

# Proposed Course Structure for Bachelor of Computer Applications (B.C.A.) Regular Course

## Ist Semester

### Papers:

|             |   |
|-------------|---|
| Paper – I   | Mathematical Foundation <sup>SA</sup>                     |
| Paper – II  | Computer Fundamentals <sup>RE</sup>                       |
| Paper – III | Business Communication & Information System <sup>IM</sup> |
| Paper – IV  | Fundamentals of Management <sup>AD</sup>                  |
| Paper – V   | Lab. On Windows   |
| Paper – VI  | Lab. On MS Office   |

## IInd. Semester

|             |                                |
|-------------|--------------------------------|
| Paper – I   | Discrete Mathematics           |
| Paper – II  | Computer Architecture          |
| Paper – III | C Programming & Data Structure |
| Paper – IV  | Business Accounting            |
| Paper – V   | Lab. On C                      |
| Paper – VI  | Lab. On Computer Organisation  |

## IIIrd. Semester

|             |  |
|-------------|--|
| Paper -- I  | System Analysis & Design                 |
| Paper – II  | Database Management System               |
| Paper – III | Object Oriented Programming in C++       |
| Paper – IV  | Computer Network                         |
| Paper – V   | Lab. On Database Management System       |
| Paper – VI  | Lab. On Numerical Techniques through C++ |

## **IVth. Semester**

|             |   |
|-------------|---|
| Paper – I   | Numerical Methodology                     |
| Paper – II  | Computer Graphics & Multimedia            |
| Paper – III | Operating System & Unix                   |
| Paper – IV  | Software Engineering Principles           |
| Paper – V   | Lab. On Unix & Multimedia                 |
| Paper – VI  | Lab. On Numerical Methodology for C / C++ |

## **Vth. Semester**

|             |                             |
|-------------|-----------------------------|
| Paper – I   | Visual Basic                |
| Paper – II  | Internet & Java Programming |
| Paper – III | Research Methodology        |
| Paper – IV  | Lab. On Oracle 8.0          |
| Paper – V   | Lab. Java & Internet        |
| Paper – VI  | Lab. On Visual Basic        |

## **VIth. Semester**

|             |  |           |
|-------------|--|-----------|
| Paper – I   | Project Report.                        | 100 marks |
| Paper – II  | Seminar Presentation,                  | 50 marks  |
| Paper – III | Viva-voce<br>(Based on Project Report) | 50 marks  |

## SEMESTER - I

### Paper I : Mathematical Foundation

Differential Calculus: Successive differentiation, Leibnitz Theorem, Taylor's theorem with Lagrange's form of remainder, Expansion of function of one variable in Taylor's and Meclaurin's infinite series, Maxima and minima of functions of one variable, Partial Derivatives, Euler's theorem, change of variables, Total differentiation, Errors and Approximation, Taylor's series in two variables, Maxima and Minima of two or more variables.

Integral Calculus : Definite integral and its application for area, length and volume, multiple integrals, change of order of integration, transformation of integral from Cartesian to polar, applications in areas, volume and surfaces.

Differential Equation: First degree and first order differential equation : Higher order differential equation with constant coefficients, Linear partial differential equation of first order P.D.E. of higher orders with constant coefficients.

Matrix Algebra : Elementary transformation, inverse of a matrix by row operation, rank, solution of a system of linear simultaneous equation by matrix method. Eigen values and Eigen vectors, Quadratic forms.

**Note :** Stress should be given on the development of ideas. Proofs of theorems and derivation of formulae are not required.

Books recommended:

1. Fundamental Structures in Modern algebra, R.S.Mishra & N.N.Bhattacharya, Pthishala Pvt. Ltd.
2. Elements of Modern Algebra, Dr. K.B.Lal Pthishala Pvt. Ltd., Allahabad
3. "Advanced Engg. Maths, by Chandrika Prasad
4. Elements of Modern Algebra – J.N.Sharma, Krishna Prakashan Media p.Ltd., Meerut.
5. Topics in Algebra – I.N.Herstein, Vikas Publications.

## SEMESTER I

### Paper II : COMPUTER FUNDAMENTALS

Computer Basic and Data Representation: Algorithms, Model of Computer, Characteristics of a Computer, Problem solving using computers, Representation of characters, Integers, fractions in computers, Hexadecimal representation of numbers, Decimal to Binary conversion, error detecting codes.

