

IMSc CS Sem.-4 (ATKT) Examination

Data Structures

January-2024

Time : 3-00 Hours]

[Max. Marks : 70

Instructions:

- Write both the Sections in the separate answer book.
- Both Sections having equal weightage.
- Draw Diagrams wherever necessary.
- Make Assumptions wherever necessary.

SECTION – I**Q-1) Attempt the following :****15**

1. For given array A[10], If someone uses linear search. What will be the best case, average case and worst case scenario for linear search algorithm.
2. What is pointer? How to pass pointer values to the function? Demonstrate with an example.
3. What is Stack? Write an algorithm to push, pop and peek in stack.

Q-2) Attempt the following : (Any Two)**10**

1. What is dynamic memory allocation? Briefly explain each function for dynamic memory allocation.
2. How Input Restricted Dequeue works? Write an algorithm to insert and delete elements in Input Restricted Dequeue.
3. What is linked list? Write an algorithm for following in singly linked list:
 - a. Create Linked List
 - b. Insert node at beginning
 - c. Insert node at end
 - d. Insert node after given node value

Q-3) Attempt the following :**10**

1. Explain the terms prefix expression, and postfix expression. Convert the following infix expressions to their postfix equivalents using stack:
 $((A - B) + D / ((E + F) * G))$
2. What is circular queue? What is the advantage of using circular queue over queue? How queue is used in Job Scheduling?

OR**Q-3) Attempt the following :**

1. Draw the queue structure in each case when the following operations are performed on an empty queue. (Assume Queue is implemented using array of SIZE 10). Mention the value of Front and Rear at each step.
 - (a) Add A, B, C, D, E, F, G, H, I
 - (b) add two letters J and K

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- (c) Add L
 - (d) Delete Two letter
 - (e) Add one letter M
2. List out the applications of stack. Explain how stack is used in recursion.

SECTION – II

Q-4 Construct a binary search tree using following node values and give following answers: **11**

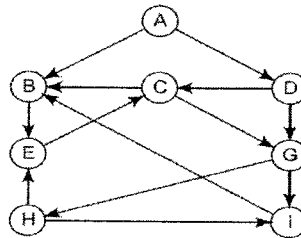
28, 24, 44, 21, 25, 49, 40, 10, 45, 50

- a. What is balance factor?
- b. Assign balance factors to each node and Justify the tree is AVL tree or not.
- c. IF it is not AVL tree, how you will make it AVL tree?
- d. It is complete binary tree or not? Justify your answer.

Q-5 Attempt the following: (Any Two)

12

1. How graphs can be represented in computer memory? Give an appropriate example.
2. Consider the graph given below. Find out its depth-first and breadth-first traversal scheme. Take G as Start:

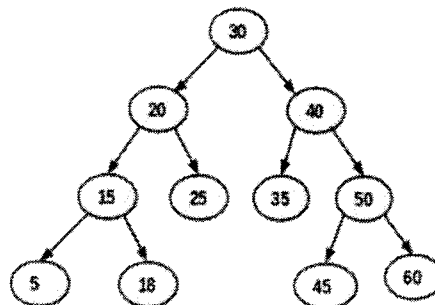


3. Explain Prim's algorithm with an example.

Q-6 Attempt the following: (Any Two)

12

1. Find the in-order, pre-order, post-order, and level-order Traversal for following tree:



2. What is M-Way search tree? Explain B and B+ tree.
3. Explain the link and array representation of binary tree.

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