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CSE303 Enrol. No. .....

[ET]

END SEMESTER EXAMINATION : NOV. – DEC., 2017

ANALYSIS AND DESIGN OF ALGORITHMS

Time : 3 Hrs. *Maximum Marks : 70*

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

SECTION – A (30 Marks)

Attempt any **five** *questions out of* **six.**
Each question carries **06** *marks.*

1. Find the optimal solution for the following fractional Knap-Sack problem using divide and conquer.

   Capacity(m)=30 and Number of items (n)=3.

   Weights are (10,20,30) and profit are (12,20,24)

2. Write the Merge Sort Algorithm to sort the following numbers 12, 14, 25, 27, 11, 12, 13, 16. Illustrate the algorithm.

P.T.O.

3. What are approximation algorithms? What is meant by a P(n)-approximation algorithm? Give an approximation algorithm for travelling salesman.

4. Explain various asymptotic methods used to represent the rate of growth of running time of algorithm. Show that $2n^2 + 3n + 1 = \theta(n^2)$.

5. Show that lower bound for any comparision based sorting algorithm is $\Omega(n\log n)$. Draw a valid decision tree for sorting three items.

6. Differentiate between BFS and DFS traversal with the help of an example.

SECTION – B (20 Marks)

Attempt any **two** *questions out of* **three.**
Each question carries **10** *marks.*

7. Differentiate between P, NP, NP-complete and NP hard problems? Give atleast five problems that can be classified as NP problem. Discuss the approximation algorithms for NP hard problems.

8. Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is <5, 4, 6, 2, 7>, i.e., the matrices are as follows:

A_1 (5x4)

A_2 (4x6)

A_3 (6x2)

A_4 (2x7)

9. Explain the algorithm to solve N-Queen's problem. Explain how 8 Queens problem is solved using back tracking.

SECTION – C (20 Marks)

(Compulsory)

10. (a) Write an algorithm to sort the given array of elements using QUICK-SORT. Apply Quick-Sort algorithm to sort the following array 5,8,1,3,6,9,2,4. Analyze the running time of the algorithm in Best-case also. (8)

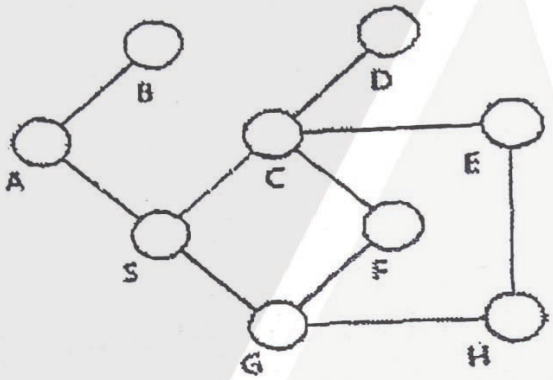
(b) Solve the following recurrence using Master Method or recursion tree method.

(i) $T(n)=3T(n/4)+n\log n$

(ii) $T(n)=2T(n/2)+n^2$

(iii) $T(n)=2T(\sqrt{n})+\log n$ (6)

(c) Discuss the procedure of BFS Algorithm for the following graph :



Take S to be the source vertex. (6)