

28-05-18

Total No. of printed pages = 4

CS 131602

Library, G.I.M.T.

Roll No. of candidate

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2018

B.Tech. 6th Semester End-Term Examination

DATA STRUCTURE

Full Marks – 100

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *six* from the rest.

(10 × 1 = 10)

1. (a) Which data structure has fixed size?
 - (i) Arrays
 - (ii) Linked List
 - (iii) Trees
 - (iv) Graphs
- (b) Structure is a _____ data type.
- (c) "A node in a linked list can point to only one node at a time". State True or False.
- (d) "Trees and Graphs are the examples of linear data structure". State True or False.
- (e) Every node in a B Tree has at most _____ children.
 - (i) M
 - (ii) M - 1
 - (iii) 2
 - (iv) M + 1

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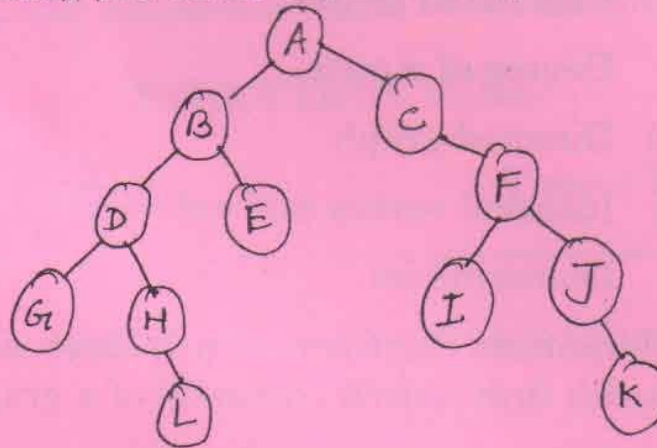
- (f) "A leaf node does not branch out further". State True or False.
- (g) Two binary trees are said to be copies if they have similar _____ and _____.
- (h) Convert the following infix expression to their postfix expression : $A * B + C / D$.
- (i) New nodes are added at _____ of the queue.
- (j) Size of a tree is basically the number of _____ in the tree.
2. (a) Write an algorithm to insert a new node after a given node in a circular linked list. (7)
- (b) Write a procedure to delete an element from the end of a singly linked list. (5)
- (c) Define doubly linked list. (3)
3. (a) Write an algorithm for evaluation of a postfix expression. (5)
- (b) Convert the following infix expression into postfix expression using stack :
 $A - (B / C + (D \% E * F) / G) * H$. (5)
- (c) Explain the algorithm for tower of Hanoi. (5)
4. (a) Differentiate between recursive and iterative algorithm. Define tail recursion. (3 + 2 = 5)
- (b) Define circular queue. Write an algorithm to delete an element from a circular queue. (2 + 3 = 5)
- (c) What is a priority queue? Discuss the linked representation of a priority queue. (5)

5. (a) Write short notes on : (2 × 3 = 6)

- (i) Complete binary tree
- (ii) Extended binary tree
- (iii) Forests.

(b) Construct the binary tree from the given expression : $exp = ((a + b) - (c * d)) \% ((e \wedge f) / (g - h))$. (5)

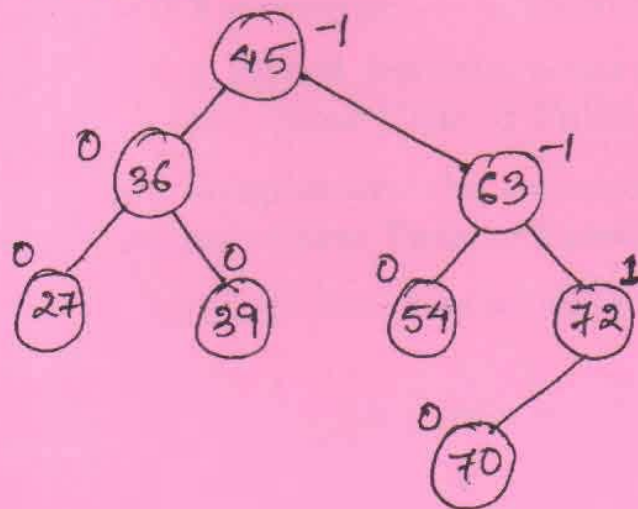
(c) Find the sequence of nodes that will be visited using pre-order traversal algorithm. (2)



(d) Define Breadth first traversal algorithm with example. (2)

6. (a) Define threaded binary tree. Discuss the advantages of a threaded binary tree. (5)

(b) Construct the AVL tree given below and insert 18, 81, 29, 15, 19, 25, 26 and 1 in it. Delete nodes 39, 63, 15 and 1 from the AVL tree so formed. (10)



7. (a) Differentiate between B Tree and B⁺ Tree. (3)
(b) Write an algorithm to insert a new element in a B Tree. (5)
(c) Create a B Tree of order 5 by inserting the following elements : 3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25 and 19. (7)
8. (a) Define the following : (5 × 2 = 10)
(i) Connected graph
(ii) Degree of a node
(iii) Directed graph
(iv) Inserted vertex and cut vertex
(v) Isomorphism.
(b) Differentiate between depth first search and breadth first search traversal of a graph. (5)
9. (a) Sort the elements given using quick sort algorithm 27, 10, 36, 18, 25, 45. (5)
(b) Explain the algorithm of shell sort with a suitable example. (5)
(c) Write the algorithm for binary search. (5)
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