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**BTECH**  
**(SEM III) THEORY EXAMINATION 2023-24**  
**DATA STRUCTURE**

TIME: 3HRS

M.MARKS: 100

**Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.

**SECTION A****1. Attempt all questions in brief.**

Q no.	Question	Marks	CO
a.	What are the different types of data structure?	2	1
b.	What is the best-case time complexity of Selection sorting?	2	1
c.	How do you represent a queue in computer's memory?	2	2
d.	What are the different operations that can be performed on a queue?	2	2
e.	In which of the sorting technique Queue can be used?	2	3
f.	What is the primary condition to implement binary search algorithm.	2	3
g.	How are lops represented in an edge-list representation of a graph?	2	4
h.	Give an example of a connected graph such that removal of any edge results in a graph that is not connected.	2	4
i.	What is threaded binary tree?	2	5
j.	What is the minimum number of nodes in a full binary tree with depth 3?	2	5

**SECTION B****2. Attempt any three of the following:**

a.	What is doubly linked list? What are its applications? Explain how an element can be deleted from doubly linked list using C program.	10	1
b.	What is Stack? Explain its application. Also explain how a stack is different from Queue.	10	2
c.	Write a C program to implement Selection sort algorithm.	10	3
d.	Write an algorithm for Breadth first traversal of a graph.	10	4
e.	Prove that the total number of edges in a complete binary tree with n terminal nodes is $2(n-1)$ .	10	5

**SECTION C****3. Attempt any one part of the following:**

a.	How to create a copy of a linked list? Write a C program to create a copy of a linked list.	10	1
b.	Write a function takes an array and finds the index of the maximum and of the minimum element.	10	1

**4. Attempt any one part of the following:**

a.	Write algorithm to perform push and pop operations in stack.	10	2
b.	Write an algorithm for finding solution to the Tower of Hanoi problem. Explain the working of its algorithm with the help of suitable diagram.	10	2

**5. Attempt any one part of the following:**

a.	Write a program in C language to implement Linear search technique.	10	3
b.	Write algorithm for merge sorting. Using the algorithm arrange the following elements of an array in ascending order: - 10, 25, 16, 5, 35, 48, 8.	10	3

**6. Attempt any one part of the following:**

a.	Describe the Dijkstra algorithm to find the shortest path. Find the shortest path in the following graph with vertex "S" as source vertex.	10	4
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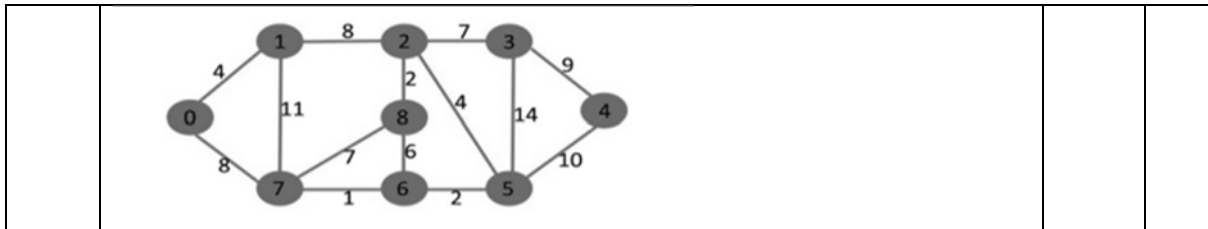
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b.	Explain how matrix multiplication algorithm can be used to obtain transitive closure of a graph.	10	4
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**7. Attempt any one part of the following:**

a.	The following sequence gives the preorder and inorder of the Binary Tree T: Preorder: A B D G C E H I F Inorder: D G B A H E I C F Draw the diagram of the tree.	10	5
b.	Write a C program to implement binary tree traversal.	10	5

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