Input Output Units: Description of computer input units, input methods, computer output units, output methods

Computer Memory: Memory cells, Memory organization, Read only Memory, Serial Access Memory, Magnetic Hard Discs, Floppy Disk Drives, Magnetic Disk Drives.

Binary Arithmetic : Binary Addition and subtraction, signed numbers, One's and two's complement representation, Addition and subtraction of numbers in one's and two's complement notation, binary multiplication and division, Floating Point Representation of numbers, Arithmetic operation with normalised floating point numbers.

Logic Circuits: Switching circuits, AND / OR, NOT operations, Boolean functions and postulates, duality principle, venn diagram, truth table, logic circuits, address, transistors, integrated circuits.

Operating System: Need of operating system, Batch operating system, Multiprogramming and time sharing o/s, On-line and real time o/s

Computer Generations and Classification: First, Second, Third, Fourth, Fifth generation of computers, Classification of computers, Distributed computer system, Parallel computers

#### Text Books:

1. Fundamentals of computers, V. Rajaraman, Prentice Hall of India Pvt. Ltd.

# SEMESTER I

## Paper: III Business Communication & Information System

1. Meaning and process of Communication and barriers to communication.
2. Verbal Communication and non-verbal communication.
3. Business Communication and its importance in Business Organisation.
4. Principles of Letter Writing. Business Letters : Quotations, Orders, tenders, Sales Letters, Claim and Adjustment Letters, Credit and Collection Letters. Social Correspondence : Letters of Congratulation, Invitations, Introduction, Recommendation, Condolence, Conveying Acceptance and regrets etc.
5. Drafting of notices, Agenda and minutes of Company Meeting.
6. Office procedure : Receipt and Dispatch of mail, Filing and Indexing Systems, Classification of mail.
7. Concept, role and importance of Management Information System (MIS)
8. MIS and decision making concepts, Herbert Simon Model of Decision making
9. Concept of information, classification of information, value of information, MIS and information concepts.
10. Concept of System Analysis and design (SAD), need for System Analysis, the process of SAD, MIS and System Analysis
11. Planning, Designing and implementation of MIS
12. Concept of Philosophy of DSS

Text Book ; Management Information System – W.S. Jawadakar

Reference Books : Information System for Modern Management –Mudic,R.G.& Ross J.E.

Management Information System – Bluementhal

Business Communication – U.S.rai and S.M.rai

Communication – C.S.Rayudu

Communication Today – Reuben Ray

Essentials of Business Communication \_ Reddy,Apparnaiah,Rao

Essentials of Business communication – R.Pal & J.S.Korlahalli

Business Communication – Theory and Application.

# Semester – I

## Paper – IV Fundamentals of Management

**Concept:** Nature, Functions of Managers, Management: Arts Vs Science, Evolution of Management Thoughts.

**Planning:** Nature, Purpose, Importance of Planning, Types of Planning, Steps in Planning.

**Organising:** Nature & Purpose, Basic Departmentation, Classification of Organisation Structure.

**Staffing:** Definition, Steps involved in staffing Process, Human Resource Planning, Recruitment & Selection, Placement, Training & Development, Performance Appraisal.

**Directing:** Concept of Motivation, Need for Motivation and Motivation Chain - Maslow, Herzberg, and the Sources of Motivation. - Leadership and group dynamics: formal and informal groups, role concept

**Controlling:** Nature & Purpose of Control, Types of control, Steps involved in Control Process.  
- Behaviours and its causation : Introduction to personality, perception, learning and attitude.

- Improving interpersonal effectiveness, Interpersonal communication

### Books:

- 1 Principles & Practices of Management by L.M. Prasad.
- 2 Essentials of Management by Harold Kooutz & Odonnell.
- 3 Organisation and Management - R.D.Agrawal.
- 1 Organisational Behaviour - Fred Luthens
- 2 Management of Organisation Behaviour - Hershey & Blanchard
- 3 Human Behaviour at work - Keith Davis

## Semester – I

Paper: V Lab. On Windows

Paper: VI Lab. On MS Office

## SEMESTER II

### Paper I : Discrete Mathematics

#### Set Theory

Notation, Inclusion and Equality of Sets, Power Set, Operation on Sets, Venn Diagram.

#### RELATION

Relation, Properties of binary relation in a set, relation Matrix, Partition and Covering Equivalence Relation.

#### FUNCTIONS

Definition and Introduction, Composition of function, Inverse function.  
Algebraic Structures : Definitions and illustrative examples of semi-groups monoids, Groups, Subgroups, Rings, Integral domains, Fields and Vector spaces..

