

# ***BACHELOR OF COMPUTER APPLICATION (BCA)***

*THREE YEAR FULL - TIME PROGRAMME*

**CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT**  
**THREE YEARS BACHELOR OF COMPUTER APPLICATION PROGRAMME**

**COURSE CONTENT** (w.e.f. August 2011)

**SEMESTER I**

**COURSE CODE**

BCA-101

BCA-102

BCA-103

BCA-104

BCA-105

BCA-106P

BCA-107P

**QUALIFYING PAPER**

008

**COURSE NAME**

Mathematics –I (MATHS)

Programming Principle & Algorithm (PPA)

Computer Fundamental & Office Automation (CFOA)

Principle of Management (POM)

Business Communication (BC)

Computer Laboratory and Practical Work of Office Automation

Computer Laboratory & Practical Work of C Programming

Environmental Studies (EVS)

**SEMESTER II**

**COURSE CODE**

BCA-201

BCA-202

BCA-203

BCA-204

BCA-205

BCA-206P

**COURSE NAME**

Mathematics II (MATHS)

C Programming (C Prog)

Organization Behavior (OB)

Digital Electronics & Computer Organization (DECO)

Financial Accounting & Management (FAM)

Computer Laboratory and Practical Work of C Programming

**SEMESTER III**

**COURSE CODE**

BCA-301

BCA-302

BCA-303

BCA-304

BCA-305

BCA-306P

BCA-307P

**COURSE NAME**

Object Oriented Programming Using C++ (C++)

Data Structure Using C & C++ (DSC)

Computer Architecture & Assembly Language (CAAL)

Business Economics (BE)

Elements of Statistics (EL)

Computer Laboratory and Practical Work of OOPS

Computer Laboratory and Practical Work of DS

**SEMESTER IV**

**COURSE CODE**

BCA-401

BCA-402

BCA-403

BCA-404

BCA-406

BCA-405

**COURSE NAME**

Computer Graphics & Multimedia Application (CGMA)

Operating System (OS)

Software Engineering (SE)

Optimization Techniques (OT)

Mathematics-III (MATHS)

Computer Laboratory and Practical Work of CGMA

## **SEMESTER V**

### **COURSE CODE**

BCA-501  
BCA-502  
BCA-503  
BCA-504  
BCA-505P  
BCA-506P  
BCA-507P  
BCA-508P

### **COURSE NAME**

Introduction to DBMS  
Java Programming and Dynamic Webpage Design  
Computer Network  
Numerical Methods  
Minor Project  
Viva-Voice on Summer Training  
Computer Laboratory and Practical Work of DBMS  
Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage Design

## **SEMESTER VI**

### **COURSE CODE**

BCA-601  
BCA-602  
BCA-603  
BCA-604  
BCA-605P  
BCA-506P

### **COURSE NAME**

Computer Network Security  
Information System: Analysis Design & Implementation  
E-Commerce  
Knowledge Management  
Major Project  
Presentation/Seminar based on Major Project

**CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT**  
**THREE YEARS BACHELOR OF COMPUTER APPLICATION PROGRAMME**

|                                        |
|----------------------------------------|
| <b>COURSE CONTENT FOR SEMESTER – I</b> |
|----------------------------------------|

**BCA-101 MATHEMATICS -I**

|                  |                                 |                                                                                                                                                                                                                                                                                                                                                             |
|------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | <b>DETERMINANTS</b>             | Definition, Minors, Cofactors, Properties of Determinants<br><b>MATRICES:</b> Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix<br>Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof)                        |
| <b>Unit – II</b> | <b>LIMITS &amp; CONTINUITY:</b> | Limit at a Point, Properties of Limit, Computation of Limits of Various Types of Functions, Continuity at a Point, Continuity Over an Interval, Intermediate Value Theorem, Type of Discontinuities                                                                                                                                                         |
| <b>Unit– II</b>  | <b>DIFFERENTIATION:</b>         | Derivative, Derivatives of Sum, Differences, Product & Quotients, Chain Rule, Derivatives of Composite Functions, Logarithmic Differentiation, Rolle’s Theorem, Mean Value Theorem, Expansion of Functions (Maclaurin’s & Taylor’s), Indeterminate Forms, L’ Hospitals Rule, Maxima & Minima, Curve Tracing, Successive Differentiation & Liebnitz Theorem. |
| <b>Unit– IV</b>  | <b>INTEGRATION:</b>             | Integral as Limit of Sum, Fundamental Theorem of Calculus (without proof.), Indefinite Integrals, Methods of Integration Substitution, By Parts, Partial Fractions, Reduction Formulae for Trigonometric Functions, Gamma and Beta Functions(definition).                                                                                                   |
| <b>Unit – V</b>  | <b>VECTOR ALGEBRA:</b>          | Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and physical interpretation of area and volume.                                                                                                                                                                                                                   |

**Referential Books:**

1. .S. Grewal, “Elementary Engineering Mathematics”, 34th Ed., 1998.
2. Shanti Narayan, “Integral Calculus”, S. Chand & Company, 1999
3. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand & Company, 9th Revised Edition, 2001.
4. Shanti Narayan, “Differential Caluculs”, S.Chand & Company, 1998.

## BCA-102 PROGRAMMING PRINCIPLE & ALGORITHM

|                  |                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Introduction to 'C' Language Fundamentals        | History, Structures of 'C' Programming, Function as building blocks.<br><br>Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types, Comments.                                                                                                                                                                                                                                                                                                          |
| <b>Unit – II</b> | Operators<br><br>Build in Operators and function | Types of operators, Precedence and Associativity, Expression, Statement and types of statements<br>Console based I/O and related built in I/O function: printf(), scanf(), getch(), getchar(), putchar(); Concept of header files, Preprocessor directives: #include, #define.                                                                                                                                                                                                  |
| <b>Unit– III</b> | Control structures                               | Decision making structures: If, If-else, Nested If-else, Switch; Loop Control structures: While, DOWHILE, for, Nested for loop; Other statements: break, continue, goto, exit.                                                                                                                                                                                                                                                                                                  |
| <b>Unit– IV</b>  | Introduction to problem solving                  | Concept: problem solving, Problem solving techniques (Trail & Error, Brain Storming, Divide & Conquer)<br>Steps in problem solving (Define Problem, Analyze Problem, Explore Solution)<br>Algorithms and Flowcharts (Definitions, Symbols), Characteristics of an algorithm<br>Conditionals in pseudo-code, Loops in pseudo code<br>Time complexity: Big-Oh notation, efficiency<br>Simple Examples: Algorithms and flowcharts (Real Life Examples)                             |
| <b>Unit – V</b>  | Simple Arithmetic Problems                       | Addition / Multiplication of integers, Determining if a number is +ve / -ve / even / odd, Maximum of 2 numbers, 3 numbers, Sum of first n numbers, given n numbers, Integer division, Digit reversing, Table generation for n, a <sup>b</sup> , Factorial, sine series, cosine series, <sup>n</sup> C <sub>r</sub> , Pascal Triangle, Prime number, Factors of a number, Other problems such as Perfect number, GCD numbers etc (Write algorithms and draw flowchart), Swapping |
| <b>Unit-VI</b>   | Functions                                        | Basic types of function, Declaration and definition, Function call, Types of function, Parameter passing, Call by value, Call by reference, Scope of variable, Storage classes, Recursion.                                                                                                                                                                                                                                                                                      |

