C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

SEMESTER-I

Course Code	Course Name
BCA-101	Mathematics-I
BCA-102	Programming Principle & Algorithm
BCA-103	Computer Fundamental and Office Automation
BCA-104	Principle of Management
BCA-106	Business Communication
BCA-108	Environmental Studies
BCA-105	Computer Laboratory and Practical Work of Computer Fundamental and Office Automation
BCA-107	Computer Laboratory and Practical Work of Programming Principle & Algorithm

C.C.S. University, Meerut.
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Semester – wise

Course Code Course Name

BCA-101 Mathematics -I

UNIT-I

DETERMINANTS:

Definition, Minors, Cofactors, Properties of Determinants MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Rank of Matrix Dependence of Vectors, Eigen Vectors of a Matrix, Caley-Hamilton Theorem (without proof).

UNIT-II

LIMITS & CONTINUITY:

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

UNIT-III

DIFFERENTIATION:

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.

UNIT-IV

INTEGRATION:

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).

UNIT-V

VECTOR ALGEBRA:

Definition of a vector in 2 and 3 Dimensions; Double and Triple Scalar and Vector Product and physical interpretation of area and volume.

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Course Code Course Name

BCA-102 Programming Principle Algorithm

UNIT-I

Introduction to 'C' Language History, Structures of 'C' Programming, Function as building blocks.

Language Fundamentals Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types, Comments.

UNIT-II

Operators

Types of operators, Precedence and Associativity, Expression, Statement and types of statements

Build in Operators and function Console based I/O and related built in I/O function: printf(), scanf(), getch(), getchar(), putchar(); Concept of header files, Preprocessor directives: #include, #define.

UNIT-III

Control structures

Decision making structures: If, If-else, Nested If-else, Switch; Loop Control structures: While, Do-while, for, Nested for loop; Other statements: break, continue, goto, exit.

UNIT-IV

Introduction to problem solving

Concept: problem solving, Problem solving techniques (Trail & Error, Brain Stroming, Divide & Conquer) Steps in problem solving (Define Problem, Analyze Problem, Explore Solution) Algorithms and Flowcharts (Definitions, Symbols), Characteristics of an algorithm Conditionals in pseudo-code, Loops in pseudo code Time complexity: Big-Oh notation, efficiency Simple Examples: Algorithms and flowcharts (Real Life Examples)

UNIT-V

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^b, Factorial, sine series, cosine series, ${}^nC_r$, Pascal Triangle, Prime number, Factors of a number, Other problems such as Perfect number, GCD numbers etc (Write algorithms and draw flowchart), Swapping

UNIT-VI

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.

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

BCA-103 Computer Fundamental & Office Automation

UNIT-I

Introduction to Computers

Introduction, Characteristics of Computers, Block diagram of computer.Types of computers and features, Mini Computers, Micro Computers, Mainframe Computers, Super Computers.Types of Programming Languages (Machine Languages, Assembly Languages, High Level Languages).Data Organization, Drives, Files, Directories.Types of Memory (Primary And Secondary) RAM, ROM, PROM, EPROM.

Secondary Storage Devices (FD, CD, HD, Pen drive)

I/O Devices (Scanners, Plotters, LCD, Plasma Display)

Number Systems

Introduction to Binary, Octal, Hexadecimal system Conversion, Simple Addition, Subtraction, Multiplication

UNIT-II

Algorithm and Flowcharts

Algorithm: Definition, Characteristics, Advantages and disadvantages, Examples,Flowchart: Definition, Define symbols of flowchart, Advantages and disadvantages, Examples

UNIT-III

Operating System and Services in O.S.

Dos – History, Files and Directories, Internal and External Commands, Batch Files, Types of O.S.

UNIT-IV

Windows Operating Environment

Features of MS – Windows, Control Panel, Taskbar, Desktop, Windows Application, Icons, Windows Accessories, Notepad, Paintbrush.

UNIT-V

Editors and Word Processors

Basic Concepts, Examples: MS-Word, Introduction to desktop publishing.

UNIT-VI

Spreadsheets and Database packages

Purpose, usage, command, MS-Excel, Creation of files in MS-Access, Switching between application, MS-PowerPoint.

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

BCA-104 Principle of Management

UNIT-I

Nature of Management:

Meaning, Definition, it's nature purpose, importance & Functions, Management as Art, Science & Profession- Management as social System Concepts of management-Administration-Organization, Management Skills, Levels of Management.

UNIT-II

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.

