



Roll No:

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BTECH
(SEM III) THEORY EXAMINATION 2023-24
BASIC DATA STRUCTURE AND ALGORITHMS

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.

2 x 10 = 20

Q no.	Question	Marks	CO
a.	Define Data structure. Describe various types of it.	2	1
b.	Explain asymptotic notation.	2	1
c.	What do you mean by priority queue?	2	2
d.	Write a C program to print first n natural numbers using recursion.	2	2
e.	What do you understand by stable and in place sorting? Explain.	2	3
f.	How does bubble sort work? Explain.	2	3
g.	Show the maximum number of nodes in a binary tree of height h is $2^{h+1} - 1$.	2	4
h.	Define complete binary tree with suitable example.	2	4
i.	Define tree. Explain its applications.	2	5
j.	How graphs are represented in memory? Explain with the help of example.	2	5

SECTION B

2. Attempt any three of the following:

10 x 3 = 30

a.	Write a C function to perform insertion and deletion in an array.	10	1
b.	What is recursion? Write a C code to solve tower of Hanoi problem.	10	2
c.	Binary search is more efficient than Linear search. Justify your answer.	10	3
d.	What is BST? Create a BST using an example by defining each and every step.	10	4
e.	Define spanning tree. Also construct minimum spanning tree using Kruskal's algorithm for the any graph.	10	5

SECTION C

3. Attempt any one part of the following:

10 x 1 = 10

a.	What is Linked List? Write c program to insert an element in linked list.	10	1
b.	Explain Sparse Matrix and its representation.	10	1

4. Attempt any one part of the following:

10 x 1 = 10

a.	Define queue. Explain various operations performed on queue with suitable example.	10	2
b.	Define Stack. Perform Push and Pop operations using an example along with the algorithm.	10	2

5. Attempt any one part of the following:

10 x 1 = 10

a.	Use quick sort algorithm to sort 15,22,30,10,15,64,1,3,9,2. Is it a stable sorting algorithm? – Justify.	10	3
b.	Explain merge sort. Discuss its time complexity in all cases.	10	3



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Subject Code: KOE035

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6. Attempt any *one* part of the following: 10 x 1 = 10

a.	What is Threaded Binary Tree? Explain insertion and deletion algorithms on threaded binary trees	10	4
b.	What is binary tree and perform all type of traversals on an example.	10	4

7. Attempt any *one* part of the following: 10 x 1 = 10

a.	Explain in detail about graph traversal techniques. Explain anyone of it with the help of an example.	10	5
b.	Explain Dijiskatra Algorithm with the help of example.	10	5

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