#### POSET

Partial Ordering, partially ordered set, Maximal, Minimal, Lub and Glb.  
Hasse DIAGRAM : Rules for drawing Hasse Diagrams.

#### LATTICE

Lattice as Poset, properties of Lattice, Sublattice, distributive and complimented lattice.

#### BOOLEAN ALGEBRA

Boolean Lattice and Boolean Algebra, Uniqueness of finite Boolean Algebra, Boolean functions and expressions, Use of K-maps.

**Note** - Stress has to be given on development of ideas and concepts. Proof of theorems and derivation of formulae are not required.

#### Text Books/Reference Books :

1. C.L.Liu : Elements of Combinatorial Math
2. D.Gries : The Science of Programming
3. Tremble : Discrete Mathematics..



## SEMESTER II

### Paper II : Computer Architecture:

Digital Logic Circuits: Logic Gates, Map simplification, Combinational circuits, Flip Flops, Sequential circuits, binary counters, shift registers, decoders, multiplexers, RAM, ROM

Data Representation: Fixed point and floating point representation, Error detection codes.

Central Processor Organisation: Processor bus Organisation, Arithmetic logic unit, instruction formats, addressing modes

Arithmetic Processor Design: Introduction, Addition and subtraction algorithm, multiplication algorithm, division algorithm

Arithmetic Algorithms: Signed-2's complement arithmetic, multiplication and division, floating point arithmetic operations, decimal arithmetic unit

Memory Organisation: Memory hierarchy Introduction to virtual and cache memory

#### Text Books:

1. Computer System Architecture by M. Moris Mano, Prentice Hall of India,

#### Reference :

1. Digital Logic and Computer Design – M. Moris Mano, Prentice Hall of India
2. Computer Architecture and Organisation – John P. Hayes, Mc Graw Hill, Singapore

## SEMESTER II

### Paper III : C-PROGRAMMING & DATA STRUCTURE

Elements of C Programming : Constants, variables, data types, operators

Decision making and branching : GOTO, IF, IF-ELSE, Nesting, Switch statements

Decision making and looping : WHILE, DO...WHILE, FOR statement, NESTED FOR statements.

Arrays: One and Two dimensional arrays

User Defined functions: Forms, Category, Nesting, recursion, function with arrays, parameter passing

Handling of character strings: string manipulations and string handling functions

Structures: Arrays of structures, arrays within structures, structure within structures, structure and functions

Pointers: Pointers and arrays, Pointers and functions

Linked Lists: Operations on linked lists, insertion, deletion into a linked list, circular linked list, doubly linked list

Stacks: Definition and concepts, operation and stacks implementation of stacks as an array and linked list evaluation of postfix & infix.

Queues: Definition and concepts, Queues in C, Dequeue, Examples.

Trees: Binary trees, operation in binary trees, tree traversals

Searching: notation, sequential search, binary search, sorting: Bubble sort, selection sort, insertion sort, shell sort, and their algorithms, comparison.

Text Books:

1. Jindal, R. "Data structures using C", Umesh Publications, Nai Sarak, delhi
2. Programming in ANSI C – E. Balaguruswamy (TMH), New Delhi

Reference:

1. Programming with C – Byron Gottfried (TMH)
2. C Programming – Moolish Kooper (Jaico Publishers ) Bombay

## SEMESTER II

### Paper: IV BUSINESS ACCOUNTING

1. Accounting: Basics of Accounting, Accounting Machines - Double Entry System, Classification, Rules for Debit & Credit, Concepts & Conventions, Indian Accounting Standards
2. Journal, Ledger and Trial Balance:  
Journal: Meaning of Journal, Advantages, Subdivision of journal  
Ledger: Meaning, Subdivision, Mechanics of posting, balancing Ledger Accounts
3. Trial Balance:  
Objectives, Defects of trial balance, errors disclosed by trial balance, preparation & locating errors.  
Cash Book and Subsidiary books of Accounting: Kinds of cashbook, Purchase day book, Sales day book, Bills receivable book, Bills payable book.
4. Finance Accounts: trading account, Profit & Loss Account, Adjustments, Balance sheet, Form of balance sheet, Assets & their classification, liabilities and their classification, uses & limitations.
5. Capital & Revenue Expenditure & receipts: Rules for determining capital expenditure & revenue expenditure, deferred revenue expenditure, capital & revenue receipts, Capital & Revenue Profits, Capital & Revenue Loss.
6. Accounting for Non-Profit Organisation: Accounting Procedures, Receipts and Payment Accounts, Distinction between receipts and payment Accounts, Income and expenditure Account problems.
7. Bill of Exchange: Parties to a Bill of Exchange, Types, Promissory Notes, Distinction between promissory notes & bill of exchange, Dishonour of bills, Effects of insolvency of drawee, renewal of bills.
8. Consignment Accounts: Economics of consignment, Distinction between sale & Consignment, Accounts Sales, Cost Price method, Invoice Price Method, Invoice Price Memorandum Column Method.

