

Total No. of Questions : 5]

SEAT No. :

P6979

[Total No. of Pages : 4

[5865]-102

First Year 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 right indicate full marks.*

Q1) Multiple choice questions.

[20×½=10]

- a) In a linked list, insertion can be done as _____.
 - i) begining
 - ii) end
 - iii) middle
 - iv) all
- b) Generally collection of nodes is called as _____.
 - i) Queue
 - ii) Graph
 - iii) Linked list
 - iv) Stack
- c) In a stack , if a user tries to insert an element in full stack, it is called _____.
 - i) Overflow
 - ii) Underflow
 - iii) Empty collection
 - 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 tree data structure in which every node can have a maximum _____ children.
 - i) 4
 - ii) 2
 - iii) 1
 - iv) 0
- f) Which of the following satisfies the property of the Red Black tree.
 - i) A tree which is a Binary search tree but not strictly Balanced tree
 - ii) A node must be either Red or Black in color and root node must be black
 - iii) A tree with maximum three children
 - iv) A tree which is binary search tree but not strictly balanced tree and A node must be either Red or Black in color and root node must be black

P.T.O.

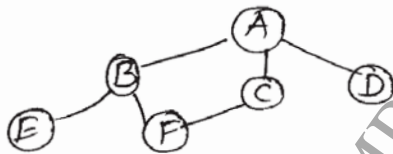
- g) Time complexity of DFS is (V-number of vertex, E-number of edges).
 i) $O(V+E)$ ii) $O(V)$
 iii) $O(E)$ iv) None
- h) For the adjacency matrix of a directed graph the row sum is _____ degree and column sum is the _____ degree.
 i) in, out ii) out, in
 iii) in, total iv) total, out
- i) Heap can be used as _____.
 i) Priority queue ii) Stack
 iii) A decreasing order array iv) Normal array
- j) What is the best case for linear search?
 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) In what manner is a state space tree for a backtracking algorithm constructed?
 i) Depth-first search ii) Breadth first search
 iii) Twice around the tree iv) Hearest neighbour first
- m) Back tracking algorithm is implemented by constructing a tree of choices called as
 i) State space tree ii) State chart tree
 iii) Node tree iv) Backtracking tree
- 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) The output of kruskal and prims algorithm is _____.
 i) Maximum spanning tree ii) Spanning tree
 iii) Minimum spanning tree iv) None
- p) What is the worst case complexity of quicksort?
 i) $O(n \log n)$ ii) $O(\log n)$
 iii) $O(n)$ iv) $O(n^2)$
- q) The optional data structure used to solve Tower of Hanoi is _____.
 i) Tree ii) Heap
 iii) Queue iv) Stack

- r) In dynamic programming the output to stage n become the input to
- Stage n-1
 - Stage n it self
 - Stage n+1
 - Stage n-2
- s) We use dynamic programming approach when
- We need on optimal solution
 - The solution has optional sub structure
 - The given problem can be reduced to 3 - SAT problem
 - It's faster than Greedy
- t) The relationship between stages of a dynamic programming problem is called _____.
- State
 - Random Variable
 - Node
 - Transformation

- Q2)** a) Apply the algorithm to draw Binary search tree for the following data.
10, 08, 15, 12, 13, 07, 09, 17, 20, 18, 04, 05 [5]
- b) Compare BFS and DFS. [3]
- c) Explain Min Heap. [2]

OR

- a) Apply DFS algorithm on the following graph and show the steps. [3]

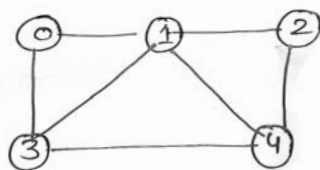


- b) Construct Binary Tree for following data 10, 25, 2, 4, 7, 13, 11, 22 and determine inorder, postorder & preorder? [5]
- c) Define Hash function 2 collision. [2]

- Q3)** a) Apply Rain Terrace algorithm to the following problem.
Input:- Height = [4, 2, 0, 3, 2, 5]. Draw the figure and find solution. [4]
- b) Explain power set with example. [3]
- c) Discuss use of priority queue. [3]

OR

- a) What is Hamiltonian cycle? [3]
- b) Find the Hamiltonian cycle from following graph. [4]

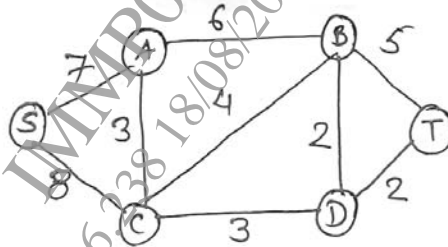


- c) Write an algorithm to count number of nodes in singly linked list. [3]

- Q4)** a) What is Jump Game algorithm? [4]
 b) Sort the following data using merge sort algorithm [38, 27, 43, 3, 9, 82, 10]. [4]
 c) Explain need of circular queue. [2]

OR

- a) Illustrate the stages, in finding the minimum cost spanning tree for given graph using Prim'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) Consider the instance of 0/1 knapsack problem $n = 3$, $m = 20$, $p = (25, 24, 15)$, $w = (18, 15, 10)$ using dynamic programming. Determine the optimal profit and the solution vector. [7]
 b) Write an algorithm to reverse the nodes of a linked list. [3]

OR

- a) Find the longest common subsequence for following string using dynamic programming. [7]
 $X = \{A, B, C, D, B, A, C, D, F\}$
 $Y = \{C, B, A, F\}$
 b) Write an algorithm delete element from linked list whose sum is equal to zero. [3]

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