage Structures: Protection – Goals – Domain – Access matrix – The Security Problem – Authentication – Threats – Threat Monitoring – Encryption. Introduction to Micro Computers, Microprocessors and Assembly Languages - Microprocessor architecture and its operations - 8085 MPU - 8085 Instruction set and classifications.

**Unit - IV**

Writing assembly levels programs - Programming techniques such as looping, counting and indexing addressing modes - Data transfer instructions - Arithmetic and logic operations - Dynamic debugging. Counters and Time delays - Hexadecimal counter - Modulo10 counter - Pulse Timings for flashing lights - Debugging counter and time delay program - stack - subroutine - conditional call and return instructions.

**Unit - V**

BCD to Binary and Binary to BCD conversions - BCD to HEX and HEX to BCD conversions - ASCII to BCD and BCD to ASCII conversions - BCD to Seven segment LED Code conversions - Binary to ASCII and ASCII to Binary conversions - Multibyte Addition - Multibyte subtraction - BCD addition - BCD Subtraction - Multiplication and Division. Interrupt - Implementing interrupts - Multiple interrupt - 8085 - trap - Problems on implementing 8085 interrupt - DMA - Memory interfaces - RAM & ROM - I/O interface - Direct I/O - Memory mapped I/O.

**Books for study and Reference**

1. A. Silberschatz P.B.Galvin, Gange., "Operating System Concepts", 6th Edn., Addison Wesley Publishing Co., 2002.

2. H.M. Deitel, An Introduction to Operating System, Second Edition, Addison Wesley, 1990.

3. R. S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085/8080A", Wiley Eastern limited, 1990.

4. A. Mathur, 'Introduction to Microprocessor', Third Edition, Tata McGraw-Hill Publishing Co. Ltd., 1993.

## PAPER VIII

## PRACTICAL II - PROGRAMMING IN COBOL AND MICROPROCESSORS LAB

The details of the problem statement can be obtained from the book:

Tyler Welburn & Wilson Price - Structured COBOL (Fundamentals and Style) - Fourth Edition - McGraw Hill - 1995.

The problem number used in the book is given inside the parenthesis.

1. Earnings Report (Assignment 6-3)
2. Price-List (Assignment 7-1)
3. Test Grades Report (Assignment 8-1)
4. Account Balance Report (Assignment 9-1)
5. Ledger-Record Validation (Assignment 10-1)
6. Department-Name Look-up (Assignment 11-1)

7.    Federal Income Tax Computation (Assignment 12-2)

8.    Sort and Print Earnings File (Assignment 13-3)

9.    Vehicle File Maintenance (Assignment 14-1)

10.    Student Grade Inquiry (Assignment 15-1)

## MICROPROCESSORS LAB

I :   Addition and Subtraction

      1. 8    - bit addition

      2. 16 - bit addition

      3. 8 - bit subtraction

      4.  BCD subtraction

II :  Multiplication and Division

      1. 8 - bit multiplication

      2. BCD multiplication

      3. 8 - bit division

III:   Sorting and Searching

      1. Searching for an element in an array.

      2. Sorting in Ascending order.

      3. Finding largest and smallest elements from an array

      4. Reversing array elements

      5. Block  move

      6. Sorting in descending order.

IV :   Code Conversion

      1. BCD to Hex and Hex to BCD

2. Binary to ASCII and ASCII to binary

3. ASCII to BCD and BCD to ASCII

V:   Applications

1. Square of a single byte Hex number

2. Square of a two digit BCD number

3. Square root of a single byte Hex number

4. Square root of a two digit BCD number

5. Traffic Signal controller.

# PAPER  IX

## PRACTICAL – III  :  NUMERICAL AND STATISTICAL METHODS AND DATA STRUCTURES USING C & C++.

1.    Finding roots of equations: Bisection Method.

2.    Finding roots of Equations: Newton-Raphson Method.

3.    Finding roots of Equations: Secant Method.

4.    Solving algebraic equations: Gauss Elimination Method.

5.    Numerical Integration – Trapezoidal rule, Simpson's 1/3 rule, 3/8 rule,

6.    Differential Equations – Runge-Kutta $2^{nd}$ order and $4^{th}$ order method.

7.    Diagrammatic and graphical representation of various statistical data and frequency distributions, Cumulative frequency curve