### Referential Books:

1. Let us C-Yashwant Kanetkar.
2. Programming in C-Balguruswamy
3. The C programming Lang., Pearson Ed - Dennis Ritchie
4. Structured programming approach using C- Forouzan & Ceilber Thomson learning publication.
5. Pointers in C - Yashwant Kanetkar
6. How to solve it by Computer - R.G. Dromy
7. Peter Norton's Introduction to Computers - Tata MGHill

|                  |                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Introduction to Computers             | <p>Introduction, Characteristics of Computers, Block diagram of computer.</p> <p>Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers.</p> <p>Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages).</p> <p>Data Organization, Drives, Files, Directories.</p> <p>\Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM. Secondary Storage Devices (FD, CD, HD, Pen drive)</p> <p>I/O Devices (Scanners, Plotters, LCD, Plasma Display) Number Systems</p> <p>Introduction to Binary, Octal, Hexadecimal system</p> <p>Conversion, Simple Addition, Subtraction, Multiplication</p> |
| <b>Unit – II</b> | Algorithm and Flowcharts              | <p>Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples</p> <p>Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Unit– III</b> | Operating System and Services in O.S. | Dos - History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Unit– IV</b>  | Windows Operating Environment         | Features of MS - Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Unit – V</b>  | Editors and Word Processors           | Basic Concepts, Examples: MS-Word, Introduction to desktop publishing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Unit – VI</b> | Spreadsheets and Database packages    | Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between application, MS-PowerPoint.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Referential Books:**

1. Fundamental of Computers - By V.Rajaraman B.P.B. Publications
2. Fundamental of Computers - By P.K. Sinha
3. Computer Today- By Suresh Basandra
4. Unix Concepts and Application - By Sumitabha Das
5. MS-Office 2000(For Windows) - By Steve Sagman
6. Computer Networks - By Tennenbum Tata MacGrow Hill Publication

## BCA-104 PRINCIPLE OF MANAGEMENT

|                  |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Nature of Management:            | Meaning, Definition, its nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management.                                                                                                                                                                                                                                                                                      |
| <b>Unit – II</b> | 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.                                                                                                                                                                                                                                                                                                                     |
| <b>Unit– III</b> | 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 |
| <b>Unit– IV</b>  | 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                                                                                                                                                                                                                                                                                                 |
| <b>Unit – V</b>  |                                  | Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.                                                                                                                                                                                                                                                                                                                                                        |
| <b>Unit – VI</b> | : 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                                                                                                                                                                                                                                                                                                                                         |

### Referential Books :

1. Essential of Management - Horold Koontz and Itenz Weibrich- McGrawhills International
2. Management Theory & Practice - J.N.Chandan
3. Essential of Business Administration - K.Aswathapa, Himalaya Publishing House
4. Principles & practice of management - Dr. L.M.Parasad, Sultan Chand & Sons - New Delhi
5. Business Organization & Management - Dr. Y.K.Bhushan
6. Management: Concept and Strategies By J.S. Chandan, Vikas Publishing
7. Principles of Management, By Tripathi, Reddy Tata McGraw Hill
8. Business organization and Management by Talloo by Tata McGraw Hill
9. Business Environment and Policy - A book on Strategic Management/ Corporate Planning By Francis Cherunilam Himalaya Publishing House 2001 Edition

## BCA-105 BUSINESS COMMUNICATION

|                  |                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Means of Communication:                                                            | Meaning and Definition - Process - Functions - Objectives - Importance - Essentials of good communication - Communication barriers, 7C's of Communication                                                                                                                                                                                                                                                                                                 |
| <b>Unit – II</b> | Types of 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. |
| <b>Unit– III</b> | Written Communication                                                              | Purpose of writing, Clarity in Writing, Principle of Effective writing, Writing Techniques, Electronic Writing Process                                                                                                                                                                                                                                                                                                                                    |
| <b>Unit– IV</b>  | 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.                                                                                                                                                                                                                                              |
| <b>Unit – V</b>  | Drafting of business letters:                                                      | Enquiries and replies - Placing and fulfilling orders - Complaints and follow-up Sales letters - Circular letters Application for employment and resume                                                                                                                                                                                                                                                                                                   |
| <b>Unit – VI</b> | Information Technology for Communication: Topics Prescribed for workshop/skill lab | 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. Group Discussion, Mock Interview, Decision Making in a Group                                                                                                                                                      |

### Referential Books :

- 1) Business Communication - K.K.Sinha - Galgotia Publishing Company, New Delhi.
- 2) Media and Communication Management - C.S. Rayudu - Hikalaya 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 Privat Limited, New Delhi.
- 8) Modern Business Correspondence - L.Gartside - The English Language Book Society and Macdonald and Evans Ltd.
- 9) Business Communication - M.Balasubrahmanyam - Vani Education Books. 10) Creating a Successful CV - Siman Howard – Dorling Kidderley.

### 106P Computer Laboratory And Practical Work Of Office Automation

Practical will be based on Paper Office Automation: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus

### 107P Computer Laboratory and Practical Work of Programming Principle & Algorithm

Practical will be based on Paper Programming Principle & Algorithm: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus

## QUALIFYING PAPER

### ENVIRONMENTAL STUDIES (CODE-008)

#### UNIT-1: THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and Importance, Need for Public Awareness.

#### UNIT-2: 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 agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) ENERGY RESOURCES: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources, case studies
- f) LAND 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 lifestyles

#### UNIT-3: ECOSYSTEMS

- ❖ Concept of an ecosystem
- ❖ Structure and function of an ecosystem
- ❖ Producers, consumers and decomposers
- ❖ Energy flow in the ecosystem
- ❖ Ecological succession

- ❖ Food chains, food webs and ecological pyramids
- ❖ Introduction, types, characteristic features, structure and function of the following ecosystem: -
  - a) Forest ecosystem
  - b) Grassland ecosystem
  - c) Desert ecosystem
  - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

#### **UNIT-4: BIODIVERSITY AND ITS CONSERVATION**

- ❖ Introduction – Definition: genetic, species and ecosystem diversity.
- ❖ Biogeographical classification of India
- ❖ Value of biodiversity: Consumptive use, productive use, social, ethical, and 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-5: ENVIRONMENTAL POLLUTION**

##### **DEFINITION:**

- ❖ Causes, effects and control measures of: -
  - a) Air pollution
  - b) Water pollution
  - c) Soil pollution
  - d) Marine pollution
  - e) Noise pollution
  - f) Thermal pollution
  - g) Nuclear pollution
- ❖ Solid waste 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-6: 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-7: HUMAN POPULATION AND THE ENVIRONMENT**

- ❖ Population growth, variation among nations.
- ❖ Population explosion: Family Welfare Programme.
- ❖ Environment and human health
- ❖ Human Rights
- ❖ Value Education
- ❖ Women and Child Welfare
- ❖ Role of Information Technology in Environment and human health
- ❖ Case Studies

## **UNIT-8: FIELD WORK**

- ❖ Visit to a local area to document environmental assets-river / forest / grassland / hill / mountain.
- ❖ Visit to a local polluted site – Urban / Rural / Industrial / Agricultural
- ❖ Study of common plants, insects, birds.
- ❖ Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours).

# CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT

## THREE YEARS BACHELOR OF COMPUTER APPLICATION PROGRAMME

### COURSE CONTENT FOR SEMESTER – II

#### BCA-201 Mathematics II

|                  |                                             |                                                                                                                                                                                                                                                                                                                                                               |
|------------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | <b>Sets</b>                                 | Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications                                                                                                                                                                |
| <b>Unit – II</b> | <b>Relations and functions</b>              | Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions, Introduction of Trigonometric, Logarithmic and Exponential Functions                                                                                                                  |
| <b>Unit– III</b> | <b>Partial order relations and lattices</b> | Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebraic Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattices                                                                                                                         |
| <b>Unit– IV</b>  | <b>Functions of several variables</b>       | Partial Differentiation, Change of Variables, Chain Rule, Extrema of Functions of 2 Variables, Euler's Theorem                                                                                                                                                                                                                                                |
| <b>Unit – V</b>  | <b>3d coordinate geometry</b>               | 3D Coordinate Geometry: Coordinates in Space, Direction Cosines, Angle Between Two Lines, Projection of Join of Two Points on a Plane, Equations of Plane, Straight Lines, Conditions for a line to lie on a plane, Conditions for Two Lines to be Coplanar, Shortest Distance Between Two Lines, Equations of Sphere, Tangent plane at a point on the sphere |
| <b>Unit – VI</b> | <b>Multiple integration</b>                 | Double Integral in Cartesian and Polar Coordinates to find Area, Change of Order of Integration, Triple Integral to Find Volume of Simple Shapes in Cartesian Coordinates.                                                                                                                                                                                    |

#### Referential Books:

1. Kolman, Busby and Ross, "Discrete Mathematical Structure", PHI, 1996.
2. S.K. Sarkar, "Discrete Maths"; S. Chand & Co., 2000

## BCA-202 C Programming

|           |                             |                                                                                                                                                                                                                                                                                                                                  |
|-----------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unit – I  | Arrays                      | Definition, declaration and initialization of one dimensional array; Accessing array elements; Displaying array elements; Sorting arrays; Arrays and function; Two-Dimensional array: Declaration and Initialization, Accessing and Displaying, Memory representation of array [Row Major, Column Major]; Multidimensional array |
| Unit – II | Pointers                    | Definition and declaration, Initialization; Indirection operator, address of operator; pointer arithmetic; dynamic memory allocation; arrays and pointers; function and pointers                                                                                                                                                 |
| Unit– II  | Strings                     | Definition, declaration and initialization of strings; standard library function: strlen(), strcpy(), strcat(), strcmp(); Implementation without using standard library functions                                                                                                                                                |
| Unit– IV  | Structures                  | Definition and declaration; Variables initialization; Accessing fields and structure operations; Nested structures; Union: Definition and declaration; Differentiate between Union and structure                                                                                                                                 |
| Unit – V  | Introduction C Preprocessor | Definition of Preprocessor; Macro substitution directives; File inclusion directives; Conditional compilation                                                                                                                                                                                                                    |
|           | Bitwise Operators           | Bitwise operators; Shift operators; Masks; Bit field                                                                                                                                                                                                                                                                             |
| Unit – VI | File handling               | Definition of Files, Opening modes of files; Standard function: fopen(), fclose(), feof(), fseek(), fwind(); Using text files: fgetc(), fputc(), fscanf()                                                                                                                                                                        |
|           |                             | <b>Command line arguments</b>                                                                                                                                                                                                                                                                                                    |

### Referential Books:

1. Let us C-Yashwant Kanetkar.
2. Programming in C-Balguruswamy
3. The C programming Lang., Person Ecl - Dennis Ritchie
4. Structured programming approach using C-Forouzah & Ceilberg Thomson learning publication

## **BCA-203      Organization Behavior**

|                  |                                                    |                                                                                                                                                                                                                                                                                                                                    |
|------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | <b>Fundamentals of Organizational Behaviour</b>    | Nature, Scope, Definition and Goals of organizational Behaviour; Fundamental Concepts of Organizational Behaviour; Models of Organizational Behaviour; Emerging aspects of Organizational Behaviour: Meaning Cultural Diversity, Managing the Perception Process                                                                   |
| <b>Unit – II</b> | <b>Perception, Attitude, Values and Motivation</b> | Concept, Nature, Process, Importance, Management Behavioural aspect of Perception. Effects of employee attitudes; Personal and Organizational Values; Job Satisfaction; Nature and Importance of Motivation; Achievement Motive; Theories of Work Motivation: Maslow's Need Hierarchy Theory McGregors's Theory 'X' and Theory 'Y' |
| <b>Unit– III</b> | <b>Personality</b>                                 | Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Traits, Mytes-Briggs Indicator; Locus of Control, SType A and Type B Assessment of Personality                                                                                                              |
| <b>Unit– IV</b>  | <b>Work Stress</b>                                 | Meaning and definition of Stress, Symptoms of Stress; Sources of Stress: Individual Level, Group Level, Organizational Level; Stressors, Extra Organizational Stressors; Effect of Stress - Burnouts; Stress Management - Individual Strategies, Organizational Strategies; Employee Counselling                                   |
| <b>Unit – V</b>  | <b>Group Behaviour and Leadership</b>              | Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders                                                                                                                                                      |
| <b>Unit – VI</b> | <b>Conflict in Organizations</b>                   | Nature of Conflict, Process of Conflict; Levels of Conflict - Intrapersonal, Interpersonal; Sources of Conflict; Effect of Conflict; Conflict Resolution, Meaning and types of Grievances & Process of Grievances Handling.                                                                                                        |

### **Referential Books:**

1. Organizational Behavior Text, Cases and Games- By K.Aswathappa, Himalaya Publishing House, Mumbai, Sixth Edition (2005)
2. Organizational Behavior Human Behavior at Work By J.W. Newstrom, Tata McGraw Hill Publishing Company Limited, New Delhi, 12<sup>th</sup> Edition (2007)
- 3 Organizational Behavior - By Fred Luthans
- 4 Organizational Behavior - By Super Robbins
5. Organizational Behavior - Anjali Ghanekar
6. Organizational Behavior Fundamentals, Realities and Challenges By Detra Nelson, James Campbel Quick Thomson Publications
7. Organizational Behavior through Indian Philosophy, By N.M.Mishra, Hikalaya Publication House

