Code No: 156AN

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August/September - 2021
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science and Engineering)

Time: 3 Hours   Max. Marks: 75

Answer any five questions
All questions carry equal marks
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1.a) Write and explain randomized quick sort algorithm.
  b) Discuss about Big oh O, Omega Ω and Theta θ notations with examples.   [8+7]

2.a) Using Merge sort, sort the following elements:
      310, 285, 179, 652, 351, 423, 861, 254, 450, 520
  b) Analyze the computing time complexity of binary search algorithm.   [7+8]

3.a) Show that depth first search can be used to find the connected components of an undirected graph.
  b) Write an algorithm of n-queen's problem and explain.   [8+7]

4. Suppose we start with n sets, each containing a distinct element.
    a) Show that if u unions are performed, then no set contains more than u+1 elements.
    b) Show that at most n – 1 unions can be performed before the number of sets becomes 1.
    c) Show that if fewer than (n/2) unions are performed, then at least one set with a single element in it remains   [5+5+5]

5.a) Solve the following 0/1 Knapsack Problem using dynamic programming
      n=4, m=30, (w1,w2,w3,w4) = (10,15,6,9) and (p1, p2, p3, p4) = (2,5,8,1).
  b) Explain the concept of the traveling salesperson problem.   [7+8]

6. Use the function OBST to compute w(i,j), r(i,j), and c(i,j), $0 \leq i < j \leq 4$, for the identifier set (a1, a2, a3, a4) = (do, if, int, while) with p(1 : 4) = (3, 3, 1, 1) and q(0:4)=(2,3,1,1,1). Using the r(i,j)'s construct the optimal binary search tree.   [15]

7.a) Explain the general method of Greedy method.
  b) Write and explain the Kruskal's algorithm with an illustrative example.   [7+8]

8.a) Explain with respect to branch and bound 0/1 knapsack problem.
  b) Discuss in detail about the classes of NP-hard and NP-complete.   [7+8]

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