

Transport Layer**(10 %)**

Transport Layer Service Primitives. Connection Establishment and Connection release Management. Problem of old duplicates. Flow control and buffering.

TCP/IP protocol Suite**(15%)**

TCP/IP and Internetworking, Ports and sockets, IP address structure, Major features of IP, IP Datagram format, Major IP services and options, Subnets and Classless InterDomain routing. TCP: Major features of TCP, Passive and active open, TCP segment format, Flow and Congestion control. UDP. ARP and RARP.

Upper layer Protocols**(5%)**

Client Server paradigm, Domain name service.

Main Reading

1. Andrew S. Tanenbaum., "Computer Networks", (5th Edition) Prentice Hall of India.

Supplementary Reading

1. Stalling W., "Data and Computer Communication" (8th edition) Prentice Hall of India.
2. Behrouz A Forouzan, "Data Communication and Networking", (4rd edition), Tata McGraw Hill.
3. Behrouz A Forouzan, "TCP/IP Protocol Suite", (3rd edition), Tata McGraw Hill.

CS303 Design and Analysis of Algorithms

Prerequisites: CS101, CS201, MT103, MT104

Course Contents:**Introduction****(20%)**

The Role of Algorithm in computing, Framework for design and analysis of algorithms, Growth of functions: asymptotic notation; Recurrences: substitution method, recursion-tree method, master method; Probabilistic analysis and randomized algorithms, indicator random variables.

Dynamic programming**(10%)**

Assembly line scheduling, matrix-chain multiplication, elements of DP, longest common subsequence;

Greedy algorithms:**(10%)**

Activity-selection problem, elements of greedy strategy, Huffman codes;

Amortized analysis:**(5%)**

Aggregate analysis, accounting method, potential method, dynamic tables

Graph Algorithms**(20%)**

Elementary graph algorithms; Minimum spanning tree: growing a spanning tree, Kruskal and Prim algorithm; Single-source shortest paths: Bellman-ford algorithm, Dijkstra's algorithm. All pairs shortest paths: shortest paths and matrix multiplication, floyd-warshall algorithm.

String matching:**(5%)**

Naïve algorithm, Rabin-Karp algorithm

Computational geometry:**(10 %)**

Line segment properties, intersection, finding convex hull, finding closest pair of points

NP-Completeness: (10%)
Polynomial time, polynomial time verification, NP-completeness and reducibility

Approximation algorithms: (10%)
The vertex cover problem, Traveling salesman problem, the set-covering problem

Main Reading

1. Cormen Thomas, L. Charles, R. Ronald, S. Clifford, "Introduction to Algorithms", Second Edition, IEEE, PHI.

Supplementary Reading

1. Algorithm Design by Jon Kleinberg and Eva Tardos, Pearson 2006
2. Introduction to the Design & Analysis of Algorithms by Anany Levitin
3. Introduction to Algorithms by Udi Manber
4. Algorithms in C++ by Sedgewick
5. Algorithmics the spirit of computing by David Harel 2. Knuth Donald, "The Art of Computer Programming vol I, II, III

CS305 Object Oriented Technology

Prerequisites: CS101, CS201

Course contents:

Object Orientation:

Basic OO Concepts and principles (15%)

Class The role of classes as modules and types, uniform type system. The OO style of computation;

Object: definition, basic form, object references, object identity, declaring references, self-reference, run-time object structure, Object creation, References and calls. Operations on references, Object cloning and copying, deep cloning. Composite objects and expanded types. Dynamic aliasing. Class level operations- static methods. Package structure and importing;

Inheritance, Polymorphism, Typing & Binding: inheritance concepts & rules, Deferred features and classes: deferring and effecting a feature, redeclaration, deferred classes, using the original version in a redefinition. The meaning of inheritance: module view and type view. Extension-specialization paradox. The role of deferred class. Multiple Inheritance, feature renaming, approaches to Multiple inheritance in OOP languages, multiple interface inheritance, repeated inheritance, inheritance and assertions, global inheritance-Ex. Class Object in Java, frozen features, assignment attempt, typing and redeclaration, anchored declaration, inheritance and information hiding. Typing: typing problem. Static and dynamic typing. Why static typing. Binding. Covariance and descendent hiding. Contravariance. Advanced Inheritance mechanisms: inheritance versus composition, Inheritance taxonomy

OOP features: (25%)

Memory management: modes of object management, space reclamation, detachment, unreachable objects, memory management in object-oriented model, approaches: casual, programmer controlled de-allocation, automatic memory management. Algorithms: reference counting, garbage collection, requirements, case studies; Collection Framework: Use of collection framework; Genericity: horizontal and vertical type generalization,