

16554(D) 9107 330 0 -
MCA 4th Semester Examination
Computer Algorithms (NS)
MCA-401 - 0 DEC 2016

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question each from the section A, B, C and D. Each question is of 12 marks. Section E is compulsory.

SECTION - A

- (a) What are the different criteria used to improve the effectiveness of algorithm? (6)
- (b) Prove that for any two functions $p(n)$ and $q(n)$, we have $p(n) = \theta(q(n))$ if and only if $p(n) = O(q(n))$ and $p(n) = \Omega(q(n))$ (6)
- (a) Define space complexity and time complexity. Which one is most important than the other? (6)
- (b) Sort the following array of elements using Heap sort - 4, 9, 3, 10, 2, 11, 1, 25, 17 (6)

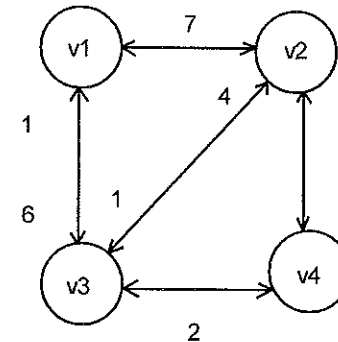
SECTION - B

- (a) Explain the algorithm for finding maximum and minimum, and analyse its time complexity. (6)
- (b) Solve the following Knapsack problem using greedy method-
Input: 5 objects, $C = 100$ $w = \{10, 20, 30, 40, 50\}$
 $p = \{20, 30, 66, 40, 60\}$ (6)

- (a) Describe merge sort algorithm and find the complexity of the algorithm. (6)
- (b) Find the optimal schedule for the following jobs with $n=7$
Profits $(p_1, p_2, p_3, p_4, p_5, p_6, p_7) = (3, 5, 18, 20, 6, 1, 38)$ and deadlines $(d_1, d_2, d_3, d_4, d_5, d_6, d_7) = (1, 3, 3, 4, 1, 2, 1)$ (6)

SECTION - C

- (a) What is dynamic programming method? How it can be used to solve reliability design problem? (6)
- (b) Find shortest path between all pair on the weighted directed graph given below: (6)

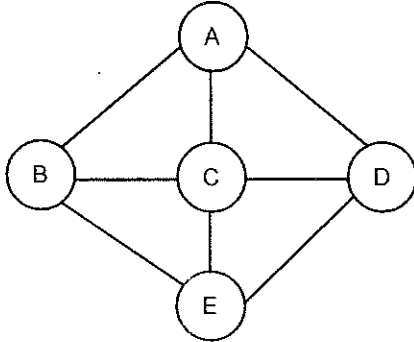


- (a) What is multistage graph problem? Discuss its solution based on dynamic programming approach. Give a suitable algorithm and find its computing time. (6)
- (b) Compute the time complexity of the depth first search algorithm when the input graph is represented by an adjacency list. (6)

SECTION - D

- (a) Explain Backtracking method. How it can be used to solve 8- queens problem. (6)

- (b) What is Hamiltonian cycle? Explain how it can be solved using backtracking algorithm? (6)
8. (a) What is graph colouring problem? Colour the graph given below with only two colour. (6)



- (b) Define P, NP, NP hard and NP complete problems. Explain the concept with suitable example. (6)

SECTION - E

9. (a) Define the terms: pseudo code flow chart.
- (b) Define feasible and optimal solution of greedy method.
- (c) What is principle of optimality?
- (d) Explain the concept of backtracking.
- (e) What is minimum spanning tree?
- (f) Define sum of subset problem. (2×6=12)