UNIT-III

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

UNIT-IV

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

UNIT – V

Management of Change: Models for Change, Force for Change, Need for Change, Alternative Change Techniques, New Trends in Organization Change, Stress Management.

UNIT-VI

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

Course Code Course Name

BCA-106 Business Communication

UNIT-I

Means of Communication:

Meaning and Definition – Process – Functions – Objectives – Importance – Essentials of good communication – Communication barriers, 7C's of Communication

UNIT-II

Types of Communication:

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.

UNIT-III

Written Communication

Purpose of writing, Clarity in Writing, Pricinciple of Effective writing, Writing Techniques, Electronic Writing Process.

UNIT-IV

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.

UNIT-V

Drafting of business letters:

Enquiries and replies – Placing and fulfilling orders – Complaints and follow-up Sales letters – Circular letters Application for employment and resume

UNIT-VI

Information Technology for Communication:

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.

Topics Prescribed for workshop/skill lab

Group Discussion, Mock Interview, Decision Making in a Group

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SEMESTER -II

Course Code	Course Name
BCA-201	Mathematics-II
BCA-202	C-Programming
BCA-203	Organization Behavior
BCA-204	Digital Electronics and Computer Organisation
BCA-205	Financial Accounting and Management
BCA-206	Computer Laboratory and Practical Work of C

Course Code Course Name

BCA-201 Mathematics II

UNIT-I

SETS

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.

UNIT-II

RELATIONS AND FUNCTIONS

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 Trignometric, Logarithmic and Exponential Functions.

UNIT-III

PARTIAL ORDER RELATIONS AND LATTICES

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, Glb, lub, Lattices & Algebric Systems, Principle of Duality, Basic Properties, Sublattices, Distributed & Complemented Lattics.

UNIT-IV

FUNCTIONS OF SEVERAL VARIABLES

Partial Differentiation, Change of Variables, Chain Rule, Extrema of Functions of 2 Variables, Euler's Theorem.

UNIT-V

3D COORDINATE GEOMETRY

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.

UNIT-VI

MULTIPLE INTEGRATION

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

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

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-III

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(),

fewind();Using text files: fgetc(), fputc(), fscanf()

Command line arguments

BCA-203 Organization Behavior

Course Code Course Name

UNIT-I

Fundamentals of Organizational Behaviour

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

UNIT-II

Perception, Attitude, Values and Motivation

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 McGregcrs's Theory 'X' and Theory 'Y'

UNIT-III

Personality

Definition of Personality, Determinants of Personality; Theories of Personality- Trait and Type Theories, The Big Five Traites, Mytes-Briggs Indicator; Locus of Control, SType A and Type B Assessment of Personality

UNIT-IV

Work Stress

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

UNIT-V

Group Behaviour and Leadership

Nature of Group, Types of Groups; Nature and Characteristics of team; Team Building, Effective Teamwork; Nature of Leadership, Leadership Styles; Traits of Effective Leaders

UNIT-VI

Conflict in Organizations

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.

Course Code Course Name

BCA-204 Digital electronics and Computer Organisation

UNIT-I

Logic gates and circuit

Gates (OR, AND, NOR, NAND, XOR & XNOR); Demogran's laws; Boolean laws, Circuit designing techniques (SOP, POS, K-Map).

UNIT-II

Combinational Building Blocks

Multiplexes; Decoder; Encoder; Adder and Subtracter.

UNIT-III

Memories

ROMs, PROMs, EPROMs, RAMs, Hard Disk, Floppy Disk and CD-ROM.

UNIT-IV

Sequential Building Blocks

Flip-Flop (RS, D, JK, Master-slave & & T flip-flops); Registers & Shift registers; Counters; Synchronous and Asynchronous Designing method.

UNIT-V

Memory Organization: Basic cell of static and dynamic RAM; Building large memories using chips; Associative memory; Cache memory organization and Virtual memory organization

Course Code Course Name

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.

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Bachelors of Computer Application
Semester – wise

SEMESTER -III

Course Code	Course Name
BCA-301	Object Oriented Programming Using C++
BCA-302	Data Structure Using C & C++
BCA-303	Computer Architecture & Assembly Language
BCA-304	Business Economics
BCA-305	Elements of Statistics
BCA-306	Computer Laboratory and Practical Work of OOPS
BCA-307	Computer Laboratory and Practical Work of DS

Course Code Course Name

BCA-301 Object Oriented programming language

UNIT-I

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.