#### Books:

1. Advance accountancy - J.R. Batliboi
2. Advance Accounting - Dr. S.M. Shukla
3. Modern Accountancy - A. Mukherjee & M. Hanif
4. New Perspectives in Management Accounting - S.K. Chakraborty
5. Financial Accounting Principles - Robert N. Anthony.

## SEMESTER II

### Paper V Computer Lab on C

## SEMESTER II

### Paper VI Computer Lab on Computer Organisation

## SEMESTER III

### Paper I : System Analysis & Design

Management Information System - Meaning, Nature, Need, Role, Importance, Evolution of Management Through Information System.

Relatedness of MIS with management activities, Management function and decision making, Concept of balanced MIS Effectiveness and Efficiency criteria, Types of Information, Sources of Information, Information System at different levels of Management

Overview of system analysis and design, Business Systems Concepts, Systems development life cycle, project selection, feasibility analysis, design, implementation testing and evaluation.

Project Selection: Sources of project requests, managing project review and selection preliminary investigation.

Feasibility Study: Technical and economical feasibility, Cost and benefit analysis.

System requirement Specification and Analysis: Fact finding techniques, Data flow diagrams, data dictionaries, process organization and interaction, Decision analysis, Decision tree, and tables.

Detailed Design: Modularisations, Module Specification, File Design System Development involving data bases.

System Control and Quality assurance : Design objectives reliability and maintenance Software Design and documentation tools, topdown, bottomup and variants . Units and integration testing, testing practice and plans. System controls audit trails.

System Administration and training, Conversion and operation plans.

Hardware and Software Selection, Hardware acquisition, memory, process, peripherals, benchmarking, Vendor selection, Software selection operating System Languages. Language process, Performance and acceptance criteria.

#### Text Books:

1. James A.Senn. "Analysis of Design of Information System" McGraw Hill Pub. New Delhi 1996.
2. Richard, D. "System Analysis Design " Irwin Inc . 1979.
3. Awad, E.J, "System Analysis & Design", Galgotia Pub. New Delhi 1996  
Lee. B.S, "Introduction System Analysis and Design", Vols. Manchester U.K, National Computer center, London, 1991
4. Murdie, R.G., Ross, J.E & Claggett, J.R. : " Information Systems for Modern Management", 3<sup>rd</sup> Ed. Prentice Hall India 1987
5. Thomas, R, and Prince: "Information Systems for planning and control".

## SEMESTER – III

### Paper II : DATABASE MANAGEMENT SYSTEM

Introduction: Purpose of database system, data abstraction, data models, instance and schema, data independence, database manager, database administrator, exercises

Entity – Relationship Model: Entities and Entity sets, relationships and relationship sets, mapping constraints, primary keys, Entity – Relationship Diagram, Reducing E-R Diagrams to tables, Generalisation and Specialisation, Aggregation, exercises

Relational Model: Structure of relational databases, formal query languages, commercial query languages, modifying databases, view, exercises

Relational Database Design. Pitfalls in relational database design, normalization using functional, multivalued and join dependencies, domain key normal form, atomic values, alternative approaches to database design, Exercise.

SQL: Basic structure, set operations, Derived Relation, Views, Join Relation, DDL, SQL Features, Exercises.

Security, Integrity & Auditing: Security and Integrity violations, Authorisation and views, integrity constraints, Encryption, Statistical databases, Auditing aspects, Exercises.

