

# **B.C.A. (Bachelor of Computer Application)**

## **Semester - II**

### **BCA 2001 MATHAMETICS - II**

#### ***Abstract Algebra:***

Group, Subgroups, Ring, Integral Domain, Field and Introduction of Boolean Algebra.

#### ***Linear Algebra:***

Spaces and Subspaces, Basic and Dimension of Vector Spaces, Linear Transformation, Their Nullity and Rank.

#### ***Matrix Algebra:***

Elementary Transformation, Inverse of a Matrix by Row Operation, Rank, Solution of a System of Linear Simultaneous Equation by Matrix Methods, Eigen Values and Eigen Vectors, Quadratic Forms.

#### ***Analytical Geometry of 3-Dimensions:***

Rectangular, Spherical, polar and Cylindrical Coordinates, Direction Cosines, Planes, Straight Lines, Shortest Distance between Two Skew Lines, Sphere.

#### ***Text Books:***

1. "Modern Algebra" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut.
2. "Matrices" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut .
3. "Analytical Geometry of The Dimensions" By Dasguta Prasad, Bharti Bhawan
4. "Advanced Course in Modern Algebra" By Prof Dr.K.K.Jha, New Bharat Prakashan Delhi- 6.
5. "Krishna Series" Analytical Geometry of three Dimension" By A.R.Vasishtha. Krishna Prakashan Media (P) Ltd Meerut .

## **BCA 2002 DATA STRUCTURE & C++**

### ***Introduction to C++:***

A First look at a C++ Program, Variables and Constants, Arithmetic Expressions, Arrays, Logical Expressions and if-else Statements, Iterative Statements, The switch Statement, Pointers, References, Dynamic Memory Allocation, Strings, Structures.

### ***Linked List:***

Data Structures and Abstract Data Types, Linked List Data structure, Linked List Traversal, The Insert Function, Remove Function, Linked Lists vs. Arrays, Linked Lists with a Tail and Doubly Linked Lists.

### ***Stacks:***

Introduction, Array Implementation of Stack, The Hardware Stack

### ***Classes:***

Introduction, Public and Private Members, Encapsulation, Implementation of a Class, Syntax for Accessing Class Members, Constructors and Destructors, Arrays of Class Objects, Operator Overloading for Classes, Classes and Efficiency.

### ***Recursion:***

Introduction, Examples of Recursive Functions, Base Case and Recursive Case, When Not to Use Recursion, Understanding and Debugging Recursive Functions.

### ***Queues:***

Introduction, Ring Buffer and Linked List Queue Implementations.

### ***Trees:***

Introduction, Binary Search Trees, The Destroy, Find, and Insert Functions for Binary Search Trees, The Remove Function for the Binary Search Tree, Binary Tree Traversals, Implementing Tree as a Class.

### ***Searching And Sorting:***

Introduction, Sequential and Binary Search, Selection Sort, Insertion Sort, Bubble Sort, Mergesort, Quicksort, Treesort and Heapsort, Radix Sort.

### ***Text Book:***

1. M.Litvin & G.Litvin- Programs with C++ and Datastructures-Vikas Publishing Home, New Delhi, 2005.

### ***Reference Books:***

1. S.Sahni- Data Structures, Algorithms and Applications in C++, 2<sup>nd</sup> Edn. Universities Press , India , 2005.

## **BCA 2003 DATABASE MANAGEMENT SYSTEM**

### ***Database System Concepts & Architecture:***

Data Independence , Schemas, Instances, Database Languages, Database System Environments Data Models, Basic Structure of Oracle System, Storage Organization in Oracle.

### ***Data Modeling:***

Use of High –level Conceptual Data Models, ER Diagrams, Subclasses, Superclasses and Inheritance, Specialization & Generalization, Conceptual Object Modeling using UML Class Diagrams, Knowledge Representation Concepts, Exercises.

### ***Relational Data Model:***

Relational Constraints, Domain Constraints, Key Constraints Referential Integrity Constraints, Relational Algebra, Fundamental Operations of Relational Algebra & their Implementation, Interdependence of Operations, Example Queries.

### ***ER and EER to Relational Mapping:***

Mapping EER Model Concepts to Relation, Tuple Relational Calculus, Domain Relational Calculus Queries.

### ***Database Design:***

Functional Dependencies, Irreducible Sets of Dependencies, Nonloss Decomposition, 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> NF, Dependency Preservation, Boyce Codd NF, Multivalued Dependency & 4<sup>th</sup> NF, Join Dependency & 5 NF, Domain Key Normal Form, Restriction –Union Normal Form, Denormalization.