UNIT-II

Classes and Objects

Encapsulation, information hiding, abstract data types, Object & classes, attributes, methods, C++ class declaration, State idendity 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.

UNIT-III

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, Parameteric Polymorphism

UNIT-IV

Generic function

Template function, function name overloading, Overriding inheritance methods, Run time polymorphism, Multiple Inheritance.

UNIT-V

Files and Exception Handling

Streams and files, Namespaces, Exception handling, Generic Classes

Course Code Course Name

BCA-302 Data Structure Using C & C++

UNIT-I

Introduction to Data Structure and its Characteristics Array

Representation of single and multidimensional arrays; Sprase arrays – lower and upper triangular matrices and Tridiagonal matrices with Vector Representation also.

UNIT-II

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.

UNIT-III

Lists

Introduction to linked lists; Sequential and linked lists, operations such as traversal, insertion, deletion searching, Two way lists and Use of headers

UNIT-IV

Trees

Introduction and terminology; Traversal of binary trees; Recursive algorithms for tree operations such as traversal, insertion, deletion; Binary Search Tree

UNIT-V

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

UNIT-VI

Sorting Techniques; Insertion sort, selection sort, merge sort, heap sort, searching Techniques: linear search, binary search and hashing

Course Code Course Name

BCA-303 Computer Architecture & Assembly Language

UNIT-I

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.

UNIT-II

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.

UNIT-III

Computer Arithmetic

Addition, subtraction and multiplication algorithms, divisor algorithms. Floating point, arithmetic operations, decimal arithmetic operations, decimal arithmetic operations.

UNIT-IV

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.

UNIT-V

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.

UNIT-VI

Assembly language, Assembler, Assembly level instructions, macro, use of macros in I/C instructions, program loops, programming arithmetic and logic subroutines, Input-Output programming.

Course Code Course Name

BCA-304 Business Economics

UNIT-I

The Scope and Method of Economics, the Economic Problem: Scarity & Choice, The Price Mechanism, Demand & Supply Equilibrium: The Concept of Elasticity and it's Applications.

The Production Process: output decisions – Revenues Costs and Profit Maximisation

Laws of returns & Returns to Scale: Economics and Diseconomies of scale.

UNIT-II

Market Structure: Equilibrium of a firm and Price, Output Determination under Perfect Competition Monopoly, Monoplastic Competition & Oligopoly

UNIT-III

Macro Economic Concerns

Inflalation, Unemployment, Trade-Cycles, Circular Flow upto Four Sector Economy, Government in the Macro Economy: Fiscal Policy, Monetary Policy, Measuring national Income and Output

UNIT-IV

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

Course Code Course Name

BCA-305 Elements of Statistics

UNIT-I

Population, Sample and Data Condensation

Definition and scope of statistics, concept of population and simple with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

UNIT-II

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.

UNIT-III

Measures of Dispersion:

Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation.

UNIT-IV

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.

UNIT-V

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.

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.

UNIT-VI

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}

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

SEMESTER -IV

Course Code	**Course Name**
BCA-401	Computer Graphics & Multimedia Application
BCA-402	Operating System
BCA-403	Software Engineering
BCA-404	Optimization Techniques
BCA-405	Practical Based on Subject Code -401.
BCA-406	Mathematics-III

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

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 Instancing 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

Course Code Course Name

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

Course Code Course Name

BCA-403 Software Engineering

UNIT-I

Software Engineering: Definition and paradigms, A generic view of software 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.

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Semester – wise

Course Code **Course Name**

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

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Semester – wise

Course Code Course Name

BCA-405 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).

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

SEMESTER -V

Course Code	**Course Name**
BCA-501	Introduction to DBMS
BCA-502	Java Programming and Dynamic Webpage Design
BCA-503	Computer Network
BCA-504	Numerical Methods
BCA-508	Minor Project
BCA-507	Viva-Voice on Summer Training
BCA-505	Computer Laboratory and Practical Work of DBMS
BCA-506	Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage Design

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code **Course Name**

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 alzebra

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 3rd normal form.

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

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code **Course Name**

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

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code **Course Name**

BCA-503 **Computer Network**

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.

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code **Course Name**

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, Laplace-Everett 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.

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise
SEMESTER -VI

Course Code	Course Name
BCA-601	Computer Network Security
BCA-602	Information System: Analysis Design & Implementation
BCA-603	E-Commerce
BCA-604	Knowledge Management
BCA-605	Major Project
BCA-606	Presentation/Seminar based on Major Project

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

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.

Course Code Course Name

BCA-602 Information System Analysis Design and 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.