#### Text Books:

1. Date, C.J. – “An Introduction to Database System” , Vol. – I and Vol. – II
2. Ullman Jeffrey, D. – Principles of Database Systems, 2<sup>nd</sup> Ed. Galgotia Publications

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1. Date, C.J. – “An Introduction to Database System”, Vol. – I and Vol. – II
2. Ullman Jeffrey, D. – Principles of Database Systems, 2<sup>nd</sup> Ed. Galgotia Publications

## SEMESTER III

### Paper III : Object oriented programming in C++

Introduction: Principles of object oriented programming, Applications of C++, tokens, expressions, control structures

Functions in C++: Call by reference, return by reference, inline functions, default arguments, functions overloading, Friend functions.

Classes and objects: member functions, inline functions outside the class. Nesting of member functions, static data member, static member functions, object as a function arguments, const member functions, returning object, constructors and destructors, overloading constructors.

Operator overloading: overloading unary operator, overloading binary operator, type conversions.

Inheritance: Derived class single inheritance, multiple inheritance, Hierarchical inheritance, virtual base class, abstract classes, constructors in derived classes.

Pointers and Polymorphism : Pointer to object, This Pointer, Pointer to derived class, virtual function, new and delete operator, pure virtual functions.

Files and I/O Operations: Streams formatted and unformatted I/O, Manipulator classes for file stream operator opening and closing a file, Random access, Error handling command line arguments.

#### Text Books:

1. Object oriented programming with C++ - E. Balaguruswamy, TMH
2. Object oriented programming to C++ - E. Robert Lafore, Galgotia Publications



## SEMESTER III

### Paper IV : COMPUTER NETWORK

Introduction: Definition of Computer Network, its use, goals and structure, network architectures, ISO reference model, examples.

Network Topology: Topology Design Process, connectivity analysis, Delay analysis, Backbone design, Local Access Design.

Physical Layers: Theoretical basis for data communication, transmission and multiplexing, terminal handling examples.

Data Link Layers: Data Link Protocols, Sliding Window protocols, Virtual circuits, Routing algorithms, Congestion, Examples of Network layers, selected examples.

#### Text Books:

1. Tanenbaum, A.S. "Computer Network", Prentice Hall of India, New Delhi, 1998.

#### Reference Books:

1. Pctor D. Varhol, E-Mail : Achieving Local & Global Communication, Comp, Tech Res. Corp., USA 1995.
2. McNamara, J.E: "Local Area Networks", Prentice Hall of India, New Delhi
3. Tanny, Betal: "Local Area Networks and the applications" , Prentice Hall of India, New Delhi

## **SEMESTER III**

**Paper V : Lab on Data Base Management System**

## **SEMESTER III**

**Paper VI : Lab on Numerical Techniques through C++**

## SEMESTER – IV

### Paper I : NUMERICAL METHODOLOGY

Solution of a nonlinear algebraic and transcendental equations by the method of False position and Newton Raphson method. Roots of polynomial equation by Newton and Bairstow's method, solution of a system of nonlinear equation by Newton Raphson method. Gaussian elimination with and without pivoting, LU decomposition and Crout's algorithms of linear systems of equation. Solution by Jacobi, Gauss Seidel and Relaxation iterative methods, Inverse of a matrix using iterative method, Finite differences and operators, Dividend differences, Numerical differentiation.

Numerical quadrature: Trapezoidal and Simpson's rules and their order of error, Gaussian quadrature, Single and multiple steps methods (Euler's, Runge Kutta, Adams Bashforth and Adams Moulton) and Residual methods for first order differential equation, Single step method (Euler's and R.K.) higher order differential equations.

#### Text Books:

1. Jain, M.K.: Numerical method for scientific and Engg. Computations – Wiley Eastern, N.Delhi
2. Sastry, S.S. – Introduction to Numerical Analysis - Prentice Hall of India
3. V. Rajaraman – Computer Oriented Numerical Methods – Prentice Hall of India
4. Gonte de Boore – Elementary Numerical Analysis, Tata McGraw Hill

## SEMESTER IV

### Paper II : COMPUTER GRAPHICS AND MULTIMEDIA

Overview of Graphics Systems : Video display devices, refresh cathode ray tubes, raster scan and random scan display, color CRT monitor, direct view storage tubes, flat panel displays, random scan systems, Input devices, hard copy devices and graphics software

Output Printer: Points and Linear, line drawing algorithm (DDA and Bresenham's line drawing algorithm ), circle generating algorithms, conic sections, polynomials and spline curves, pixel addressing, filled area primitives, fill-area functions.

Two – Dimensional geometric transformation : Basic transformations, matrix representation, composite transformations, reflection, shear, transformations between coordinate systems, affine transformations, transformations function s, Raster Methods for transformation.