B.E. / B.Tech. Computer Science and Engineering (Model Curriculum) Semester-IV

SE202CS - Design & Analysis of Algorithms

P. Pages : 2 **GUG/W/24/13807(S)**

Time : Three Hours * 7 5 9 8 * Max. Marks : 80

Notes : 1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. All questions are compulsory.

1. a) Explain Asymptotic Notation's in detailed. **10**

b) Solve the following recurrence by characteristic equation and generalize solution method. **6**

$T(n) = 3T\left(n/3\right) + n^2$

OR

2. a) Write an algorithm of insertion sort and derive worst case and best case run time complexity for insertion sort. **8**

b) Give an expression for the runtime T(n) by master method $T(n) = 3.T(n/2) + n^2$ **8**

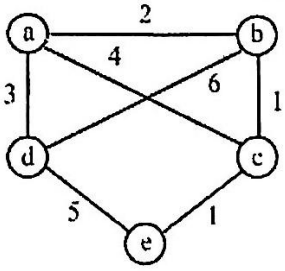
3. a) Describe the maximum and minimum problem in algorithm. **8**

b) Describe the binary search algorithm and its time complexity. **8**

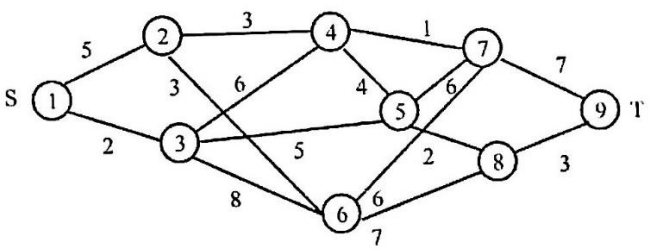
OR

4. a) Describe Knapsack problem. Give applications of Knapsack problem. **8**

b) What is minimum spanning tree? Write Prim's algorithm for finding minimum cost spanning tree. Also give stepwise illustration of his algorithm using suitable example. **8**



5. a) Consider the following multi-stage graph: Find the minimum cost and shortest path in the graph. **8**

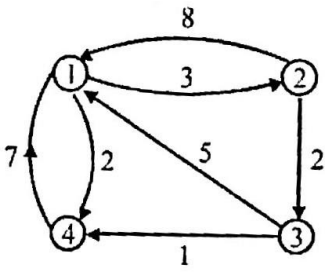


b) Explain travelling salesman problem. Find shortest path with Node (i) as source **8**

$$\begin{bmatrix} 0 & 3 & 8 & 9 \\ 4 & 0 & 7 & 6 \\ 2 & 3 & 0 & 5 \\ 1 & 4 & 3 & 0 \end{bmatrix}$$

OR

6. a) Find all pair shortest path using Floyd Warshall algorithm. **8**



b) Write Matrix Chain multiplication algorithm and show its stepwise execution for following chain of matrices. $P = \langle 10, 100, 50, 20, 25 \rangle$. **8**

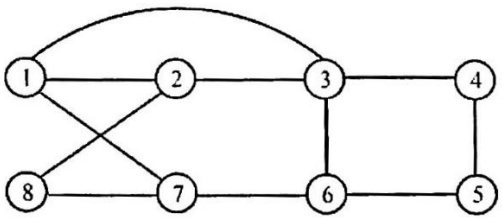
7. a) Define Hash table and explain hash functions. **8**

b) Explain the 8-Queen's problem and how it can be solved using backtracking and hash table. **8**

OR

8. a) Write a algorithm and explain for Graph coloring using backtracking approach. **8**

b) Define Hamiltonian cycle. Write the algorithm for the same & find the Hamiltonian cycle for the following graph. **8**



9. a) Write a note on: **8**

i) NP-Hard ii) NP-Complete

b) State and explain Cook's theorem. **8**

OR

10. a) What is non-deterministic algorithm? Explain primality testing. **8**

b) Describe the Max-Clique problem with example. **8**

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