Course Code Course Name

BCA-603 E-Commerce

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.

C.C.S. University, Meerut.
Bachelors of Computer Application
Semester – wise

Course Code Course Name

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.

PROGRAM OUTCOME (PO)

PROGRAM SPECIFIC OUTCOME (PSO)

COURSE OUTCOME (CO)

Programme Outcomes

- ✓ Acquire Knowledge of mathematical foundations, computer application theory and algorithm principles in the design and modelling of computer based system.
- ✓ To provide thorough understanding of nature, scope and application of computer and computer languages.
- ✓ To develop interdisciplinary approach among the students.
- ✓ Exhibit clarity on both conceptual and application-oriented skills of Computing, programming for higher studies in Post Graduate programs.

Programme Specific Outcomes

- ✓ To pursue further studies to get specialization in Computer Science and Applications, Economics, Mathematic.
- ✓ To pursue the career in corporate sector can opt for M. Sc., MCA.
- ✓ To Work in the IT sector as programmer, system engineer, software tester, junior programmer, web developer, system administrator, software developer, etc.
- ✓ To work in public sector undertakings and Government organizations.
- ✓ For teaching in Schools and Colleges.
- ✓ Students will able to understand, analyse and develop computer programs in the areas related to algorithm, system software, web design and networking for efficient design of computer-based system.
- ✓ Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.
- ✓ Student will able to know various issues, latest trends in technology development and thereby innovate new ideas and solutions to existing problems

Course Outcomes (COs):

Sr. No	Name of the course	Course Code	Course Objectives / Outcome
BCA Semester First			
1	Mathematics-I	BCA-101	✓ To understand and solve mathematical problems. ✓ To impart knowledge regarding relevant topics such as matrices addition, subtraction and multiplication. ✓ To familiarize students with limits and continuity. ✓ Knowledge of differentiations, integration and vector algebra.
2	Programming Principle & Algorithm	BCA-102	✓ To understand the basic structure of a C program. ✓ To gain knowledge of various programming errors. ✓ To enable the students to make flowchart and design an algorithm for a given problem. ✓ To enable the students to develop logics and programs. ✓ Ability to design and develop Computer programs, analyses, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. ✓ Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. ✓ Student must be able to define union and enumeration user defined data types. Develop confidence for self-education and ability for life-long learning needed for Computer language.
3	Computer Fundamental and Office Automation	BCA-103	✓ To impart knowledge about the structure, components and functions of a computer system. ✓ To understand working of basic input and output devices. ✓ To learn about the binary number representation along with its operations. ✓ Learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab control, keyboard shortcuts, printing, as well as how to include some graphics such as pictures and charts. ✓ In general, develop an intuitive sense of how computers work and how they can be used to make your academic work more efficient. ✓ Familiarization with the terms like Operating System, peripheral devices, networking, multimedia, internet, etc. ✓ Ability to use internet for searching information on web, sending e-mails and many other tasks. ✓ Skill to work with MS-Word, Excel and PowerPoint. ✓ Initiation into the process of writing business letters or job applications, tabulating data, preparing PPTs, etc. using MS-Office. ✓ Bridge the fundamental concepts of computer with the present level of knowledge of the students.

4	Principle of Management	BCA-104	✓ Describing the Nature and Scope of Business, Forms of Business Organizations and Formation of a Company. ✓ Comparing Sole Trading Concerns, Partnership, Joint Stock Company, Co-operative Societies, Government and Business, Public Enterprise, Small Business. ✓ Examine the Functions of Management, Business Ethics, and Social Responsibility of Business. ✓ Interpret the interactions between the environment, technology, human resources, and organizations in order to achieve high performance. ✓ Examine the effectiveness of applications of management concepts. ✓ Appraise different types, roles and styles of managers across organizations.
5	Business Communication	BCA-106	✓ To provide the skills of comprehension writing. ✓ To develop Informal correspondence writing skills. ✓ To learn the language skills grammatically. ✓ To know the process of Interview Techniques, Group discussion, Conferences and Meetings. ✓ To understand the needs and benefits of written communication. ✓ Develop the student's ability to use English language accurately and effectively by enhancing their communication skills ✓ Participate actively in GD, seminars and conferences and meetings practically. ✓ To study the personality development of individuals in the micro perspective. ✓ To provide employability skills. ✓ To provide the skills of comprehension writing. ✓ To develop Formal correspondence writing skills. ✓ To actively participate in oral and written communication in practical applications.
6	Environmental Studies	BCA-008	✓ Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving. ✓ Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. ✓ Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. ✓ Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales. ✓ Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes. ✓ Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world. ✓ Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

