

## COMP 6 – 1 (RC)

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

Duration : 3 Hours

Total Marks : 100

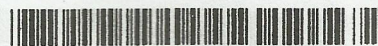
**Instruction :** Answer **any five** questions by selecting **atleast one** question from **each** Module.

#### 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<sup>th</sup> 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)  $O(\text{Big Oh})$
  - ii)  $\Omega$  (Omega)
  - iii)  $\theta$  (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  $(a_1, a_2, a_3, a_4) = (\text{cout, float, if, while})$  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

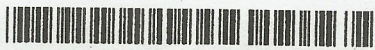
MODULE – III

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  
 $T = \text{"Twinkle Twinkle Little Star"}$   
 $P = \text{"Little"}$ . 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 :

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

- d) Draw standard tree for the following set of strings. 6
- S = {bear, bell, bid, bull, buy, sell, stock, stop}. 4