## **BCA-204     Digital Electronics & Computer Organization**

|                  |                                      |                                                                                                                                                          |
|------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | <b>Logic gates and circuit</b>       | Gates (OR, AND, NOR, NAND, XOR & XNOR); Demorgan's laws; Boolean laws, Circuit designing techniques (SOP, POS, K-Map).                                   |
| <b>Unit – II</b> | <b>Combinational Building Blocks</b> | Multiplexes; Decoder; Encoder; Adder and Subtractor.                                                                                                     |
| <b>Unit– III</b> | <b>Memories</b>                      | ROMs, PROMs, EPROMs, RAMs, Hard Disk, Floppy Disk and CD-ROM                                                                                             |
| <b>Unit– IV</b>  | <b>Sequential Building Blocks</b>    | Flip-Flop (RS, D, JK, Master-slave & T flip-flops); Registers & Shift registers; Counters; Synchronous and Asynchronous Designing method                 |
| <b>Unit – V</b>  | <b>Memory Organization</b>           | Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization |

### **Referential Books:**

- |                                                     |                              |
|-----------------------------------------------------|------------------------------|
| 1. Digital Logic and Computer design (PHI) 1998     | : M.M. Mano                  |
| 2. Computer Architecture (PHI) 1998                 | : M.M. Mano                  |
| 3. Digital Electronics (TMH) 1998                   | : Malvino and Leach          |
| 4. Computer Organization and Architecture           | : William Stallings          |
| 5. Digital fundamentals (Universal Book Stall) 1998 | : Floyd, L.Thomas            |
| 6. Computer Organization (MC Graw-Hill, Signapore)  | : Hamcher, Vranesic and Zaky |

## **BCA-205     Financial Accounting & Management**

- Unit – I** : Overview - Meaning and Nature of Financial Accounting, Scope of Financial Accounting, Financial Accounting & Management Accounting, Accounting concepts & convention, Accounting standards in India
- Unit – II** : Basics of accounting - Capital & Revenue items, Application of Computer in Accounting Double Entry System, Introduction to Journal, Ledger and Procedure for Recording and Posting, Introduction to Trail Balance, Preparation of Final Account, Profit & Loss Account and related concepts, Balance Sheet and related concept
- Unit– III** : Financial statement analysis: Ratio analysis, Funds flow analysis, concepts, uses, Preparation of funds flow statement, simple problem, Cash flow analysis, Concepts, uses, preparation of cash flow statement, simple problem, Break - even analysis
- Unit– IV** : Definition nature and Objective of Financial Management, Long Term Sources of Finance, Introductory idea about capitalization, Capital Structure, Concept of Cost of Capital, introduction, importance, explicit & implicit cost, Measurement of cost of capital, cost of debt.
- Unit – V** : Concept & Components of working Capital. Factors Influencing the Composition of working Capital, Objectives of working Capital Management - Liquidity Vs. Profitability and working capital policies. Theory of working capital: Nature and concepts
- Unit – VI** : Cash Management, Inventory Management and Receivables Management

### **Referential Books:**

1. Maheshwari & Maheshwari, "An Introduction to Accountancy", 8<sup>th</sup> Edition, Vikas Publishing House, 2003
2. Gupta R.L., Gupta V.K., "Principles & Practice of Accountancy", Sultan Chand & Sons, 1999.
3. Khan & Jain, "Financial Accounting"
4. Maheshwari S.N., "Principles of Management Accounting", 11<sup>th</sup> Edition, Sultan Chand & Sons, 2001
5. Shukla and Grewal, "Advanced Accounts", 14<sup>th</sup> Edition, Sultan Chand & Sons.

## **BCA-206     Computer Laboratory and Practical Work of C Programming**

Practical will be based on Paper Programming Principle & Algorithm: Covers UNIT-III, UNIT-IV, UNIT-V, UNIT-VI of Syllabus

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**COURSE CONTENT FOR SEMESTER – III**

**BCA-301    Object Oriented Programming Using C++**

|                  |                              |                                                                                                                                                                                                                                                                                                                                                  |
|------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Introduction                 | Introducing Object- Oriented Approach, Relating to other paradigms {Functional, Data decomposition}.                                                                                                                                                                                                                                             |
|                  | Basic terms and ideas        | Abstraction, Encapsulation, Inheritance, Polymorphism, Review of C, Difference between C and C++ - cin, cout, new, delete, operators.                                                                                                                                                                                                            |
| <b>Unit – II</b> | Classes and Objects          | Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State identity and behaviour of an object, Constructors and destructors, instantiation of objects, Default parameter value, object types, C++ garbage collection, dynamic memory allocation, Metaclass / abstract classes. |
| <b>Unit– III</b> | Inheritance and Polymorphism | Inheritance, Class hierarchy, derivation - public, private & protected, Aggregation, composition vs classification hierarchies, Polymorphism, Categorization of polymorphism techniques, Method polymorphism, Polymorphism by parameter, Operator overloading, Parametric Polymorphism                                                           |
| <b>Unit– IV</b>  | Generic function             | Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.                                                                                                                                                                                                                       |
| <b>Unit – V</b>  | Files and exception Handling | Streams and files, Namespaces, Exception handling, Generic Classes                                                                                                                                                                                                                                                                               |

**Referential Books:**

1. A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. S.B.Lippman & J.Lajoie, “ C++ Primer”, 3<sup>rd</sup> Edition, Addison Wesley, 2000.The C programming Lang., Person Ecl - Dennis Ritchie
3. R.Lafore, “Object Oriented Programming using C++”, Galgotia Publications, 2004
4. D.Parasons, “Object Oriented Programming using C++”, BPB Publication.

## **BCA-302      Data Structure Using C & C++**

|                  |                                                              |                                                                                                                                                                                                                                                                       |
|------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Introduction to Data Structure and its Characteristics Array | Representation of single and multidimensional arrays; Sparse arrays - lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.                                                                                                   |
| <b>Unit – II</b> | 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. |
| <b>Unit– III</b> | Lists                                                        | Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers                                                                                                              |
| <b>Unit– IV</b>  | Trees                                                        | Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree                                                                                                          |
| <b>Unit – V</b>  | 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                                                             |
| <b>Unit - VI</b> |                                                              | Sorting Techniques; Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing                                                                                                                             |

### **Referential Books:**

1. E.Horowitz and S.Sahani, “ Fundamentals of Data structures”, Galgotia Book source Pvt. Ltd.2003
2. R.S.Salaria, “ Data Structures & Algorithms” , Khanna Book Publishing Co. (P) Ltd.,2002
3. Y.Langsam et. Al., “ Data Structures using C and C++” , PHI, 1999