### ***Query Processing And Optimization:***

#### ***SQL-***

Basic Queries in SQL, Subqueries, Retrieving a Query Plan – Table Space Span & I/O, Index Scan, Equal Unique Index Lookup, Clustered vs. Non Clustered Indexing, Index Only Scan, Methods for Joining Tables –Nested Loop Join Merge Join, Hybrid Join, Multiple table Join, Transforming Nested Queries to Joins, Object Relational SQL, Procedural SQL, Introduction to Embedded SQL.

#### ***TRANSACTION-***

Schedules, Serializability, Precedence Graph, Concurrency Control Techniques, Implementation of Transaction in Programs, Cursors and Transaction, Dynamic SQL, Locking Levels of Isolation, Recovery, Checkpoints.

### ***Database Security & Authorization:***

Specifying Privileges, Revoking Privileges, Propagation of Privileges, Statistical Database Security.

***Text Books:***

1. Fundamental of Database Systems- Elmasri Navathe- Pearson Education Asia
2. Database- Principles, Programming and Performance- Parick O' Neil Elizabeth O' Niel, Harcourt Asia PTE Limited

***References Books:***

1. An Introduction to Database Systems- C.J.Date, Addison Wesley, Pearson Education Press
2. Database System Concepts- Abraham Silberschat, Henry F. Korth, S.Sudarshan, Tata McGraw Hill.

## **BCA 2004 LINUX PROGRAMMING**

**Introduction:** The Linux/Unix File Model, The Linux/Unix Process Model, Standard C vs. Original C, Why GNU Programs Are Better.

**Arguments, Options, And The Environment:** Option and Argument Conventions, Basic Command-Line Processing, Option Parsing: getopt() and getopt\_long (), The Environment.

**User-Level Memory Management:** Linux/Unix Address Space, Memory Allocation, Library Calls: malloc(), calloc(), realloc(), free(), String Copying: strdup(), System Calls: brk() and sbrk(), Lazy Programmer Calls: alloca (), Address Space Examination.

**Files And File I/O:** Introduction the Linux/Unix I/O Model, Presenting a Basic Program Structure, Determining What Went Wrong, Doing Input and Output, Random Access: Moving Around within a File, Creating Files, Forcing Data to Disk, Setting File Length.

**Directories And File Metadata:** Considering Directory Contents, Creating and Removing Directories, Reading Directories, Obtaining Information about Files, Changing Ownership, Permission, and Modification Times.

**General Library Interfaces-Part 1** Times and Dates, Sorting and Searching Functions, User and Group Names, Terminals: isatty ().

**Filesystems And Directory Walks:** Mounting and Unmounting Filesystems, Files for Filesystem Administration, Retrieving Per-Filesystem Information, Moving Around in the File Hierarchy, Signals for Interprocess Communication, Important Special-Purpose Signals, Signals Across fork () and exec ().

**Permissions And User And Group Id Numbers:** Checking Permissions, Retrieving User and Group Ids, Checking As the Real User: access (), Checking as the Effective User: edidaccess () (GLIBC), Setting Extra Permission Bits for Directories, Setting Real and Effective IDs, Working with All Three IDs: getresuid () and setresuid () (Linux).

### **Text Book:**

1. A. Robbins- Linux Programming by Example- Pearson Education, New Delhi- 2005

### **Reference Books:**

1. J.Goerzen- Linux Programming Bible, IDG Books, New Delhi- 2001
2. N.Mathew & R.Stones- Beginning Linux Programming Wiley Publishing India , 2004.

## **BCA 2005 MANAGERIAL ECONOMICS**

Meaning, nature, scope and significance of economics Consumer Behaviour. Utility approach, Law of diminishing marginal utility. Law of equip marginal utility. Indifference curve approach, Consumer equilibrium income, prices & substitution effects. Revealed preference theory of law of Demand, Elasticity of demand and its measurements, methods of Demand forecasting, Concepts of cost and revenue, Short run and long run cost curves, Concept of total, average and marginal revenues. Relationship between average revenue, marginal revenue and elasticity of demand. Price determination under perfect, oligopoly, duopoly, monopoly, monopolistic competition price discrimination. Investment decision – capital building, public investment decision, risk and uncertainty

### ***Reference Books:***

1. **Elements of Economics** – Dewett & Dewett
2. **Managerial Economics** – Vartshney & Maheswari
3. **Managerial Economics** – J.G.Verma
4. **Economical Analysis for Management Decisions** – T.W.Elliot
5. **Business Economics** – V.G.Mankar
6. **Managerial Economics** – N.F. Dufty

