

P. Pages : 3

Time : Three Hours



NRJ/KW/17/4556

Max. Marks : 80

- Notes :
1. Solve Question 1 OR Questions No. 2.
 2. Solve Question 3 OR Questions No. 4.
 3. Solve Question 5 OR Questions No. 6.
 4. Solve Question 7 OR Questions No. 8.
 5. Solve Question 9 OR Questions No. 10.
 6. Solve Question 11 OR Questions No. 12.
 7. Due credit will be given to neatness and adequate dimensions.
 8. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain the concept of bounding summation using integration. 6

b) Explain principles of designing algorithm. 7

OR

2. a) Solve the following equation by using characteristic equation 6

$$t_n = n, \text{ if } n = 0 \text{ or } n = 1 \text{ or } n = 2$$

$$= 5t_{n-1} - 8t_{n-2} + 4t_{n-3}, \text{ otherwise}$$

b) Prove that $\sum_{i=1}^n \log(i) = O(n \cdot \log n)$. 4

c) Show that $\log n \neq O(n \cdot \log n)$. 3

3. a) What is the significance of amortized Analysis. Explain all its three methods. 6

b) What are different Asymptotic notation. Explain them briefly. Find upper bound, lower bound and tight bound range for following. 7

i) $3n + 2$

ii) $20n^2 + 8n + 10$

OR

4. a) Give stepwise operation of Heap sort on following input array & also explain the complexity of heap sort. 7

$$A = \langle 4, 8, 20, 17, 7, 25, 2, 13, 5 \rangle$$

b) Explain worst case, best case and average case analysis with example. 6

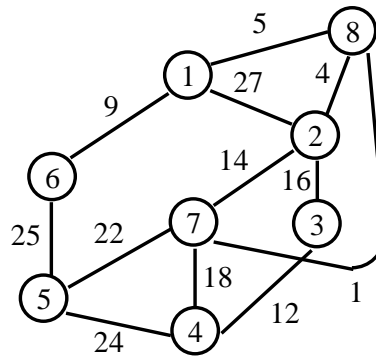
5. a) Write an algorithm to sort an array using Quicksort method. Obtain its best case and worst case time complexity. 7

- b) Find out average no. of comparison required for successful and unsuccessful binary search on the following array. 6

-12, 22, 34, 45, 56, 78, 91, 103, 114, 125, 156

OR

6. What is minimum cost spanning tree? Write an algorithm for Prim's method for finding the minimum cost spanning tree. Also discuss its complexity solve the following using Prim's Algorithm. 13



7. a) Write an algorithm to generate LCS - Matrix and print - LCS Implement the algorithm on following string to construct LCS Matrix. 8
 String A = 101101101
 String B = 0101101

- b) What is travelling salesman problem? Implement TSP for the following matrix representing compute graph. 6

0	10	15	20
5	0	9	10
6	13	0	12
8	08	9	0

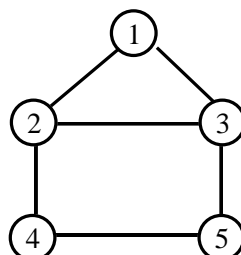
OR

8. a) For the following set of keys implement optimal Binary search tree. Draw the tree and find the cost of tree. 8

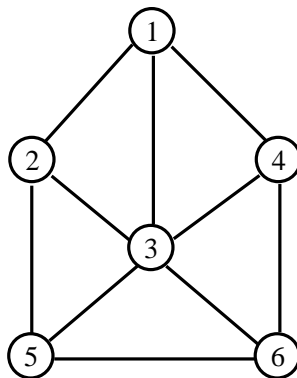
i	0	1	2	3	4	5
P_i	--	0.08	0.05	0.12	0.20	0.10
P_j	0.05	0.11	0.05	0.11	0.10	0.04

- b) Write the algorithm to implement backward approach on multistage graph. Comment on the complexity of the algorithm. 6

9. a) What is planner graph. Find solution space tree for colouring following graph. 7

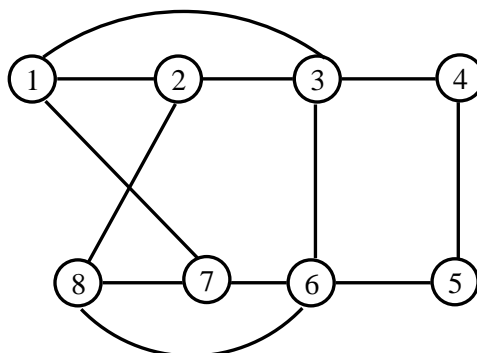


- b) What is Backtracking? Explain implicit as well as explicit constraints? Obtain the BFS tree and DFS tree for following graph. 6



OR

10. a) Give any two solution of 8 queen problem. Explain the constraint implementation formula. 6
- b) Write Algorithm to find Hamiltonian cycle for given graph. For the given graph generate at least two cycle. 7



11. a) Write algorithm for 7
- i) Non-deterministic sorting.
- ii) Non-deterministic searching.
- b) Explain P, NP, NP - HARD and NP - complete problem. 7

OR

12. a) Write short note on : 8
- i) Polynomial Reduction.
- ii) Deterministic and non deterministic algorithm.
- b) Write a non deterministic algorithm to generate CLIQUE of size K from graph of n vertices. 6