## BCA-303 Computer Architecture & Assembly Language

|                  |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  |                              | Basic computer organization and design, Instructions and instruction codes, Timing and control/ instruction cycle, Register/ Types of register/ general purpose & special purpose registers/ index registers, Register transfer and micro operations/ register transfer instructions, Memory and memory function, Bus/ Data transfer instructions, Arithmetic logic micro-operations/ shift micro-operations, Input/ Output and interrupts, Memory reference instructions, Memory interfacing memory/ Cache memory. |
| <b>Unit – II</b> | Central Processing Unit      | General Register Organization/ stacks organizations instruction formats, addressing modes, Data transfer and manipulation. Program control reduced computer, pipeline/ RISC/ CISC pipeline vector processing/ array processing. Arithmetic Algorithms: Integer multiplication using shift and add, Booth's algorithm, Integer division, Floating-point representations.                                                                                                                                             |
| <b>Unit– III</b> | Computer Arithmetic          | Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point, arithmetic operations, decimal arithmetic operations, decimal arithmetic operations.                                                                                                                                                                                                                                                                                                                                       |
| <b>Unit– IV</b>  | Input - Output Organization  | Peripheral devices, Input/output interface, ALU Asynchronous Data transfer, mode of transfer, priority interrupts, Direct memory Address (DMA), Input/ Output processor (IOP), serial communication.                                                                                                                                                                                                                                                                                                                |
| <b>Unit – V</b>  | Evaluation of Microprocessor | Overview of Intel 8085 to Intel Pentium processors Basic microprocessors, architecture and interface, internal architecture, external architecture memory and input/ output interface.                                                                                                                                                                                                                                                                                                                              |
| <b>Unit – VI</b> |                              | Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output programming.                                                                                                                                                                                                                                                                                                                         |

### Referential Books:

1. Leventhal, L.A, "Introduction to Microprocessors", Prentice Hall of India
2. Mathur, A.P., "Introduction to Microprocessors" , Tata McGraw Hill
3. Rao,P.V.S., "Prospective in Computer Architechture" , Prentice Hall of India

## **BCA-304      Business Economics**

|                  |                                                                                                                         |                                                                                                                                                                                                                                    |
|------------------|-------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | The Scope and Method of Economics, the Economic Problem<br>The Production Process<br>Laws of returns & Returns to Scale | Scarcity & Choice, The Price Mechanism, Demand & Supply Equilibrium: The Concept of Elasticity and it's Applications.<br><br>Output decisions - Revenues Costs and Profit Maximisation<br><br>Economics and Diseconomies of scale. |
| <b>Unit – II</b> | Market Structure                                                                                                        | Equilibrium of a firm and Price, Output Determination under Perfect Competition Monopoly, Monoplastic Competition & Oligopoly                                                                                                      |
| <b>Unit– III</b> | Macro Economic Concerns                                                                                                 | Inflation, Unemployment, Trade-Cycles, Circular Flow upto Four Sector Economy, Government in the Macro Economy: Fiscal Policy, Monetary Policy, Measuring national Income and Output                                               |
| <b>Unit– IV</b>  | The World Economy                                                                                                       | - WTO, Globalisation, MNC's, Outsourcing, Foreign Capital in India, Trips, Groups of Twenty (G-20), Issues of dumping, Export-Import Policy 2004-2009                                                                              |

### **Referential Books:**

1. Ahuja H.L., "Business Economics", S.Chand & Co., New Delhi, 2001
2. Ferfuson P.R., Rothchild, R and Fergusen G.J."Business Economics" Mac-millan, Hampshire, 1993
3. Karl E.Case & Ray C. fair , "Principles of Economics" , Pearson Education , Asia, 2000
4. Nellis, Joseph, Parker David, " The Essence of Business Economics", Prentice Hall, New Delhi, 1992.

## BCA-305 Elements of Statistics

|                  |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Unit – I</b>  | Population, Sample and Data Condensation | Definition and scope of statistics, concept of population and sample with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.                                                                                                                                                                                                                                                                                                                                         |
| <b>Unit – II</b> | Measures of Central Tendency             | Concept of central Tendency, requirements of a good measures of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Unit– III</b> | Measures of Dispersion                   | Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Unit– IV</b>  | Permutations and Combinations            | Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). ${}^n P_r = n!/(n-r)!$ (without proof). Combinations of 'r' objects taken from 'n' objects. ${}^n C_r = n!/(r!(n-r)!)$ (without proof) . Simple examples, Applications.                                                                                                                                                                                                                                                                              |
| <b>Unit – V</b>  | Sample space, Events and Probability     | Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples.<br>Classical definition of probability, Addition theorem of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, simple numerical problems. |
| <b>Unit – VI</b> | Statistical Quality Control              | Introduction, control limits, specification limits, tolerance limits, process and product control; Control charts for X and R; Control charts for number of defective {n-p chart} ,control charts for number of defects {c - chart}                                                                                                                                                                                                                                                                                                            |

### Referential Books:

1. S.C.Gupta - Fundamentals of statistics - Sultan chand & sons , Delhi.
2. D.N.Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
3. Montgomery D.C. - Statistical Quality Control - John Welly and Sons
4. Goon, Gupta And Dasgupta- Fundamentals of statistics- The world press private ltd. , Kolkata.
5. Hogg R.V. and Craig R.G. - Introduction to mathematical statistics Ed 4 {1989} - Macmillan Pub. Co. Newyork.
6. Gupta S.P. - Statistical Methods , Pub - Sultan Chand and sons New Delhi

### Course Code Course Name

#### BCA-306P Computer Laboratory and Practical Work of OOPS

Practical will be based on Paper Object Oriented Programming: Covers UNIT-II, UNIT-III, UNIT-IV, UNIT-V of Syllabus

#### BCA-307P Computer Laboratory and Practical Work of DS

Practical will be based on Paper Data Structure: Covers UNIT-III, UNIT-IV, UNIT-V, UNITVI of Syllabus

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**COURSE CONTENT FOR SEMESTER – IV**

**BCA-401     Computer Graphics & Multimedia Application**

- Unit – I** Introduction: The Advantages of Interactive Graphics, Representative Uses of Computer Graphics, Classification of Application Development of Hardware and software for computer Graphics, Conceptual Framework for Interactive Graphics, Overview, Scan: Converting Lines, Scan Converting Circles, Scan Converting Ellipses.
- Unit – II** Hardcopy Technologies, Display Technologies, Raster-Scan Display System, Video Controller, Random-Scan Display processor, Input Devices for Operator Interaction, Image Scanners, Working exposure on graphics tools like Dream Weaver, 3D Effects etc, Clipping Southland- Cohen Algorithm, Cyrus-Beck Algorithm, Midpoint Subdivision Algorithm
- Unit– III     Geometrical Transformation:** 2D Transformation, Homogeneous Coordinates and Matrix Representation of 2D Transformations, composition of 2D Transformations, the Window-to-Viewport Transformations, Introduction to 3D Transformations Matrix.
- Unit– IV     Representing Curves & Surfaces:** Polygon meshes parametric, Cubic Curves, Quadric Surface. Solid Modeling: Representing Solids, Regularized Boolean Set Operation primitive Instanting Sweep Representations, Boundary Representations, Spatial Partitioning Representations, Constructive Solid Geometry Comparison of Representations.
- Unit – V** Introductory Concepts: Multimedia Definition, CD-ROM and the multimedia highway, Computer Animation (Design, types of animation, using different functions)
- Unit – VI** Uses of Multimedia, Introduction to making multimedia - The stage of Project, hardware & software requirements to make good multimedia skills and Training opportunities in Multimedia Motivation for Multimedia usage

