COMP 6 – 1 (RC)

T.E. (Comp.) (Semester – VI) (RC) Examination, Nov./Dec. 2017
MODERN ALGORITHM DESIGN FOUNDATION

Duration : 3 Hours | Total Marks : 100

Instruction : *Answer **any five** questions by selecting atleast **one** question from **each** Module.*

MODULE – I

1. a) Explain the concept of recursive algorithms with the help of an example. **6**

   b) Explain how partition algorithm works to find the 7^{th} smallest element in the following set of numbers using selection sort

   S = {65, 70, 75, 80, 85, 60, 55, 50, 45}. **7**

   c) Explain divide and conquer strategy in general with the help of an algorithm. **5**

   d) Define the following :

   i) Debugging

   ii) Profiling **2**

2. a) Define the following asymptotic notations :

   i) O(Big Oh)

   ii) Ω (Omega)

   iii) θ (Theta). **6**

   b) Simulate MaxMin algorithm on the following elements using divide and conquer strategy. Draw the tree calls.

   S = {22, 13, –5, –8, 15, 60, 17, 31, 47}. **8**

   c) Explain how performance measurement can be done on an algorithm with the help of an example. **6**

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MODULE – II

3. a) Explain greedy method in general with the help of an algorithm. 5

   b) Find the optimal solution for the following knapsack problem.
   $n = 3$; $M = 20$ (twenty); $\{p_1, p_2, p_3\} = \{25, 24, 15\}$ $\{w_1, w_2, w_3\} = \{18, 15, 10\}$. 6

   c) Write Prim's algorithm to find the minimum cost spanning tree and state its complexity. 6

   d) Define spanning tree. State it's applications. 3

4. a) Differentiate between greedy method and dynamic programming. 5

   b) Find optimal solution for the problem of job sequencing with deadlines on the following data :
   $n = 4$; $\{p_1, p_2, p_3, p_4\} = \{70, 12, 18, 35\}$
   $\{d_1, d_2, d_3, d_4\} = \{2, 1, 2, 1\}$. 6

   c) Construct OBST for the identifier set (a_1, a_2, a_3, a_4) = (cout, float, if, while) with $\{p_1, p_2, p_3, p_4\} = \{2, 2, 1, 1\}$ and $\{q_0, q_1, q_2, q_3, q_4\} = \{2, 2, 3, 1, 1\}$. 9

MODULE – III

5. a) What is backtracking ? Explain with the help of an example. 5

   b) Write an algorithm for sum of subsets problem using backtracking technique. Solve the sum of subset problem for $M = 25$ $S = \{5, 10, 10, 25\}$. 10

   c) Explain the concept of graph coloring problem with the help of an example. 5

6. a) Explain Least Cost Search Technique used in Branch and Bound. 6

   b) Write the algorithm for the backtracking solution to the 0/1 knapsack problem. 8

   c) Write the algorithm for N-Queen's problem using backtracking. 6

MODULE – IV

7. a) Explain and demonstrate how Brute Force algorithm will be used to search the pattern P in text T where
   T = "Twinkle Twinkle Little Star"
   P = "Little". 6

   b) Explain the complexity measures of network algorithms. 4

   c) Explain steiner trees with the help of an example. 5

   d) Draw suffix tree and its compact representation for the string "minimize". 5

8. a) Explain distributed broadcast routing algorithms. 5

b) Write distance vector routing algorithm for distributed unicast routing. 5

c) Draw the Huffman tree and write the Huffman code for all the symbols based on the data provided in the following table : 6

Symbol	Frequency
A	24
B	12
C	10
D	8
E	8

d) Draw standard tree for the following set of strings. 4

S = {bear, bell, bid, bull, buy, sell, stock, stop}.
