

N.B. Assume Suitable data where necessary.

Q.1 Distinguish Between-(any three) (12)

- 1) ZPP Randomized Complexity classes Vs BPP Randomized Complexity Classes
- 2) Las Vegas Randomized Class Vs Monte Carlo Randomized Class
- 3) Priority Search Trees Vs Quad Trees
- 4) NP-Hard Problems Vs NP-Complete Problems

Q.2 Answer the following:-any two (12)

- 1) Analyse the Complexity of Karger's Min-Cut Algorithm.
- 2) Prove that independent set is NP-Complete by reducing it from Clique.
- 3) Prove that Set Cover is ratio 2 Approximation algorithm
- 4) Discuss the different ways to solve NP-Hard Problems and also discuss how to analyse the efficiency of randomized and approximation algorithms.

Q.3 The pattern of sunny and rainy days of two states Markov Chain is as follows .Every sunny day is followed by another sunny day with probability 0.8. Every rainy day is followed by another rainy day with probability 0.6. (12)

- a) Write transition matrix for the same.
- b) If today is sunny ,what is the chance of rain the day after tomorrow?
- c) Draw the markov model for the same.

Q.4 Answer the following questions :- (12)

- 1) Give any two examples for each of the following Complexity Classes:-  
1) NP-Complexity Class      2) RP- Complexity Class    3) ZPP Complexity class
- 2) Discuss any two data structures for Geometric Algorithms

Q.5 Write notes on:- (any three) (12)

- 1) Convex Hull
- 2) Three Problems for Hidden Markov Models
- 3) Fermat's Primality Testing algorithm
- 4) Data Streaming Algorithms
- 5) k-d trees