

Total No. of Questions : 5]

SEAT No. : 20242  
[Total No. of Pages : 4

PA-2552

[5948]-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) From Q2 to Q5 having internal choices.
- 3) Figure to be right indicate full marks.

**Q1) MCQ**

**[20×½=10]**

- a) In a linked list insertion can be done as \_\_\_\_\_
  - i) beginning
  - ii) end
  - iii) middle
  - iv) all
- b) The minimum number of fields with each node of DLL is
  - i) 1
  - ii) 2
  - iii) 3
  - iv) 4
- c) In a stack if a user tries to remove an element from empty stack, it is called
  - i) empty collection
  - ii) underflow
  - iii) overflow
  - iv) garbage collection
- d) Which method is used for retrieving the top element of the stack without deleting it
  - i) pop ( )
  - ii) dequeue ( )
  - iii) push ( )
  - iv) peek ( )
- e) Binary tree is a special type of freedata structure in which every node can have a maximum \_\_\_\_\_ children
  - i) 4
  - ii) 2
  - iii) 1
  - iv) 0
- f) A Binary search tree whose left subtree and right subtree differ in height by at most 1 unit is called
  - i) AVL tree
  - ii) Red Black tree
  - iii) Lemma tree
  - iv) Unique tree

**P.T.O.**

- g) The Breadth first search traversal of a graph will result into?
- Linked List
  - Tree
  - Graph with back edges
  - None
- h) Time complexity of DFS is (V-number of vertex, E-number of edges)
- $O(V+E)$
  - $O(V)$
  - $O(E)$
  - None
- i) Heap can be used as \_\_\_\_\_
- Priority queue
  - stack
  - A decreasing order array
  - Normal array
- j) What is the Best case for linear search
- $O(n \log n)$
  - $O(\log n)$
  - $O(n)$
  - $O(1)$
- k) In linear search with array, how many comparisons are needed in best case?
- 0
  - 1
  - n
  - $n/2$
- l) Backtracking algorithm is implemented by constructing a tree of choice called as \_\_\_\_\_
- state - space tree
  - Back tracking tree
  - state - chart tree
  - Node tree
- m) What is meant by the power set of a set?
- subset of all sets
  - set of all subsets
  - set of particular subset
  - emptyset
- n) What is the other name of Dijkstra Algorithm?
- Single source shortest path
  - multiple source shortest path
  - multiple destination
  - single destination shortest path problem
- o) Which of the following standard algorithms is not a Greedy algorithm.
- Dijkstra algorithm
  - Prim's
  - Kruskal
  - Bellment Ford stortest path

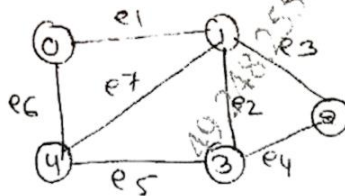
- p) What is the worst case complexity of quick sort?
- $O(n \log n)$
  - $O(\log n)$
  - $O(n)$
  - $O(n^2)$
- q) Which of the following method is used for sorting in merge sort.
- merging
  - partitioning
  - selection
  - exchanging
- r) In dynamic programming the output to stage  $n$  become the input to
- stage  $n - 1$
  - stage  $n$  itself
  - stage  $n + 1$
  - stage  $n - 2$
- s) Choose the recursive formula for Fibonacci series ( $n > 1$ )
- $F(n) = F(n + 1) + F(n + 2)$
  - $F(n) = F(n) + F(n - 1)$
  - $F(n) = F(n - 1) + F(n - 2)$
  - $F(n) = F(n - 1) - F(n - 2)$
- t) The algorithm like quick sort does not require extra memory for carrying out
- in-place
  - stable
  - unstable
  - in-partition

Q2) a) Draw Binary tree from given traversal [5]

inorder : 4, 2, 5, 1, 6, 7, 3, 8

Postorder : 4, 5, 2, 6, 7, 8, 3, 1

- b) Give the Adjacency Matrix and linked list representation of undirected graph. [3]



- c) Define collisions. [2]

OR

- a) Apply the algorithm to draw Binary search tree for following data. [5]  
10, 08, 15, 12, 13, 07, 09, 17, 20, 18, 04, 05
- b) Compare BFS and DFS. [3]
- c) Explain Min Heap. [2]

- Q3) a)** Apply Rain Terrace algorithm to following problem  
Input : [4, 2, 0, 3, 2, 5] Draw the figure and find solution. [4]  
b) Write an algorithm for knight's tour. [3]  
c) Discuss use of Priority queue. [3]

OR

- a) Apply the maximum subarray algorithm to the  
Input : arr = [-2, -5, 6, -2, -3, 1, 5, -6] and find sum of maximum subarray. [4]  
b) Give the explicit and implicit constraints in 8 queen's problem. [3]  
c) Discuss Hamiltonian Cycle. [3]

- Q4) a)** Sort the following data using Mergesort [38, 27, 43, 3, 9, 82, 10]. [4]  
b) Consider the following array [1, 3, 5, 8, 9, 2, 6, 7, 6] what is minimum number of jump required to reach the end of the array? [4]  
c) Explain need of circular queue. [2]

OR

- a) Write an algorithm of Kruskal's algorithm. [4]  
b) Explain Rules for Tower of Hanoi with a suitable example. [4]  
c) What is the purpose of Linked List. [2]

- Q5) a)** Write an algorithm to implement queue using linked list. [3]  
b) Solve the following instance of 0/1 knapsack problem by applying Dynamic programming  $n = 3$   $w = (3, 5, 7)$   $p(3, 7, 12)$ ,  $M = 4$  [7]

OR

- a) Write an algorithm to delete element from linked list whose sum is equal to zero. [3]  
b) Find the largest common subsequence for the following string using Dynamic Programming [7]

$X = [A, B, C, D, B, A, C, D, F]$

$Y = [C, B, A, F]$