7 8	Computer Laboratory and Practical Work of Computer Fundamental and Office Automation and Computer Laboratory and Practical Work of Programming Principle & Algorithm	BCA-105 & BCA-107	✓ To give detailed knowledge of MS-Office. ✓ To give an in-depth understanding of role of computers in business, education and society. ✓ To make the student learn a programming language. ✓ To learn problem solving techniques. ✓ To teach the student to write programs in C and to solve the problems. ✓ After Completion of this course the student would be able to Student will be able to identify the components of a personal computer system ✓ Student will be able to demonstrate mouse and keyboard functions ✓ Student will be able to compose, format and edit a word document, PPT, excel. ✓ Read, understand and trace the execution of programs written in C Lang. ✓ Write the C code for a given algorithm. ✓ Implement Programs with pointers and arrays, perform pointer arithmetic, and use the per-processor. ✓ Write programs that perform operations using derived data types.
BCA Semester Second			
9	Mathematics-II	BCA-201	✓ Understand the basic principles of sets and operations in sets. ✓ Demonstrate an understanding of relations and functions and be able to determine their properties. ✓ Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems
10	C-Programming	BCA-202	✓ Ability to design and develop Computer programs, analyses, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. ✓ Develop confidence for self-education and ability for life-long learning needed for Computer language. ✓ Utilize the best of the inbuilt functions for various input and output operations. ✓ Implement the concept of arrays. ✓ Implement problem solving skills using pointer concept of the programming languages. ✓ Work efficiently with files using the programming languages.
11	Organization Behaviour	BCA-203	✓ Describing the Nature and Scope of Business, Forms of Business Organizations and Formation of a Company. ✓ Comparing Sole Trading Concerns, Partnership, Joint Stock Company, Co-operative Societies, Government and Business, Public Enterprise, Small Business. ✓ Examine the Functions of Management, Business Ethics, and Social Responsibility of Business. ✓ Interpret the interactions between the environment, technology, human resources, and organizations in order to achieve high performance. ✓ Examine the effectiveness of applications of management concepts. ✓ Appraise different types, roles and styles of managers across organizations.

12	Digital Electronics and Computer Organisation	BCA-204	✓ To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. ✓ To prepare students to perform the analysis and design of various digital electronic circuits. ✓ Have a thorough understanding of the fundamental concepts and techniques used in digital electronics. ✓ To understand and examine the structure of various number systems and its application in digital design. ✓ The ability to understand, analyse and design various combination and sequential circuits. ✓ Ability to identify basic requirements for a design application and propose a cost-effective solution. ✓ The ability to identify and prevent various hazards and timing problems in a digital design. ✓ To develop skill to build, and troubleshoot digital circuits.
13	Financial Accounting and Management	BCA-205	✓ Listing the aim, scope and significance of finance function, sources of company finance. ✓ Discussion of theories and valuation of capital structure, cost of capital and capital budgeting ✓ Assessing the SEBI guidelines for raising company finance. ✓ Recommend the working capital requirement, steps in responsibility accounting ✓ Illustrating the planning of capital expenditure and its evaluation including risk and uncertainty
14	Computer Laboratory and Practical Work of C	BCA-206	✓ To make the student learn a programming language. ✓ To learn problem solving techniques. ✓ To teach the student to write programs in C and to solve the problems. ✓ Read, understand and trace the execution of programs written in C Lang. ✓ Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor. ✓ Write programs that perform operations using derived data types.
BCA Semester Third			
15	Object Oriented Programming Using C++	BCA-301	✓ To give an overview of benefits of Object-Oriented Programming (OOP) approach over the Traditional Programming approach. ✓ To deliver comprehensive view of OOP concept. ✓ To impart detailed knowledge of a powerful object-oriented programming language –C++. ✓ Familiarization with a widely used programming concept – Object Oriented Programming. ✓ Develop logical thinking. ✓ Skill to write codes in C++ by applying concept of OOP, such as Objects, Classes, Constructors, Inheritance etc., to solve mathematical or real-world problems. ✓ Ability to isolate and fix common errors in C++programs