8.    Computation of various measures of location, dispersion, moments, skewness and kurtosis.

9. Computation of correlation coefficients – regression lines(raw data and grouped data) – correlation coefficients.

10. Fitting of Binomial, Poisson and normal distributions and testing goodness of fit.

11. Large sample test – tests for proportions.

12. Exact test based on t, Chi-square distributions with regard to mean, variance and correlation coefficients.

## Data Structures using C++

1. Implement PUSH, POP operations of stack using Arrays.

2. Implement PUSH, POP operations of stack using Pointers.

3. Implement add, delete operations of a queue using Arrays.

4. Implement add, delete operations of a queue using Pointers.

5. Conversion of infix to postfix using stack operations

6. Postfix Expression Evaluation.

7. Addition of two polynomials using Arrays and Pointers.

8. Creation, insertion, and deletion in doubly linked list.

9.  Binary tree traversals (in-order, pre-order, and post-order) using linked list.

10. Depth First Search and Breadth first Search for Graphs using Recursion.

# THIRD YEAR

## PAPER X

## BCA 309 – PROGRAMMING IN JAVA AND DATA COMMUNICATION AND NETWORKING

### Unit - I

Introduction to Java - Features of Java - Object Oriented Concepts - Lexical Issues - Data Types - Variables - Arrays - Operators - Control Statements. Classes - Objects - Constructors - Overloading method - Access Control - Static and fixed methods - Inner Classes - String Class - Inheritance - Overriding methods - Using super-Abstract class.

### Unit-II

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws - Thread - Synchronization - Messaging - Runnable Interface - Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads - Multithreading. I/O Streams - File Streams - Applets - String Objects - String Buffer - Char Array - Java Utilities - Code Documentation.

### Unit - III

Networks basics - Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus. Introduction to Data Communication, Network, Protocols & standards and standards organizations - Line Configuration - Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSI Model.

### Unit - IV

Parallel and Serial Transmission - DTE/DCE/such as EIA-449, EIA-530, EIA-202 and x.21 interface - Interface standards - Modems - Guided Media - Unguided Media - Performance - Types of Error - Error Detection - Error Corrections. Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - FDDI - IEEE 802.6 - SMDS - Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.

### Unit - V

History of Analog and Digital Network - Access to ISDN - ISDN Layers - Broadband ISDN - X.25 Layers - Packet Layer Protocol - ATM - ATM Topology - ATM Protocol. Repeaters - Bridges - Routers - Gateway - Routing algorithms - TCP/IP Network, Transport and Application Layers of TCP/IP - World Wide Web.

### Books for study and Reference

1. Cay S.Horstmann, Gary Cornell - Core Java 2 Volume I – Fundamentals,5<sup>th</sup>  Edn. PHI,2000.

2. P. Naughton and H. Schildt - Java2 (The Complete Reference) - Third Edition,TMH 1999.

3. K. Arnold and J. Gosling - The Java Programming Language - Second Edition, Addison Wesley,1996.

4. Behrouz and Forouzan - Introduction to Data Communication and Networking – 2<sup>nd</sup> Edition – TMH - 2001.

5. Jean Walrand - Communication Networks (A first Course) - Second Edition - WCB/McGraw Hill - 1998.

# PAPER XI

# BCA 310 - DATABASE MANAGEMENT SYSTEMS AND COMPUTER GRAPHICS

## Unit - I

Advantages and Components of a Database Management Systems – Feasibility Study – Class Diagrams – Data Types – Events – Normal Forms – Integrity – Converting Class Diagrams to Normalized Tables – Data Dictionary. Query Basics – Computation Using Queries – Subtotals and GROUP BY Command – Queries with Multiple Tables – Subqueries – Joins – DDL & DML – Testing Queries.

## Unit - II

Effective Design of Forms and Reports – Form Layout – Creating Forms – Graphical Objects – Reports – Procedural Languages – Data on Forms – Programs to Retrieve and Save Data – Error Handling. Power of Application Structure – User Interface Features – Transaction – Forms Events – Custom Reports – Distributing Application – Table Operations – Data Storage Methods – Storing Data Columns – Data Clustering and Partitioning.

## Unit - III

Database Administration – Development Stages – Application Types – Backup and Recovery – Security and Privacy – Distributed Databases – Client/Server Databases – Web as a Client/Server System – Objects – Object Oriented Databases – Integrated Applications. Introduction to computer Graphics – Video display devices – Raster scan Systems – Random Scan Systems – Interactive input devices – Hard copy devices – Graphics software – Output primitives

– line drawing algorithms – initialising lines – line function – circle Generating algorithms.

**Unit- IV**

Attributes of output Primitives – line attributes – Color and Grayscale style – Area filling algorithms – Character attributes – inquiry functions – Two dimensional transformation – Basic transformation – Composite transformation – Matrix representation – other transformations. Two – dimensional viewing – window- to view port co-ordinate transformation – clipping algorithms – Interactive input methods – Physical input devices – logical classification of input devices – interactive picture construction methods.

**Unit - V**

Three – dimensional concepts – Three dimensional display methods – parallel Projection – Perspective Projection – Depth Cueing – Visible line and surface identification – Three dimensional transformation. Three dimensional viewing – Projection – Viewing transformation – implementation of viewing operations – Hidden surface and Hidden line removal – backface removals.

