COMP 6 – 1 (RC) 2007-08

T.E. (Computer) (Semester – VI) (RC) 2007-08 Examination, Nov./Dec. 2018
MODERN ALGORITHM DESIGN FOUNDATION

Duration : 3 Hours | Total Marks : 100

Instruction : *Answer **any 5** questions by choosing atleast **one** from **each** Module.*

MODULE – I

1. a) Define algorithm. Explain the Criteria's for designing an efficient algorithm. 5

   b) Define space complexity of an algorithm. Calculate space complexity for the following code

```
Algorithm sum (a [ ], n)
{
    s : = 0.0 ;
    for i = 1 to n do
        s : s + a [ i ] ;
    return s ;
}
```

   5

   c) Prove the following : 4

      i) Given $f(n) = 2^n + 6n^2 + 3n$ show that $f(n) = 0(2^n)$.

      ii) Given $f(n) = n^3$ show that $f(n) = \Omega(n^2)$.

   d) Explain general method of divide and conquer strategy with the help of an algorithm. 6

2. a) Differentiate between 4

      i) O(Big oh) and o (small o)

      ii) Ω (omega) and ω (little omega).

   b) Write an algorithm to find Maximum and minimum element in an array using divide and conquer strategy. Explain how this algorithm is optimal over the one without using this strategy. 8

P.T.O.

c) Draw tree of calls of merge sort algorithm and merge procedure using divide and conquer strategy on the following data.

{310, 285, 179, 652, 351, 423, 861, 254, 450, 520}. **6**

d) Define : **2**

i) Debugging

ii) Profiling.

MODULE – II

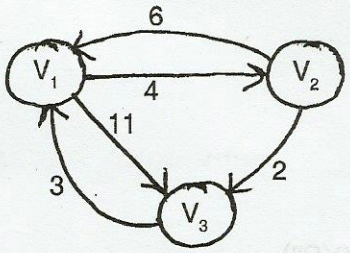
3. a) Explain greedy method in general with the help of an algorithm. **6**

b) Find an optimal solution for the following data using job sequencing with deadlines algorithm

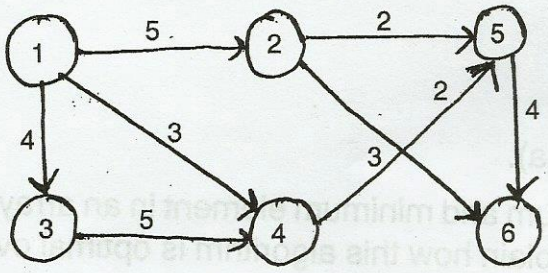
$n = 4, (p_1, p_2, p_3, p_4) = (100, 10, 15, 27)$

$(d_1, d_2, d_3, d_4) = (2, 1, 2, 1)$ **6**

c) Find the shortest path between all the vertices using all pairs shortest path algorithm using dynamic approach for the following graph. **8**



4. a) Using Krushkal's algorithm find minimum cost spanning tree and its cost for the following graph. **6**



b) Write Bellman Ford's algorithm to find shortest path from a single source to all the other vertices in a graph. **6**

c) With respect to the flow shop scheduling define the following : 8

i) Finish time of a job.

ii) Finish time of a schedule.

iii) Mean flow time.

iv) Optimal finish time.

MODULE – III

5. a) Write the algorithm for N-Queen's problem. Draw the solution space tree for 4 Queen's problem. 6

b) Explain with the help of an example how rearrangement of nodes helps in efficient searching in a tree. 6

c) Draw the solution space tree for the set n = 4 w [1 : 4] = {3, 4, 5, 6} and M = 9 for sum of subset problem. 8

6. a) Write an algorithm for graph coloring problem. 6

b) Explain the concept of least cost search with the help of an example. 6

c) Write an algorithm for sum of subset problem. 8

MODULE – IV

7. a) Compute a table representing facture function for Knuth Morris Pratt's (KMP) algorithm for the pattern string. a b a a b a. 6

b) Explain the difference between standard tree and compressed tree with the help of an example. 4

c) What are network algorithm list and explain complexity measures in network algorithm. 5

d) Explain steiner trees. 5

8. a) Using Boyer Moore algorithm check whether the pattern P = abacab lies in the text given by T = abacaabadcabacabaabb. or not. 10

b) Explain :

i) Flooding with Hop count Heuristics. 5

ii) Flooding with sequence number Heuristics. 5
