(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

THIRD SEMESTER [B.TECH] JANUARY 2024

Paper Code: AIML/IIOT/AIDS-201 **Subject: Data Structures**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit. Assume missing data if any.

Q1 Attempt all questions:

i) What is Data Structures? Why do we need data structures? In how many ways can you classified the data structures? **(3)**

ii) Explain features of list, set, tuples, and dictionary data structures. **(3)**

iii) Given a sorted list of numbers {1,13,19,25,38,55,70,80}. Search for value 70 using Binary Search Algorithm. **(3)**

iv) Explain threaded binary tree? **(3)**

v) Explain Topological sort with the help of example. **(3)**

UNIT-I

Q2 a) Write an algorithm/function to convert the infix expression into prefix expression using stack. Using the above algorithm convert the following infix expression into prefix using stack. **(7)**

P*O/R+(S-T*U)

b) What is Circular Queue? Why Circular Queue better than Linear Queue? Write an algorithm/function for enqueue and dequeue operations on Circular Queue? **(8)**

OR

Q3 a) What is an array? How multidimensional array are stored in memory? Consider a 2-D float array A [5:10][6:10] is stored in row –wise form in the memory. Suppose the base address of an array A is 800. **(5)**

i) Find the total number of elements in an array A.

ii) Find the address of A[7][7]

b) Write a function/algorithm to evaluate the postfix expression using stacks? Using above algorithm evaluate the following expression: 3,4,5,6,*,+,7,-,/ **(5)**

c) What is Deque? Write an algorithm for deletion at rear end in a Deque? **(5)**

UNIT-II

Q4 a) What is linked list? Explain advantages and disadvantages of linked list over an array? Write an algorithm/function to insert an element at the end of the linear linked list. **(8)**

b) Write an algorithm/function for Quick Sort. Perform quick sort on the following values. Assume 48 as Pivot point. **(7)**

48, 37, 12, 78, 19, 50, 22, 60

P.T.O.

OR

Q5 a) What is doubly linked list? Write a program to create a doubly linked list having information about a student such as name, roll no, marks etc. and perform insertion and deletion of a node from the beginning. **(8)**

b) Write an algorithm for Radix Sort. Perform the radix sort on the following values. **(7)**

380, 489, 567, 235, 323, 755, 155

UNIT-III

Q6 a) What is B-tree? Compare B- tree with B+ trees. Construct B-tree of order 5 by inserting the following elements in the order of their occurrence. **(8)**

M, T, E, Q, K, C, G, N, H, U, W,

b) The pre-order and in-order traversal of a binary tree are given below. Construct corresponding binary tree. Write its equivalent post-order traversal. Write a recursive algorithm/ function for post-order traversal. **(7)**

Pre-order: A, B, D, C, E, G, F, H, I

In-order: D, B, A, E, G, C, H, F, I

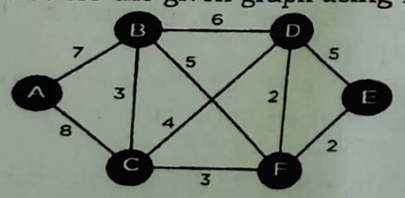
OR

Q7 a) What is Binary Search tree? Construct a Binary Search tree for the following data in sequence 77,33,44,11,22,55,66. Write its equivalent in-order traversal. **(7)**

b) What kind of the Binary Search Tree is created in section (i)? Is there any associated problem with such kind of Binary Search Tree? If yes, provide the detail solution. **(8)**

UNIT-IV

Q8 a) What is minimum spanning tree? Find the minimum spanning tree for the given graph using Prim's algorithm. **(7)**

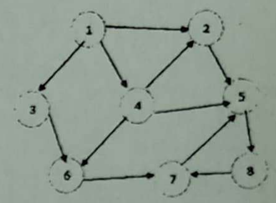


b) Explain the following collision resolution method with the help of example: **(8)**

a) Linear Probing
b) Double hashing
c) Quadratic probing
d) Chaining

OR

Q 9 a) Write an algorithm for Depth First Search. Traverse the given graph using DFS. Assume vertex 1 as starting vertex. **(5)**



b) Explain briefly about the following file organization: **(9)**

a) Sequential access file organization
b) Direct access file organization
c) Indexed Sequential access file organization

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