16	Data Structure Using C & C++	BCA-302	✓ To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms. ✓ To familiar with basic techniques of algorithm analysis. ✓ To master the implementation of linked data structures such as linked lists and binary trees. ✓ To familiar with several sub-quadratic sorting algorithms including Selection sort, Insertion sort etc. ✓ Describe how arrays, records, linked structures, stacks, queues, and trees are represented in memory and used by algorithms. ✓ Describe common applications for arrays, records, linked structures, stacks, queues and trees. ✓ Write programs that use arrays, records, linked structures, stacks and queues. ✓ Demonstrate different methods for traversing trees. ✓ Compare alternative implementations of data structures with respect to performance. ✓ Describe the concept of recursion, give examples of its use, describe how it can be implemented using a stack. ✓ Discuss the computational efficiency of the principal algorithms for sorting and searching.
17	Computer Architecture & Assembly Language	BCA-303	✓ To develop background knowledge and core expertise of microprocessor & microcontroller. ✓ To know the importance of different peripheral devices and their interfacing to microcontrollers. ✓ To know the design aspects of microprocessor & microcontrollers. ✓ To write assembly language programs of microcontrollers for various applications. ✓ At the end of course, a student will able to draw & describe architecture of 8051 microcontrollers. ✓ To Interface various peripherals devices to the microcontrollers. ✓ To write assembly language program for microcontrollers. ✓ To design microcontroller based system for various applications. ✓ To know the design aspects of microprocessor & microcontrollers. ✓ To write assembly language programs of microcontrollers for various applications.
18	Business Economics	BCA-304	✓ Explain the basic concepts of microeconomics and issues in business economics ✓ Discussing the consumer equilibrium, utility analysis indifference curve and the demand and supply analysis. ✓ Examine the production and cost structure under different stages of production. ✓ Identify how and why equilibrium prices might change and their impact on resource allocation; ✓ Recommending the pricing and output decisions under various market structure.

19	Elements of Statistics	BCA-305	✓ Organize, manage and present data. ✓ Analyse statistical data graphically using frequency distributions and cumulative frequency distributions. ✓ Analyse statistical data using measures of central tendency, dispersion and location. ✓ Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events. ✓ Translate real-world problems into probability models. ✓ Derive the probability density function of transformation of random variables. ✓ Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.
20 21	Computer Laboratory and Practical Work of OOPS And Computer Laboratory and Practical Work of DS	BCA-306 & BCA-307	✓ Practically familiar with basic techniques of algorithm analysis. ✓ Implementation of linked data structures such as linked lists and binary trees. ✓ Practically isolate and fix common errors in C++programs ✓ Identify and practice the object-oriented programming concepts and techniques ✓ Practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts. ✓ Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms. ✓ Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs. ✓ Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs. ✓ Creating simple programs using classes and objects in C++. ✓ Implement Object Oriented Programming Concepts in C++.
BCA Semester Four			
22	Computer Graphics & Multimedia Application	BCA-401	✓ The main objective of this module is to introduce to the students the concepts of computer graphics. ✓ This course deals with two and three dimensional transformations, projection and graphical functions. It helps to have a better understanding of 2D and 3D technologies. ✓ Understand the basics of computer graphics, different graphics systems and applications of computer graphics. ✓ Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. ✓ Use of geometric transformations on graphics objects and their application in composite form. ✓ Extract scene with different clipping methods and its transformation to graphics display device. ✓ Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. ✓ Performing Animation techniques using twining and morphing.

			✓ Students will understand 2D and 3D graphic techniques which will help them to proceed with their project development. ✓ Knowledge and understanding • Have a knowledge and understanding of the structure of an interactive computer graphics system, and the separation of system components. • Have a knowledge and understanding of geometrical transformations. • Have a knowledge and understanding of techniques for representing 2D geometrical objects. • Have a knowledge and understanding of interaction techniques. • Cognitive skills (thinking and analysis). ▪ Practical and subject specific skills (Transferable Skills). ▪ Perform simple 2D graphics with lines, curves and can implement algorithms to rasterizing simple shapes, fill and clip polygons and have a basic grasp of anti-aliasing techniques.
23	Operating System	BCA-402	✓ To deliver a detailed knowledge of integral software in a computer system – Operating System. ✓ To understand the working of operating system as a resource manager. ✓ To familiarize the students with Process and Memory management. ✓ To describe the problem of process synchronization and its solution. ✓ Ability to apply CPU scheduling algorithms to manage tasks. ✓ Initiation into the process of applying memory management methods and allocation policies. ✓ Knowledge of methods of prevention and recovery from a system deadlock.
24	Software Engineering	BCA-403	✓ To know about software engineering and its application in Software development ✓ The aim of the course is to assist the student in understanding the basic theory of software engineering, and to apply these basic theoretical principles to a group software development project. ✓ To inculcate in student's different concepts of software engineering principles ✓ To develop the skills necessary to design, develop and execute software projects. ✓ Select and implement different software development process models ✓ Extract and analyse software requirements specifications for different projects ✓ Understand the importance of the stages in the software life cycle. ✓ Implement software development efficiently and effectively ✓ Understanding of the discipline of software Testing and Quality Management. ✓ Learn about quality standards, quality planning, quality assurance and quality control. ✓ Understand fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods. ✓ Gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing

25	Optimization Techniques	BCA-404	✓ Ability to apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems ✓ Ability to go in research by applying optimization techniques in problems of Engineering and Technology ✓ Ability to solve the mathematical results and numerical techniques of optimization theory to concrete Engineering problems by using computer software
26	Practical Based on Subject Code -401.	BCA-405	✓ Understand the basics of computer graphics, different graphics systems and applications of computer graphics. ✓ Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. ✓ Use of geometric transformations on graphics objects and their application in composite form. ✓ Students will understand 2D and 3D graphic techniques which will help them to proceed with their project development.
27	Mathematics-III	BCA-406	✓ Describe fundamental properties of the real numbers that lead to the formal development of real analysis. ✓ Construct rigorous mathematical proofs of basic results in real analysis. ✓ Demonstrate an understanding of limits and how they are used in sequences, series, differentiation and integration.
BCA Semester Five			
28	Introduction to DBMS	BCA-501	✓ To introduce the students to the database system. ✓ To learn how to design a database by using different models. ✓ To enable the students to understand the database handling during execution of the transactions. ✓ To understand the handling of database by concurrent users. ✓ To gain complete knowledge of SQL and PL/SQL. ✓ Familiarization with Database Management System. ✓ Comprehensive knowledge of database models. ✓ Ability to code database transactions using SQL.
29	Java Programming and Dynamic Webpage Design	BCA-502	✓ Covers software design, implementation, and testing using Java. ✓ Understands fundamentals of basic java programming ✓ Introduces object-oriented design techniques and problem solving. ✓ Emphasizes development of secure, well-designed software projects that solve practical real-world problems. ✓ Be able to use the java SDK environment to create, debug, & run simple java program. ✓ Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs. ✓ Read and make elementary modifications to Java programs that solve real-world problems. ✓ Validate input in a Java program. ✓ Identify and fix defects and common security issues in code. ✓ Document a Java program using Javadoc.

30	Computer Network	BCA-503	✓ It will help students in understanding of various types of computer networks, technologies behind networks and application protocols, e-mail and communication protocols will be introduced to students through this subject. ✓ Become familiar with the basics of computer networks ✓ Become familiar with network architectures ✓ Become familiar with fundamental protocols ✓ Explain how communication works in computer networks and to understand the basic terminology of computer networks ✓ Explain the role of protocols in networking and to analyse the services and features of the various layers in the protocol stack. ✓ Understand design issues in Network Security and to understand security threats, security services and mechanisms to counter. ✓ Demonstrate basic understanding of network principles. ✓ Demonstrate understanding of how computers communicate with each other and the methods employed to assure that the communication is reliable. ✓ Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Layers 1-3.
31	Numerical Methods	BCA-504	✓ To learn how to perform error analysis for arithmetic operations. ✓ To demonstrate working of various numerical methods. ✓ To provide a basic understanding of the derivation and use of methods of interpolation and numerical integration. ✓ To impart knowledge of various statistical techniques. ✓ To develop students' understanding through laboratory activities to solve problems related to above stated concepts. ✓ Skill to choose and apply appropriate numerical methods to obtain approximate solutions to difficult mathematical problems. ✓ Ability to apply various statistical techniques such as Measures of Central Tendency and Dispersion. ✓ Understanding of relationship between variables using the method of Correlation and Trend Fit Analysis. ✓ Skill to execute programs of various Numerical Methods and Statistical Techniques for solving mathematical problems.
32	Computer Laboratory and Practical Work of DBMS	BCA-505	✓ To understand the different issues involved in the design and implementation of a database system. ✓ To study the physical and logical database designs, database modelling, relational, hierarchical, and network models. ✓ To understand and use data manipulation language to query, update, and manage a database. ✓ To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency ✓ Populate and query a database using SQL DML/DDL commands.