**Referential Books:**

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles& practice,2000.
2. D.J. Gibbs & D.C. Tsichritz: Multimedia programming Object Environment & Frame work , 2000.
3. Ralf Skinmeiz and Klana Naharstedt, Multimedia: computing, Communication and Applications, pearson, 2001.
4. D.Haran & Baker. Computer Graphics Prentice Hall of India,1986

## BCA-402      Operating System

**Unit – I** Introduction, What is an operating system, Simple Batch Systems, Multi-programmed Batch systems, Time- Sharing Systems, Personal - Computer Systems, Parallel systems, Distributed systems, Real- Time Systems. Memory Management: Background, Logical versus physical Address space, swapping, Contiguous allocation, Paging, Segmentation Virtual Memory: Demand Paging, Page Replacement, Page-replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing, Other Considerations

**Unit – II** **Processes:** Process Concept, Process Scheduling, Operation on Processes. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple - Processor Scheduling. **Process Synchronization:** Background, The Critical - Section Problem, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

**Unit– III** **Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

**Unit– IV** **Device Management:** Techniques for Device Management, Dedicated Devices, Shared Devices, Virtual Devices; Input or Output Devices, Storage Devices, Buffering, Secondary Storage **Structure:** Disk Structure, Disk Scheduling, Disk Management, Swap- Space Management, Disk Reliability

**Unit – V** **Information Management:** Introduction, A Simple File system, General Model of a File System, Symbolic File System, Basic File System, Access Control Verification, Logical File System.

**Physical File system File** - System Interface; File Concept, Access Methods, Directory Structure, Protection, Consistency Semantics File - System Implementation: File- System Structure, Allocation Methods, Free-Space Management

### Referential Books:

1. Silberschatz and Galvin, “ Operating System Concepts”, Person, 5<sup>th</sup> Ed. 2001
2. Madnick E., Donovan J., “ Operating Systems:,Tata McGraw Hill,2001
3. Tannenbaum, “Operating Systems”, PHI, 4<sup>th</sup> Edition, 2000

## **BCA-403      Software Engineering**

- Unit – I    Software Engineering:** Definition and paradigms, A generic view of software are engineering.
- Unit – II    Requirements Analysis:** Statement of system scope, isolation of top level processes and entitles and their allocation to physical elements, refinement and review. Analyzing a problem, creating a software specification document, review for correctness, consistency, and completeness.
- Unit– III    Designing Software Solutions:** Refining the software Specification; Application of fundamental design concept for data, architectural and procedural designs using software blue print methodology and object oriented design paradigm; Creating design document: Review of conformance to software requirements and quality.
- Unit– IV    Software Implementation:** Relationship between design and implementation, Implementation issues and programming support environment, Coding the procedural design, Good coding style and review of correctness and readability.
- Unit – V    Software Maintenance:** Maintenance as part of software evaluation, reasons for maintenance, types of maintenance (Perceptive, adoptive, corrective), designing for maintainability, techniques for maintenance.
- Unit – VI    Comprehensive examples using available software platforms/case tools, Configuration Management.**

### **Referential Books:**

1. K.K.Aggarwal & Yogesh Singh "Software engineering", 2<sup>nd</sup> Ed., New Age International 2005.
2. I.Sommerville, "Software Engineering", Addison Wesley, 2002.
3. James Peter, W. Pedrycz, "Software Engineering: An Engineering Approach" John Wiley & Sons.

## **BCA-404      Optimization Techniques**

- Unit – I    Linear programming:** Central Problem of linear Programming various definitions included Statements of basic theorem and also their properties, simplex methods, primal and dual simplex method, transport problem, tic-tac problem, and its solution. Assignment problem and its solution. Graphical Method Formulation, Linear Programming Problem.
- Unit – II    Queuing Theory:** Characteristics of queuing system, Classification of Queuing Model Single Channel Queuing Theory, Generalization of steady state M/M/1 queuing models(Model-I, Model-II).
- Unit– III    Replacement    Theory:** Replacement of item that deteriorates replacement of items that fail. Group replacement and individual replacement.
- Unit– IV    Inventory Theory:** Cost involved in inventory problem- single item deterministic model economics long size model without shortage and with shorter having production rate infinite and finite.
- UNIT-V    Job Sequencing:** Introduction, solution of sequencing problem Johnson s algorithm for n jobs through 2 machines.

### **Referential Books:**

1. Gillet B.E. "Introduction to Operation Research"
2. Taha,H.A. "Operation Research - an introduction"
3. Kanti Swarup "Operation Research"
4. S.D.Sharma "Operation Research"
5. Hira & Gupta "Operation Research"

## **BCA-406     Mathematics III**

**Unit – I COMPLEX VARIABLES:** Complex Number System, Algebra of Complex Numbers, Polar Form, Powers and Roots, Functions of Complex Variables, Elementary Functions, Inverse Trigonometric Function.

**Unit – II SEQUENCE, SERIES AND CONVERGENCE:** Sequence, Finite and Infinite Sequences, Monotonic Sequence, Bounded Sequence, Limit of a Sequence, Convergence of a Sequence, Series, Partial Sums, Convergent Series, Theorems on Convergence of Series (statement, alternating series, conditional convergent), Leibnitz Test, Limit Comparison Test, Ratio Test, Cauchy's Root Test, Convergence of Binomial and Logarithmic Series, Raabe's Test, Logarithmic Test, Cauchy's Integral Test (without proof)

**Unit– III VECTOR CALCULUS:** Differentiation of Vectors, Scalar and Vector Fields, Gradient, Directional Derivatives, Divergence and Curl and their Physical Meaning.

**Unit– IV FOURIER SERIES:** Periodic Functions, Fourier series, Fourier Series of Even and Odd Functions, Half Range Series.

**Unit – V ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER:** Variable- Separable Method, Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations, Bernoulli's Differential Equations, Differential Equations of First Order and First Degree by Integrating Factor.

**Unit – VI ORDINARY DIFFERENTIAL EQUATIONS OF SECOND ORDER:** Homogenous Differential Equations with Constant Coefficients, Cases of Complex Roots and Repeated Roots, Differential Operator, Solutions by Methods of Direct Formulae for Particular Integrals, Solution by Undetermined Coefficients, Cauchy Differential Equations, (only Real and Distinct Roots) Operator Method for Finding Particular Integrals, (Direct Formulae).

### **Referential Books:**

1. A.B. Mathur and V.P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers, 1999.
2. 2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Co., 9th Revised Ed.

