Hall Ticket No

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal-500043, Hyderabad

B.Tech III SEMESTER END EXAMINATIONS (REGULAR) - FEBRUARY 2022

Regulation:UG-20

DATA STRUCTURES

Time: 3 Hours

(COMMON TO ALL BRANCHES)

Max Marks: 70

Answer ALL questions in Module I and II Answer ONE out of two questions in Modules III, IV and V NOTE: Provision is given to answer TWO questions from among one of the Modules III / IV / V All Questions Carry Equal Marks All parts of the question must be answered in one place only

MODULE - I

1. (a) What do you mean by recursive algorithm? Give examples for linear and non linear recursion.

[7M]

(b) Consider a given list of integers 10, 18, 19, 20, 25, 28, 48, 55, 62, 70 and describe the steps to implement the binary search method. Write a Python program to find the desired element 25 in the given list using binary search. [7M]

$\mathbf{MODULE}-\mathbf{II}$

- 2. (a) How the queue is implemented by linked list? Explain priority queue with diagram and give the operations. Give the applications of priority queues. [7M]
 - (b) Write procedure for converting in-fix- to postfix. Convert the following expression X+(Y * Z) ((N * M + O) / P) in to post form. [7M]

$\mathbf{MODULE}-\mathbf{III}$

- 3. (a) Write basic operations on linked list and types of linked list.Find length of a linked list (Iterative and Recursive)? [7M]
 - (b) Write a function to count the number of nodes in a given singly linked list shown in Figure 1. For example, the function should return 5 for linked list 1->3->1->2->1. [7M]



Figure 1

4. (a) What are the operations that can be performed on a stack and queue? Give the applications of linked and doubly linked list. [7M]

(b) Write a GetNth() function that takes a linked list and an integer index and returns the data value stored in the node at that index position.
Example: Input: 1->10->30->14, index = 2
The node at index 2 is 30. [7M]

$\mathbf{MODULE}-\mathbf{IV}$

- 5. (a) What is graph data structure? Explain various terminologies related to graph data structure. [7M]
 - (b) Traverse the binary tree given in Figure 2 using inorder, preorder and postorder. Also write the recursive procedures for inorder, preorder and postorder. Mention the time complexity. [7M].



Figure 2

6. (a) Explain different representation of binary trees. Write about threaded binary tree with examples.

[7M]

[7M]

- (b) Explain deletion operation in binary search tree for the following criteria with example.i) Node to be deleted is the leaf
 - ii) Node to be deleted has only one child
 - iii) Node to be deleted has two children

$\mathbf{MODULE}-\mathbf{V}$

- 7. (a) Write are the steps to convert a general tree into binary tree. What are the two methods of binary tree implementation? [7M]
 - (b) A binary search tree contains the numbers 1, 2, 3, 4, 5, 6, 7, 8. When the tree is traversed in pre-order and the values in each node printed out, the sequence of values obtained is 5, 3, 1, 2, 4, 6, 7, 8. Find the post order traversal sequence of the tree? [7M]
- 8. (a) What is collision? How to handle collisions? Explain two methods to handle collision. [7M]
 - (b) Consider a hash function as "key mod 7" and sequence of keys as 50, 700, 76, 85, 92, 73, 101 using separate chaining. Also write the advantages of separate chaining. [7M]

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