33	Computer Laboratory and Practical Work of Java Programming & Dynamic Webpage Design	BCA-506	✓ Understands fundamentals of basic java programming ✓ Introduces object-oriented design techniques and problem solving. ✓ Emphasizes development of secure, well-designed software projects that solve practical real-world problems. ✓ Do research in the emerging areas of cryptography and network security. ✓ Read and make elementary modifications to Java programs that solve real-world problems. ✓ Validate input in a Java program. ✓ Identify and fix defects and common security issues in code.
34	Viva-Voice on Summer Training	BCA-507	✓ Explore career alternatives prior to graduation. ✓ Integrate theory and practice. ✓ Assess interests and abilities in their field of study. ✓ Learn to appreciate work and its function in the economy. ✓ Develop work habits and attitudes necessary for job success. ✓ Develop communication, interpersonal and other critical skills in the job interview process. ✓ Build a record of work experience. ✓ Acquire employment contacts leading directly to a full-time job following graduation from college. ✓ Identify, write down, and carry out performance objectives (mutually agreed upon by the employer, the MCC experiential learning supervisor, and the student) related to their job assignment.
35	Minor Project	BCA-508	✓ To be able to apply some of the techniques/principles you have been taught ✓ To carry out time planning for the project. ✓ To follow correct grounding and shielding practices ✓ To do effective trouble-shooting of the mini project. ✓ To develop effective communication skill by delivering a seminar based on mini project ✓ Demonstrate a through and systematic understanding of project contents. ✓ Understand methodologies and professional way of documentation and communication. ✓ Know the key stages in development of the project. ✓ Extend or use the idea in mini project for major project.
BCA Semester SIX			
36	Computer Network Security	BCA-601	✓ To understand basics of Cryptography and Network Security. ✓ To understand basic concepts of different attacks and security threats. ✓ To be able to secure a message over insecure channel by various means. ✓ To understand various System Security Threats – Intruders, Viruses & related Threats ✓ To understand various protocols for network security to protect against the threats in the networks. ✓ Provide security of the data over the network. ✓ Do research in the emerging areas of cryptography and network security. ✓ Protect any network from the threats in the world.

37	Information System: Analysis Design & Implementation	BCA-602	✓ Understand both the nature of 'information systems analysis and design' and its various components. ✓ Appreciate the use of systems design techniques, methodologies, and tools. ✓ Identify various types of information systems concepts and terminologies. ✓ Explain the types of business needs that can be addressed using information technology based solutions. ✓ Discuss the initial phases of the System Development Life Cycle (SDLC) using analytical tools and quantitative techniques used to identify problems. ✓ Define problems and opportunities that initiate projects. ✓ Write clear and concise business requirements and convert them into technical specifications.
38	E-Commerce	BCA-603	✓ Explain the concept of ecommerce and its revolution. ✓ Explain the infrastructure of the Internet and how the various elements contribute to the marketing distribution solutions. ✓ Explain and develop solutions for implementing an ecommerce site. ✓ Discuss security and ecommerce and the ramifications of neglecting it. ✓ Create a marketing plan and promotional plan for an ecommerce site. ✓ Evaluate a payment system for a site. ✓ Create a strategy for the different, non-traditional areas surrounding ecommerce. ✓ Implement, in simulation or authentically, an ecommerce site.
39	Knowledge Management	BCA-604	✓ Demonstrate research skills ✓ Understand the basic concepts and technologies used in the field of management information systems. ✓ Have the knowledge of the different types of management information systems. ✓ Understand the processes of developing and implementing information systems.
40	Major Project	BCA-605	✓ Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study. ✓ Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study. ✓ Demonstrate a sound technical knowledge of their selected project topic. ✓ Undertake problem identification, formulation and solution. ✓ Design engineering solutions to complex problems utilising a systems approach. ✓ Use effectively oral, written and visual communication. ✓ Identify, analyse, and solve problems creatively through sustained critical investigation. ✓ Integrate information from multiple sources. ✓ Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards. ✓ Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning.

41	Presentation/Seminar based on Major Project	BCA-606	✓ Students will demonstrate the ability to perform close and critical readings. ✓ Students will demonstrate the ability to consider critically the motives and methods of scholarship and the relationship between them. ✓ Students will demonstrate the ability to distinguish opinions and beliefs from researched claims and evidence and recognize that kinds of evidence will vary from subject to subject. For instance, some fields call for quantitative support while others work more commonly with quoted, textual evidence. ✓ Students will demonstrate the ability to ask disciplinarily appropriate questions of the material and recognize when lines of inquiry fall outside of disciplinary boundaries. ✓ Students will demonstrate the ability to evaluate, credit, and synthesize sources.