## Additional Optional Courses

### BCA 2008 CHEMISTRY

**Chemical Bonding:** Trends in periodic properties (ionization energy, electron affinity, electro negativity), VBT, VSEPR theory, MOT for diatomic molecules and polyatomic molecules, coordination complexes & ligands, CFT, colour and magnetism of coordination complexes, spectrochemical series. (8)

**Kinetics and catalysis:** Kinetics of chain reactions, parallel reactions, side reactions, fast reactions in solutions, flash photolysis, kinetics of catalytic action (acid base catalysis, biological catalysis), application of catalyst in industrially important processes (Haber's processes, Ostwald process, Bergius process) (6)

**Thermo-chemistry and Fuels:** Hess's law, entropy, enthalpy and combustion calculations, characterization and application of fossil fuels, solid fuel (carbonization & gasification), liquid fuels (refining, reforming, petrol & diesel, knocking characteristics, octane and cetane number) and gaseous fuels (water gas, producer gas, coal gas and biogas), lubricants and its properties. (8)

**Electrochemistry and corrosion sciences :** Redox process cell, potential and free energy, galvanic cells, electrolysis and Nernst's equation, Fuel cells, and its applications, chemical and electrochemical corrosion, general methods of corrosion prevention (with brief introduction to chemistry of paints, varnishes and enamel) (6)

**Fundamentals of spectroscopic techniques:** Basic principles of vibrational, rotational and Mossbauer spectroscopy. (6)

**Macromolecules:** Classification, Addition and Condensation polymers, molecular weight of polymers ( $M_n$ ,  $M_w$ ,  $M_v$ ), glass transition temperature ( $T_g$ ), structure property relationship in polymers (chemical, electrical, optical and mechanical), examples and use of inorganic polymers, synthesis of some commercially important polymers and their use (Nylon 6, 6, PE, PET, PS) (6)

**An introduction to computational chemistry**  
(5)

#### **Text Books :**

1. Applied chemistry a text book for engineers and technologist, H.D. Gesser, Plenum Publishers.
2. Physical Chemistry: P.W. Atkins
3. Inorganic Chemistry : J.D. Lee
4. Fundamentals of molecular spectroscopy : C.N. Banwell, TMH publication
5. Computational Chemistry : E. Lewars, Kluwer publication
6. Engineering Chemistry : Sashi Chawla

## **BCA 2009 PHYSICS – II**

### ***Special Theory Of Relativity***

Postulates, Galilean Transformations, Lorentz Transformations, Length Contraction, Time Dilation, Velocity Addition, Mass Change and Einstein's Mass Energy Relation.

### ***Quantum Mechanics***

Planck's Theory of Black-Body Radiation, Compton Effect, Wave Particle Duality, De Broglie Waves, Phase velocity, group velocity, Davisson and Germer's Experiment, Uncertainty Principle, Physical Interpretation of Wave Function and its Normalization, Expectation Value.

Schrodinger Equation in One Dimension, Solutions of Time-Independent Schrodinger Equation for Free Particle in an Infinite Square Well, Potential Barrier and Tunneling, Hydrogen atom. (qualitative)

### ***Statistical Physics And Thermodynamics:***

Zeroth law, First law, Second law, statement of second law, Reversibility and Carnot's Theorem, Entropy, Heat Transfer, Steady state one-dimensional Heat conduction.

Statistical Equilibrium, Distribution Laws, Comparison of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Distributions.

### ***Lasers and Applications***

Emission of Light by Atoms, Spontaneous and Stimulated Emission, Einstein's A and B Coefficients, Laser: Population-Inversion, Properties of laser radiation, Ruby & He-Ne Lasers, Applications of Lasers, Elementary Ideas of Holography and Fiber Optics.

### ***Nuclear Physics***

Nuclear Forces, Binding Energy, Liquid Drop Model, Fission, Nuclear Reactors, Fusion and Energy Processes in Stars, Controlled Thermonuclear Reactions.

### ***Text Books:***

1. Resnick, Halliday and Krane, Physics Part-II John Wiley, 5th Ed. (2002).
2. A . Beiser, Perspectives of Modern Physics, Mc Graw Hill Int, Ed. 2002.
3. W. D. Callister, Material Science and Engineering: An Introduction, John Wiley 1997.
4. Sen, Introduction to Plasma Physics.
5. F.F.Chen, Introduction to Plasma Physics, Wiley Eastern.