

SEMESTER 3

BCA301 : Advanced Statistical Methods (Complementary)
(Syllabus as approved by Board of Studies of Statistics (UG)

BCA302 : Design and Analysis of Algorithms (Core)

Unit I:

Introduction Definition of Algorithm, Areas of algorithm study, performance analysis space complexity, time complexity, asymptotic notations (Ore, Ω , θ).

Unit II:

Divide and Conquer General method, Binary search, finding the maximum and minimum, merge sort, quick sort, performance measurement of quick sort, Selection, Saracens matrix multiplication.

Unit III:

Greedy method General method, Knapsack problem, Job sequencing with dead lines, Minimum cost spanning trees Prims algorithm, Kruskals algorithm, Optimal merge patterns, Single source shortest path, Optimal binary search trees.

Unit IV:

Dynamic programming The general method, multistage graphs, all-pairs shortest path, Single source shortest path, 0/1 Knapsack problem, Traveling Sales person problem.

Unit V:

Basic traversal and search techniques - BFS and traversal, DFS and traversal, Bi-connected components and DFS, Backtracking General method, 8-queens problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

Book of study:

Ellis Horowitz, Sartaj Sahni, Sanguthevan Rajasekharan
Computer algorithms/C++ (Second Edition)
Universities Press.

Reference:

1. Anany Levitin
Introduction to design and analysis of algorithms
Addison Wesley
Low price edition.
2. Richard Neapolitan, Kumarss Naimipour
Foundation of Algorithms using C++

BCA303: Computer Organization and Architecture (Core)

Unit 1:

Functional units of a computer, Basic operational concepts, Bus structure, Addressing methods, Memory locations and addresses, Instructions and instruction sequencing, Instruction execution.

Unit 2:

Central Processing Unit, General Register Organization, Stack Organization, Instruction Formats, Instruction Classification, Addressing modes.

Unit 3:

Main Memory, Organization of RAM, SRAM, DRAM,, Read Only Memory- ROM,PROM,EROM,EEPROM, Auxiliary memory, Cache memory, Virtual Memory, Memory mapping Techniques.

Unit 4:

Parallel Computer Structures: Introduction to parallel processing, Pipeline computers, Multi processing systems, Architectural classification scheme-SISD, SIMD, MISD, MIMD.

Unit 5:

Pipelining and Vector processing, Introduction to pipelining, Instruction and Arithmetic pipelines(design) Vector processing, Array Processors.

Book of study :

M.M Mano-Computer Systems Architecture

Kai Hwang and F A Briggs-Computer Architecture and parallel processing

Reference

Hamachar-Computer Organization

BCA304: Computer Graphics (Core)

Unit 1:

Practical applications of Computer Graphics: Display devices, Raster Scan Display, DVST, Flat panel, LCD, Raster Scan systems, Random Scan systems. Input devices, Hard copy devices, Graphics software.

Unit 2:

Points and lines: Line drawing algorithms, Simple DDA. Circle generation, Mid point circle algorithm, Character generation.

Unit 3:

2D Transformations: Translation, Rotation, Scaling Matrix representation and homogenous coordinates, composite transformation, raster methods for transformations. **Two-dimensional viewing:** viewing pipeline, concept of window and view port, window to viewport transformation. Clipping operations point clipping, line clipping, Cohen Sutherland line clipping, polygon clipping, Sutherland-Hodgeman polygon clipping.

Unit 4:

Structure Concepts: Basic structure functions, setting structure attributes, Editing structures. **Graphical User interface and interactive input methods:** Input of graphical data, interactive picture construction techniques.

Unit 5:

Three-dimensional concepts: Three dimensional display methods, three dimensional graphics packages. **Three dimensional object representations:** Polygon surfaces, sweep representations, constructive solid geometry methods, octrees and quad trees.

Book of study :

Hearn D & Baker MP, Computer Graphics, PHI pvt Ltd

References

1. Newman W M & R F Sproul, Principles of Interactive Computer Graphics, Mc-Graw Hill Book Company.
2. Plastock R & Xiang Z, Theory and problems of computer Graphics, Schaum Series, McGraw Hill bok Company.

BCA305 :Object Oriented Programming and C++ (Core)

Unit 1:

Introduction- Object Orientation- object oriented development-Object oriented Methodology-Object oriented Models-Object oriented themes-Modeling-Objects and classes concepts-Links and association concepts-Generalization and Inheritance-state modeling-interaction modeling

Unit 2:

Object Oriented language C++: Basic concept of object oriented programming - benefits of oops-Structure of C++ Program-Basic, derived and user defined data types-Symbolic constants-operators in C++ - Control Structures -Functions in C++-

The main function, function prototyping-call by reference-return by reference- inline function-function overloading- friend and virtual functions,

Unit 3:

classes and objects-specifying a class - Defining member functions - Nesting of member functions - Private member functions - arrays within a class - static data members - static member functions - Arrays of objects-objects as function arguments

Unit 4: Constructors and Destructors- Constructors- Parameterized Constructors- Multiple constructors - Copy constructor - Dynamic constructor-Destructors - Operator overloading & Type conversions.

Inheritance-Defining derived classes-Single, Multiple, Multilevel, Hierarchical and hybrid inheritance- private, public, protected inheritance-virtual base classes-Abstract classes- Constructors in derived classes- nesting of classes.

Unit 5: Pointers-Virtual functions and polymorphism-Pointers-Pointers to objects-this pointer-pointer to derived classes-virtual functions-Pure virtual functions-C++ streams-Stream classes-Unformatted and Formatted console I/O operations-Managing output with manipulators. Manipulating strings.

Book of study :

Object Oriented Modeling and Design with UML, Second Edition

By James Rumbaugh, Michael Blaha

Object oriented Programming with C++, Fourth edition By E. Balaguruswamy

References:

Let Us C++ ,Yashwant Kanetkar, Bpb Publications

John R Hubbard, Programming with C++, Shaums Outline series.

Objected-Oriented Programming in C++ , Rajesh K Shukla, Wiley India.2008 Edition

Venugopal, Rajkumar, Ravishankar, *Mastering C++*, Mc Graw Hill

BCA306 : Software Lab III (Core)

[There will be two questions one from 1 to 4 and second from 5 to 8]

1. Programs based on class, objects and manipulation of objects using member functions
2. Programs based on friend functions, passing objects as arguments to function.
3. Programs based on array of objects.
4. Programs based on function overloading, Default arguments.
5. Programs based on operator overloading (binary, unary) using member functions and friend functions.

6. Programs based on constructors, different types of constructors- copy constructor, default constructor.
7. Programs based on Inheritance, different types of inheritance.
8. Programs using virtual functions and polymorphism, this pointer