(Please write your Exam Roll No.) Exam Roll No. 08113627721

END TERM EXAMINATION

THIRD SEMESTER [B.TECH.] FEBRUARY 2023

Paper Code: CIC209 **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.

Q1 Attempt all questions: **(2.5x6=15)**

a) What is DEQUE? How it is different from priority queue.

b) What are polish notations in stack? Explain all polish notations with example.

c) Which sorting technique is best and under what conditions? Justify your answer with the help of example.

d) What is header linked list. Explain its types.

e) How two-dimensional array are internally stored? What is row major and column major matrices?

f) What is stack? Explain operations on stack. How stack is different from queue?

UNIT-I

Q2 a) Define data structure. In how many ways can you categorize data structure? Explain primitive and non-primitive data structures. Discuss operations performed on data structures. **(5)**

b) What is double linked list? Write a function to insert a node at specified location into doubly linked list. **(5)**

c) Write an algorithm to convert infix expression to postfix expression. Convert the following infix expression into postfix expression. **(5)**

A + (B * C – (D / E ^ F) * G) * H

Q3 a) What is linear linked list? Write algorithm to insert a node at the beginning of singly linked list. **(5)**

b) Write algorithm for insertion in circular queue. Explain why circular queue is better than linear queue. **(5)**

c) Write an algorithm to evaluate the postfix expression. Evaluate the following postfix expressions using stack. **(5)**

5 9 8 + 4 6 * + 7 – *

UNIT-II

Q4 a) What is m-way tree? Construct 3-way tree out of empty search tree with following keys in order **(5)**

D, K, P, V, A, G

b) What is B^+ tree? How B^+ tree is different from B-tree. Explain with example. **(5)**

P.T.O.

c) What is AVL tree? Explain insertion and deletion rotations. Construct AVL tree from following elements. (5)

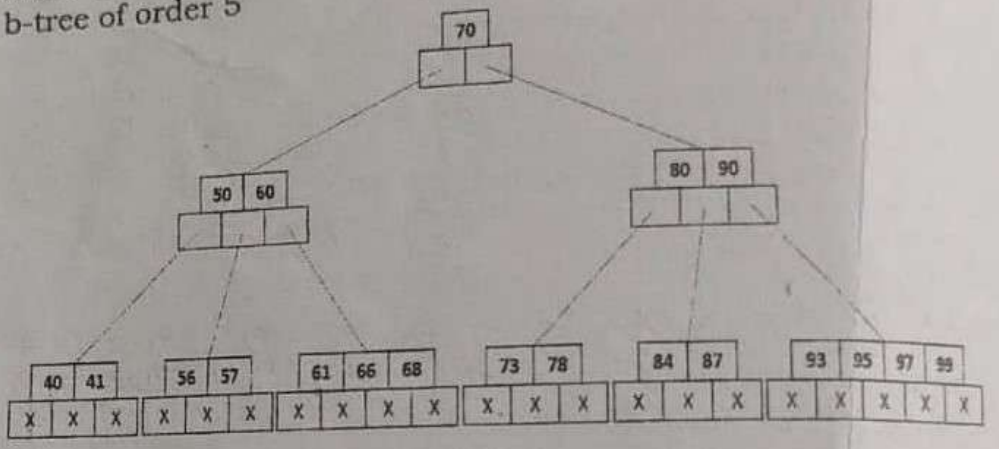
64, 1, 14, 26, 13, 110, 98, 85

Q5 a) What is sparse matrix? Explain different types of sparse matrix with suitable examples. State different storage formats of sparse matrix. (5)

b) The pre-order and in-order traversal of a tree are given below. Construct corresponding binary tree. Write its equivalent post order traversal. (5)

Preorder: F A E K C D H G B
Inorder: E A C K F H D B G

c) What is b-tree? What are properties of b-tree? Explain balancing rules of b-tree. Delete elements 66, 90, 87, 56 from the following b-tree of order 5 (5)



UNIT-III

Q6 a) Write algorithm for insertion sort. Perform insertion sort on following values (8)

77, 33, 44, 11, 88, 22, 66, 55

b) What is binary search? Write algorithm for binary search. Search item 23 from the following sorted data elements using binary search (7)

2, 5, 8, 12, 16, 23, 38, 56, 72, 91

Q7 a) Define hashing. Why do we use hashing? Discuss any two hashing methods with example. How hashing is different from other searching techniques? (7)

b) Write algorithm for merge sort. Perform merge sort on following values. (8)

38, 27, 43, 3, 9, 82, 10

UNIT-IV

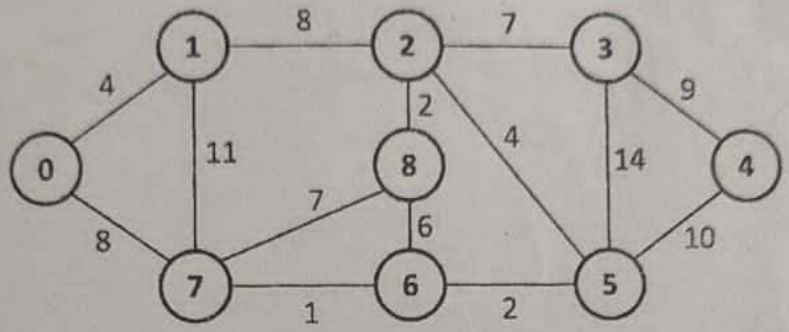
Q8 a) What is graph traversal? Differentiate BFS and DFS with example. Write their traversal algorithms for graph. (7)

P.T.O.

b) Explain minimum spanning tree. What is difference between Prim's and Kruskal's algorithms. **(8)**

Q9 a) What are different ways of representing a graph? Explain different shortest path algorithms with examples. **(8)**

b) Find minimum spanning tree for the following graph using Kruskal's algorithm. **(7)**



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