Code: 17F00402

MCA IV Semester Regular Examinations May 2019
DESIGN & ANALYSIS OF ALGORITHMS
(For 2017 admitted batches only)

Time: 3 hours   Max. Marks: 60

Answer all the questions
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1   (a)   Apply Strassen's algorithm to compute matrix multiplication, using 2 X 2 matrices, exiting the recursion when n = 2.

$$\begin{bmatrix} 1 & 0 & 2 & 1 \\ 4 & 1 & 1 & 0 \\ 0 & 1 & 3 & 0 \\ 5 & 0 & 2 & 1 \end{bmatrix} \times \begin{bmatrix} 0 & 1 & 0 & 1 \\ 2 & 1 & 0 & 4 \\ 2 & 0 & 1 & 1 \\ 1 & 3 & 5 & 0 \end{bmatrix}$$

   (b)   Explain the concept of divide and conquer.
OR
2   (a)   Illustrate the tracing of Quick Sort algorithm for the following set of numbers:
          18, 25, 18, 40, 11, 37, 32, 9
   (b)   Explain best case, average case and worst case efficiencies for quick sort with specific examples.

3   (a)   Write an algorithm to find single source shortest paths.
   (b)   Obtain the optimal solution for the job sequencing problem with deadline where n = 4 Profit
         (P1, P2, P3, P4) = {100, 10, 15, 17} and deadlines = {2, 1, 2, 1}.
OR
4   (a)   Write an algorithm, to find the minimum cost spanning tree using Kruskal's method. Apply the algorithm on the graph shown below.
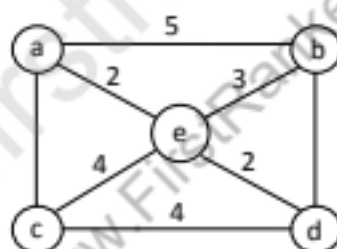
   (b)   Write a note on travelling sales person problem.

5   (a)   What is graph traversal? Explain depth first traversal and breadth first traversals, with an example.
   (b)   What is a Hamilton cycle? Give an example.
OR
6   (a)   Explain back tracking concept and apply it to solve subset sum problem for S = {6, 5, 3, 7} and d = 15.
   (b)   Explain Bi-connected components of a graph with a suitable example.

7   Explain how branch and bound is different from backtracking. Solve the following instance of the 0/1 knapsack problem by Branch and bound algorithm (W = 16).

Item	Weight	Value
1	10	$100
2	7	$63
3	8	$56
4	4	$12

OR

8   (a)   What is a comparison tree? Draw the comparison tree for sorting three elements.
    (b)   Show how to invert a lower triangular matrix using lower bound theory.

9   Give and explain the relationship between P, NP, NP-complete and NP hard problems.

OR

10   Write short notes on the following NP-complete problems:
    (a)   Node cover.
    (b)   Hamilton circuit problem.
    (c)   Graph coloring problem.

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