### **Course Code Course Name**

**BCA-405 Computer Laboratory and Practical Work of Computer Graphics & Multimedia Application**

Practical will be based on Paper Computer Graphics & Multimedia Application: Covers UNIT-II, UNIT-III, UNIT-V of Syllabus

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| <b>COURSE CONTENT FOR SEMESTER – V</b> |
|----------------------------------------|

**BCA-501     Introduction to DBMS**

**Unit – I    Introduction:** Characteristics of database approach, data models, DBMS architecture and data independence.

**Unit – II    E-R Modeling:** Entity types, Entity set, attribute and key, relationships, relation types, roles and structural constraints, weak entities, enhanced E-R and object modeling, Sub classes; Super classes, inheritance, specialization and generalization.

**Unit– III    File Organization:** Indexed sequential access files; implementation using B & B++ trees, hashing, hashing functions, collision resolution, extendible hashing, dynamic hashing approach implementation and performance.

**Unit– IV    Relational Data Model:** Relational model concepts, relational constraints, relational algebra SQL: SQL queries, programming using SQL.

**Unit – V    EER and ER to relational mapping:** Data base design using EER to relational language.

**Unit – VI    Data Normalization:** Functional Dependencies, Normal form up to 3<sup>rd</sup> normal form.

**Concurrency Control:** Transaction processing, locking techniques and associated, database recovery, security and authorization. Recovery Techniques, Database Security

**Referential Books:**

1. Abraham Silberschatz, Henry Korth, S.Sudarshan, "Database Systems Concepts", 4<sup>th</sup> Edition, McGraw Hill, 1997.
2. Jim Melton, Alan Simon, "Understanding the new SQL: A complete Guide", Morgan
3. A.K.Majumdar, P. Bhattacharya, "Database Management Systems", TMH, 1996.
4. Bipin Desai, "An Introduction to database systems", Galgotia Publications, 1991.

## **BCA-502      Java Programming and Dynamic Webpage Design**

- Unit – I    Java Programming:** Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.
- Unit – II**      Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)
- Unit– III**    Networking (datagram socket and TCP/IP based server socket) event handling,  
**JDBC:** Introduction, Drivers, Establishing Connection, Connection Pooling.
- Unit– IV**    **HTML:** use of commenting, headers, text styling, images, formatting text with <FONT>, special characters, horizontal rules, line breaks, table, forms, image maps, <META> tags, <FRAMESET> tags, file formats including image formats.
- Unit – V**    **Java Servlets:** Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking, Database Connectivity
- Unit- VI**    **Java Server Pages:** Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

### **Referential Books:**

1. Patrick Naughton and Herbertz Schildt, “Java-2 The Complete Reference” 199, TMH.
2. Shelley Powers, “Dynamic Web Publishing” 2<sup>nd</sup> Ed. Techmedia, 1998.
3. Ivor Horton, “Beginning Java-2” SPD Publication
4. Jason Hunter, “Java Servlet Programming” O’Reilly
5. Shelley Powers, “Dynamic Web Publishing” 2<sup>nd</sup> Ed. Techmedia, 1998
6. Hans Bergsten, “Java Server Pages”, 3<sup>rd</sup> Ed. O’reilly

- Unit – I Basic Concepts:** Components of data communication, distributed processing, standards and organizations. Line configuration, topology, Transmission mode, and categories of networks.  
**OSI and TCP/IP Models:** Layers and their functions, comparison of models.  
**Digital Transmission:** Interfaces and Modems: DTE-DCE Interface, Modems, Cable modems.
- Unit – II Transmission Media:** Guided and unguided, Attenuation, distortion, noise, throughput, propagation speed and time, wavelength, Shannon capacity, comparison of media
- Unit– III Telephony:** Multiplexing, error detection and correction: Many to one, One to many, WDM, TDM, FDM, Circuit switching, packet switching and message switching.  
**Data link control protocols:** Line discipline, flow control, error control, synchronous and asynchronous protocols, character and bit oriented protocols, Link access procedures.  
**Point to point controls:** Transmission states, PPP layers, LCP, Authentication, NCP.  
**ISDN:** Services, Historical outline, subscriber's access, ISDN Layers and broadcast ISDN.
- Unit– IV Devices:** Repeaters, bridges, gateways, routers, The Network Layer; Design issues, Routing algorithms, Congestion control Algorithms, Quality of service, Internetworking, Network-Layer in the internet.
- Unit – V Transport and upper layers in OSI Model:** Transport layer functions, connection management, functions of session layers, presentation layer and application layer.

**Referential Books:**

1. A.S.Tanenbaum, "Computer Networks"; Pearson Education Asia, 4<sup>th</sup> Ed. 2003.
2. Behrouz A.Forouzan, "Data Communication and Networking", 3<sup>rd</sup> Ed. Tata McGraw Hill, 2004.
3. William stallings, "Data and computer communications", Pearson education Asia, 7<sup>th</sup> Ed., 2002.

## **BCA-504 Numerical Methods**

**Unit – I Roots of Equations:** Bisections Method, False Position Method, Newton's Raphson Method, Rate of convergence of Newton's method.

**Unit – II Interpolation and Extrapolation :** Finite Differences, The operator E, Newton's Forward and Backward Differences, Newton's dividend differences formulae, Lagrange's Interpolation formula for unequal Intervals, Gauss's Interpolation formula, Starling formula, Bessel's formula, LaplaceEverett formula.

**Unit– III Numerical Differentiation Numerical Integration:** Introduction, direct methods, maxima and minima of a tabulated function, General Quadratic formula, Trapezoidal rule, Simpson's One third rule, Simpson's three-eight rule.

**Unit– IV Solution of Linear Equation:** Gauss's Elimination method and Gauss's Siedel iterative method.

**UNIT-V Solution of Differential Equations:** Euler's method, Picard's method, Fourth-order Ranga - Kutta method.

### **Referential Books:**

1. Scarbourogh, "Numerical Analysis".
2. Gupta & Bose S.C. "Introduction to Numerical Analysis, "Academic Press, Kolkata,
3. S.S.Shashtri, " Numerical Analysis", PHI

## **BCA-505P Minor Project**

Evaluation will be based on Summer Training held after fourth semester and will be Conducted by the college committee only.

## **BCA-506P Viva-Voice on Summer Training**

The viva will be conducted based on summer training of four weeks after the end of fourth Semester and will be Conducted by the college committee only.

## **BCA-507P Computer Laboratory and Practical Work of DBMS**

Practical will be based on Paper Data Base Management System : on UINT-IV converging the concept from UNIT-II to UNIT-VI of Syllabus

## **BCA-508P Computer Laboratory and Practical Work of Java Programming and Dynamic Webpage Design**

Practical will be based on Paper Data Base Management System : on UINT-IV converging the concept from UNIT-II to UNIT-VI of Syllabus

**CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT**  
**THREE YEARS BACHELOR OF COMPUTER APPLICATION PROGRAMME**

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| <b>COURSE CONTENT FOR SEMESTER – VI</b> |
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**BCA-601    Computer Network Security**

- Unit – I    Introduction:** Attack, Services and Mechanism, Model for Internetwork Security.  
**Cryptography:** Notion of Plain Text, Encryption, Key, Cipher Text, Decryption and cryptanalysis; Public Key Encryption, digital Signatures and Authentication.
- Unit – II    Network Security:** Authentication Application: Kerveros, X.509, Directory Authentication Service, Pretty Good Privacy, S/Mime.
- Unit– III    IP security Architecture:** Overview, Authentication header, Encapsulating Security Pay Load combining Security Associations, Key Management.
- Unit– IV    Web    Security:** Requirement, Secure Socket Layer, Transport Layer Security, and Secure Electronic Transactions.
- Unit – V    Network Management Security:** Overview of SNMP Architecutre-SMMPVI1 Communication Facility, SNMPV3.
- Unit – VI    System Security:** Intruders, Viruses and Relate Threats, Firewall Design Principles. Comprehensive examples using available software platforms/case tools, Configuration Management.

