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CSE303

[ET]

Enrol. No. .....

END SEMESTER EXAMINATION : OCT.–NOV., 2018

ANALYSIS AND DESIGN OF ALGORITHMS

Time : 3 Hrs. *Maximum Marks : 70*

Note: *Attempt questions from all sections as directed.*

Use of Simple Calculator is allowed.

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six.**

Each question carries 06 *marks.*

1. (a) Explain why analysis of algorithms is important? Explain: Worst Case, Best Case & Average Case Complexity. (3)

   (b) Solve the recurrence relation using iteration/ recurrence tree method, $T(n) = 8T(n/2) + n^2$; $T(1) = 1$. (3)

2. Solve the following recurrence relation using master theorem method : (Any three)

   (i) $T(n) = 3T(n/2) + n^2$

   (ii) $T(n) = 2T(n/2) + n \log n$

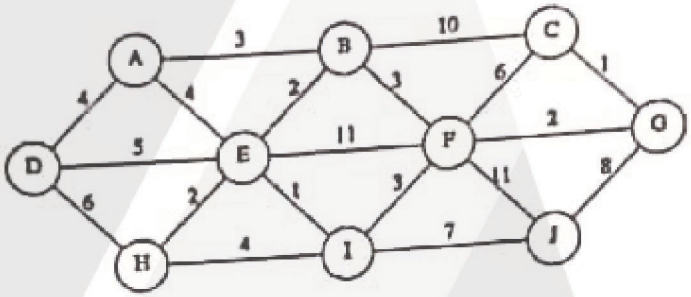
   (iii) $T(n) = 3T(n/3) + \sqrt{n}$

   (iv) $T(n) = 64T(n/8) - n^2 \log n$

P.T.O.

3. Write an algorithm for quick sort and derive best case, worst case using divide and conquer technique using given data (3, 12, 16, 8, 1, 4, 5, 9, 2, 6, 5).

4. Define minimum spanning tree. Find minimum spanning tree using Prim's algorithm of the following graph.



5. Solve the following Knapsack Problem using greedy method. Number of items = 5, knapsack capacity W = 100, weight = {50, 40, 30, 20, 10} and profit = {1, 2, 3, 4, 5}.

6. Find longest common subsequence of following two strings X and Y using dynamic programming. X=aabdbacdcba, Y=aabddcbac.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**

Each question carries **10** *marks.*

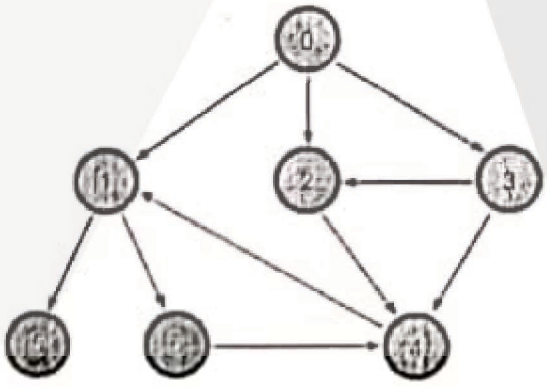
7. (a) Compare NP-Hard with NP-Complete problems, with suitable examples. (5)

(b) If any problem in NP cannot be solved by a polynomial-time deterministic algorithm, then NP-complete problems are not in P. Justify the given statement.

8. Find the LC branch and bound solution for the travelling sales person problem whose cost matrix is as follows :

addresses	1	2	3	4	5
1	∞	600	1000	1900	1100
2	600	∞	1900	1900	1500
3	1000	1900	∞	1700	1200
4	1900	1900	1700	∞	1900
5	1100	1500	1200	1900	∞

9. (a) Show the ordering of vertices produced by Topological-sort for the following graph : (5)



(b) Prove any strongly connected undirected graph with n vertices and (n – 1) edges is a tree. (5)

P.T.O.

SECTION – C (20 Marks)

(Compulsory)

10. (a) Consider the chain of matrices A1, A2, A3, A4 & A5 with the dimensions given below. Give the optimal parenthesization to get the product A1.....A5.

- A1: [30 * 35]
- A2: [35 * 15]
- A3: [15 * 25]
- A4: [25 * 20]
- A5: [20 * 18] (10)

(b) Consider the following undirected, weighted graph, Step through Dijkstra's algorithm to calculate the single-source shortest path using node 'A' as the source node. (10)