**References:**

1. G. V. Post – Database Management Systems Designing and Building Business Application – McGraw Hill International edition – 1999.

2. Raghu Ramakrishnan – Database Management Systems – WCB/McGraw Hill – 1998.

3. C.J. Date – An Introduction to Database Systems – 7th Edition – Addison Wesley - 2000.

4. D.Hearn and M.P.Baker – Computer Graphics – Prentice Hall of India – 1997.

5. W.M. Newman and R.F.Sproull – Principles of Interactive Computer Graphics – McGraw Hill International Edition – 1979.

# PAPER XII

## BCA 311 - VISUAL PROGRAMMING AND SOFTWARE ENGINEERING

**Unit - I**

Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers. Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

**Unit - II**

Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms – Do Events and Sub Main - Error Trapping. VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics. Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation - DLL Servers - OLE Drag and Drop.

### Unit – III

Introduction to Software Engineering : Definitions – Size Factors – Quality and Productivity Factors – Managerial Issues – Planing a software project : Defining the problem - Developing a Solution Strategy - Planning the Development Process – Planning an Organization structure - Other Planning Activities. Software Cost Estimation : Software cost factors – Software Cost Estimation Techniques – Staffing-level Estimation - Estimating Software Maintenance Costs – The Software Requirements Specification – Formal Specification Techniques – Languages and Processors for Requirements Specification

### Unit - IV

Software design: Fundamental Design Concepts – Modules and Modularization Criteria – Design Notations - Design Techniques – Detailed Design Considerations – Real-Time and Distributed System Design – Test Plans – Milestones, walkthroughs, and Inspections. Implementation issues : Structured Coding Techniques – Coding Style – Standards and Guidelines – documentation guidelines -Type Checking – Scoping Rules – Concurrency Mechanisms.

### Unit - V

Quality Assurance – Walkthroughs and Inspections – Static Analysis – Symbolic Execution – Unit Testing and Debugging – System Testing - Formal Verification: Enhancing Maintainability during Development – Managerial Aspects of Software Maintenance – Source Code Metrics – Other Maintenance Tools and Techniques.

**Books for study and Reference**

1. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.

2. Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill - 1999.

3. R.Fairley, Software Engineering Concepts, Tata McGraw-Hill Edn. 1997.

4. R.S.Pressman, Software Engineering, Fourth Ed., McGraw Hill, 1997

# PAPER XIII

## BCA 312 - RESOURCE MANAGEMENT TECHNIQUES AND WEB TECHNOLOGY

### Unit – I

Basics of Operations Research (OR): Characteristics of OR Necessity of O.R in Industry - OR and Decision making Role of computers in O.R. Linear programming: Formulations and Graphical solution (of 2 variables) canonical & standard terms of Linear programming problem. Algebraic solution: Simplex method. Algebraic solution: Charnes method of penalties - two phase simplex method - concept of Duality properties of duality Dual simplex method.

### Unit – II

Transportation model: Definition - formulation and solution of transportation models - the row minima, column minima, matrix minima and vogel's approximation methods. Assignment model: Definition of Assignment model comparison with transportation model - formulation and solution of Assignment model - variations of Assignment problem. Sequencing problem: Processing each of n jobs

through m machines - processing n jobs through 2 machines processing n jobs through 3 machines - processing 2 jobs through m machines - processing n jobs through m machines travelling salesman problem.

## Unit - III

Game Theory: Characteristics of games   Maximin, Minimax criteria of optimality  Dominance property  algebraic and graphical method of solution of solving 2 x 2 games. Pert  CPM: Networks  Fulkerson's Rule  measure of activity PERT computation  CPM computation  resource scheduling. Simulation: Various methods of obtaining random numbers for use in computer simulation   Additive, multiplicative and mixed types of congruence random number generators Monte Carlo method of simulation   its advantages and disadvantages.

## Unit - IV

Internet Basic – Introduction to HTML – List – Creating Table – Linking document – Frames – Graphics to HTML Doc – Style sheet – Style sheet basic – Add style to document – Creating Style sheet rules – Style sheet properties – Font – Text – List – Color and background color – Box - Display properties.

Introduction to Javascript – Advantage of Javascript – Javascript Syntax – Datatype – Variable – Array – Operator and Expression – Looping Constructor – Function – Dialog box.  Javascript document object model – Introduction – Object in HTML – Event Handling – Window Object – Document object – Browser Object – Form Object – Navigator object – Screen object – Build in Object – User defined object – Cookies.

**Unit - V**

ASP. NET Language Structure – Page Structure – Page event, Properties & Compiler Directives.  HTML server controls – Anchor, Tables, Forms, Files. Basic Web server Controls – Lable, Textbox, Button, Image, Links, Check & Radio button, Hyperlink.  Data List Web Server Controls – Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.  Request and Response Objects, Cookies, Working with Data – OLEDB connection class, command class, transaction class, data adaptor class, data set class.  Advanced Issues – Email, Application Issues, Working with IIS and page Directives , Error handling.