**Referential Books:**

1. W. Stallings, Networks Security Essentials: Application & Standards, Pearson Education, 2000.
2. W.Stallings, Cryptography and Network Security, Principles and Practice, Pearson Education, 2000.

## **BCA-602      Information System: Analysis Design & Implementation**

**Unit – I    Overview of System Analysis and Design:** Systems Development Life Cycle; concept and Models: requirements determination, logical design, physical design, test planning, implementation, planning and performance evaluation, communication, interviewing, presentation skills; group dynamics; risk and feasibility analysis; group based approaches, JAD, structures walkthroughs, and design and code reviews; prototyping; database design software quality metrics; application categories software package evaluation and acquisition.

**Unit – II    Information Requirement Analysis:** Process modeling with physical logical data flow diagrams, data modeling with logical entity relationship diagrams.

**Unit– III    Developing a Proposal:** Feasibility study and cost estimation.  
System Design: Design of input and control, design of output and control, file design/database design, process, user interface design, prototyping; software constructors; documentation.

**Unit– IV    Application Development Methodologies and CASE tools:** Information engineering structured system analysis and design, and object oriented methodologies for application development data modeling, process modeling, user interface design, and prototyping, use of computer aided software engineering (CASE) tools in the analysis design and implementation of information systems.

**Unit – V    Design and Implementation on OO Platform:** Object oriented analysis and design through object modeling technique, object modeling, dynamic modeling and functional object oriented design and object oriented programming systems for implementation, object oriented data bases.

**Unit- VI    Managerial issues in Software Projects:** Introduction to software markets; planning of software projects, size and cost estimates; project scheduling; measurement of software quality and productivity, ISO and capability maturity models for organizational growth.

### **Referential Books:**

1. I.T.Haryszkiewicz, Introduction of System Analysis and Design, Pearson Education, (PHI) 1998.
2. V.Rajaraman, Analysis and Design of Information System, Pearson Education, 1991.
3. J.A.Senn, "Analysis and Design of Information Systems"
4. J.K.Whiten., L.D.Bentley, V.M.Beslow, "System Analysis and Design Methods", (Galgotia Publications Pvt.Ltd.) 1994

**Unit – I    Introduction to E-Commerce:** The Scope of Electronic Commerce, Definition of Electronic Commerce, Electronic E-commerce and the Trade Cycle, Electronic Markets, Electronic Data Interchange, Internet Commerce, E-Commerce in Perspective.

**Business Strategy in an Electronic Age:** Supply Chains, Porter's Value Chain Model, Inter Organizational Value Chains, Competitive Strategy, Porter's Model, First Mover Advantage Sustainable Competitive Advantage, Competitive Advantage using E-Commerce, Business Strategy, Introduction to Business Strategy, Strategic Implications of IT, Technology, Business Environment, Business Capability, Exiting Business Strategy, Strategy Formulation & Implementation Planning, E-Commerce Implementation, E-Commerce Evaluation.

**Unit – II    Business-to-Business Electronic Commerce:** Characteristics of B2B EC, Models of B2B Ec, Procurement Management Using the Buyer's Internal Marketplace, Just in Time Delivery, Other B2B Models, Auctions and Services from Traditional to Internet Based EDI, Intergration with Back-end Information System, The Role of Software Agents for B2B EC, Electronic marketing in B2B, Solutions of B2B EC, Managerial Issues, Electronic Data Interchange (EDI), EDI: The Nuts and Bolts, EDI & Business.

**Unit– III    Internet and Extranet :** Automotive Network Exchange, The Largest Extranet, Architecture of the Internet, Intranet and Extranet, Intranet software, Applications of Intranets, Intranet Application Case Studies, Considerations in Intranet Deployment, The Extranets, The structures of Extranets, Extranet products & services, Applications of Extranets, Business Models of Extranet Applications, Managerial Issues.

**Electronic Payment Systems :** Is SET a failure, Electronic Payments & Protocols, Security Schemes in Electronic payment systems, Electronic Credit card system on the Internet, Electronic Fund transfer and Debit cards on the Internet, Stored - value Cards and E- Cash, Electronic Check Systems, Prospect of Electronic Payment Systems, Managerial Issues.

**Unit– IV    Public Policy: From Legal Issues to Privacy :** EC- Related Legal Incidents, Legal Incidents, Ethical & Other Public Policy Issues, Protecting Privacy, Protecting Intellectual Property, Free speech, Internet Indecency & Censorship, Taxation & Encryption Policies, Other Legal Issues: Contracts, Gambling & More, Consumer & Seller Protection In EC.

**Unit – V    Infrastructure For EC :** It takes more than Technology, A Network Of    Networks, Internet Protocols, Web- Based client/ Server, Internet Security, selling on the web, Chatting on the Web, Multimedia delivery, Analyzing Web Visits, Managerial Issues.

**Referential Books:**

1. David Whiteley, " E-Commerce", Tata McGraw Hill, 2000.
2. Eframi Turban, Jae Lee, David King, K. Michale Chung, "Electronic Commerce", Pearson Education, 2000

## **BCA-604      Knowledge Management**

**Unit – I    Business Intelligence and Business Decisions:** Modeling Decision Process; Decision support systems; Group decision support and Groupware Technologies.

**Unit – II    Executive Information and support Systems:** Business Expert System and AI, OLTO & OLAP; Data Warehousing; Data Marts, Data Warehouse architecture; Tools for data warehousing.

**Unit– III    Multi-    Dimensional    analysis:** Data mining and knowledge discovery; Data mining and Techniques; Data mining of Advance Databases.

**Unit– IV    Knowledge Management Systems:** Concept and Structure KM systems, techniques of knowledge management appreciation & limitation.

### **Referential Books:**

1. Decision support system, EIS, 2000 .
2. W.H.Inmon, "Building Data Warehousing", Willey, 1998.
3. Han, Jiawei, Kamber, Micheline, " Data Mining Concepts & Techniques", Harcourt India, 2001

## **BCA-605P    Major Project**

Evaluation will be based on held after fourth semester and will be Conducted by the college committee only.

## **BCA-606P    Presentation/Seminar based on Major Project**

Presentation/Seminar based on Major Project will be evaluated by external examiner only.