CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT

THREE YEARS BACHELOR OF COMPUTER APPLICATION PROGRAMME

COURSE CONTENT FOR SEMESTER – III

BCA-301 Object Oriented Programming Using C++

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 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.
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, Parametric 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

Referential Books:

1. A.R.Venugopal, Rajkumar, T. Ravishanker “Mastering C++”, TMH, 1997.
2. S.B.Lippman & J.Lajoie, “ C++ Primer”, 3rd 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++

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

Referential Books:

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

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.

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

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

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

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}

Referential Books:

1. S.C.Gupta - Fundamentals of statistics - Sultan chand & sons , Delhi.
2. D.N.Elhance - Fundamentals of statistics - Kitab Mahal, Allahabad.
3. Montogomery 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 **Re**presenting 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

Referential Books:

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles& practice,2000.
2. D.J. Gibbs & D.C. Tsichritzs: Multimedia programming Object Environment & Frame woork , 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. Silbersachatz and Galvin, " Operating System Concepts", Person, 5th Ed. 2001
2. Madnick E., Donovan J., " Operating Systems:,Tata McGraw Hill,2001
3. Tannenbaum, "Operating Systems", PHI, 4th 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”, 2nd 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