Security – Authentication , IP Address, Secure by SSL & Client Certificates.

**Note  :**    Equal weightage may be given for all the Units in the  question paper.

**Books for study and Reference**

1. Hamdy A. Taha: Operation Research   An Introduction, 5thed. Prentice Hall of India, Pvt. Ltd., New Delhi, 1996.

2. Ackoff R.L. and Sasieni M. W. : Fundamentals of Operations Research, John Wiley and sons, New York, 1968.

3. Charnes A. Cooper W. and Hendersen  A. : Introduction to Linear Programming, Wiley and Sons, New York, 1953.

4. Srinath L.S.: PERT and CPM principles  and applications, Affiliated East West Press Pvt. Ltd., New York, 1973.

5 I. Bayross, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications, 2000

6. J. Jaworski, Mastering Javascript, BPB Publications, 1999

7. T. A. Powell, Complete Reference HTML (Third Edition),TMH, 2002

8. G.Buczek, ASP.NET Developers Guide, TMH, 2002

## PAPER XIV

## PRACTICAL IV - RDBMS AND WEB APPLICATIONS LAB

Creation of a Database and performing the operations given below using a Menu Driven Program.

a) Insertion b)Deletion c) Modification d) Generating a Simple report for the following:

1.   Payroll

2.   Mark sheet Processing

3.   Saving Bank account for banking

4.   Inventory System

5.   Invoice system

6.   Library information system

7.   Student information system

8.   Income tax processing system

9.   Electricity bill preparation system

10.  Telephone directory maintenance.

**WEB APPLICATIONS**

1.   Create a simple page introducing yourself, how old you are, what you do, what you like and dislike.  Modify the introduction to include a bullet list of what you do and put list the 5 things you like most and dislike as

numbered lists. Create another page about your favourite hobby, and link it to (and from) your main page. Center something, and put a quote on one of your pages.

2. Put an existing image on a web page. Create a table, use a heading and at least one use of row span/col span. Colour a page and some text within the page. Link to another site

3. Create a new file called index.html.

   r Put the normal HTML document structure tags in the file.

   r Give it a title.

   r At the bottom of the page (i.e. the last thing between the body tags) put the following:

   r A horizontal rule.

   r A link to your email address (with your name between the tag); remember to put the link to your email address within address tags.

   r A line break.

   r The date. (I have this same structure at the bottom of this page).

   r Above this block (which is called the footer), put a title in heading tags.

   r Add some text describing yourself. (you can split this into multiple headings and paragraphs if you wish).

5.   Write a script to create an array of 10 elements and display its contents.

6.   Write a function in Javascript that takes a string and looks at it character by character.

7.   Create a simple calculator using form fields. Have two fields for number entry & one field for the result. Allow the user to be able to use plus, minus, multiply & divide.

8.   Create a document and add a link to it. When the user moves the mouse over the link, it should load the linked document on it s own. (User is not required to click on the link).

9.   Create a document, which opens a new window without a toolbar, address bar, or a status bar that unloads itself after one minute.

10.  Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

11.  Create a Web form for an online library. This form must be able to accept the Membership Id of the person borrowing a book, the name and ID of the book, and the name of the book's author. On submitting the form, the user (the person borrowing the book) must be thanked and informed of the date when the book is to be returned. You can enhance the look of the page by using various ASP.NET controls.

12.  Display an advertisement at the bottom of the Web form that you created in question 10.

13. Create an array containing the titles of five new movies. Use this array as a data source for a drop down list control. The page must be capable of displaying the selected movie title to the user when the user clicks on the submit button.

14. Create a virtual directory in IIS. Create a global.asax file and include the "Session_Start" and "Session_End" and, "Application_BeginRequest" and "Application_End Request" events. Write a simple ASP.NET page and execute it in the browser.

## PAPER XV

## PRACTICAL V - PROGRAMMING IN JAVA AND MINI PROJECT APPLICATION

1. Finding area and Perimeter of a circle. Use Buffered Reader class.

2. Substring Removal from a String. Use String Buffer Class.

3. Determining the order of numbers generated randomly using Random Class.

4. Implementation of Point Class for Image manipulation.

5. Usage of Calender Class and manipulation.

6. String Manipulation using Char Array.

7. Database Creation for storing e-mail addresses and manipulation.

8. Usage of Vector Classes.

9. Implementing Thread based applications & Exception Handling.

10. Application using synchronization such as Thread based, Class based and synchronized statements.

**Applets**

11. Working with Frames and various controls.

12. Working with Dialogs and Menus.

13. Working with Panel and Layout.

14. Incorporating Graphics.

15. Working with Colors and Fonts.

**Mini Project**

Each student will develop and implement individually application software based on any emerging latest technologies.