

Total No. of Questions : 5]

SEAT No. :

PA-2552

[Total No. of Pages : 4

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



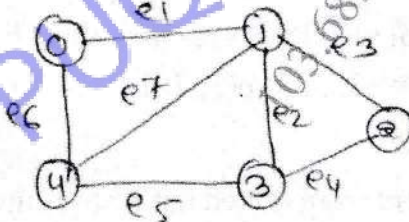
- p) What is the worst case complexity of quick sort?
- i) $O(n \log n)$
 - ii) $O(\log n)$
 - iii) $O(n)$
 - iv) $O(n^2)$
- q) Which of the following method is used for sorting in merge sort.
- i) merging
 - ii) partitioning
 - iii) selection
 - iv) exchanging
- r) In dynamic programming the output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