Total No. of Questions : 5]

SEAT No. :

P-5780

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[6120]-102

M.C.A. (Management)

IT-12 : DATA STRUCTURE AND ALGORITHMS

(2020 Pattern) (Semester - I)

Time : 2½ Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***

Q1) a) Write an algorithm to reverse the nodes from singly linked list. **[6]**

b) Write an algorithm to copy elements from queue to stack. **[4]**

OR

a) Write an algorithm to calculate sum of data of alternate nodes of doubly linked list. **[6]**

b) Discuss the use of priority queue. **[4]**

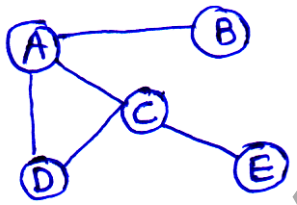
Q2) a) Construct binary search tree with following traversals. **[6]**

Preorder Traversal : 22, 15, 4, 17, 16, 19, 58, 82

Inorder Traversal : 4, 15, 16, 17, 19, 22, 58, 82

b) Write adjacency matrix and DFS for following graph. **[4]**

[Starting vertex : A]



OR

a) Construct segment tree (sum of range) for following data. **[6]**

14, 11, 12, 16, 17, 21, 28

b) Explain has collision with suitable example. **[4]**

P.T.O.

Q3) a) Apply the rain terrace algorithm to the following problem. Input : [3, 0, 3, 0, 4, 2]. Draw the figure & find the solution. **[6]**

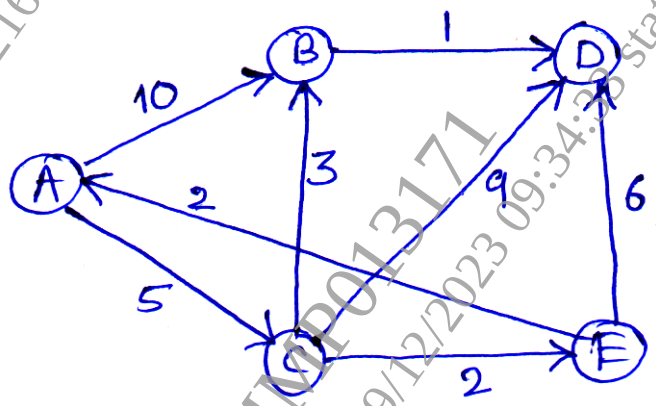
b) Describe the rules for solving N queen problem. **[4]**

OR

a) Apply the maximum subarray algorithm to the input : [–4, –7, –1, 4, 2, –3, 5] and find sum of maximum subarray. **[6]**

b) Explain combination sum problem with example. **[4]**

Q4) a) Apply Dijkstra's algorithm to find shortest path for following graph. **[6]**



b) Apply Euclidean algorithm to find GCD of 60 and 36. **[4]**

OR

a) Sort the following data using Mergesort algorithm [20, 55, 30, 4, 97, 13, 24]. **[6]**

b) Explain fast powering with suitable example. **[4]**

Q5) a) Find the length of longest common substring using dynamic programming for following strings. **[7]**

X = "congratulations" and Y = " gratitude"

b) How dynamic programming is used to find unique paths. **[3]**

OR

a) Consider the given instance of 0/1 Knapsack problem. **[7]**

n = 4, m = 8, p = (1, 2, 5, 6), w = (2, 3, 4, 5)

Using dynamic programming determine the optimal profit and the solution vector.

b) Explain regular expression matching using dynamic programming. **[3]**

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