PAPER ID-411183

Subject Code: KOE045

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM IV) THEORY EXAMINATION 2023-24

BASIC DATA STRUCTURE AND ALGORITHMS

TIME: 3 HRS **M.MARKS: 100**

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

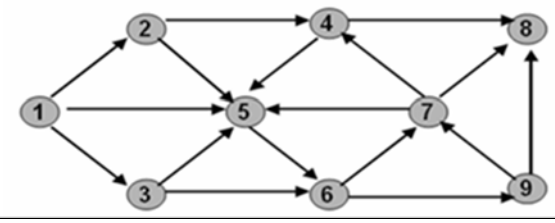
SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Give the difference between Linear and Non-Linear data structures with the help of an example.	02	1
b.	Rank the following typical bounds in increasing order of growth rate: O (log n), $O(n^4)$, O(1)	02	1
c.	Convert the infix expression (A+B) *(C-D) $E*F to postfix. Give the answer without any spaces.	02	2
d.	Explain circular queue. What is the condition if circular queue is full?	02	2
e.	Write advantages of AVL tree over Binary Search Tree (BST)	02	3
f.	Define complete binary tree with suitable example.	02	3
g.	Explain transitive closure of a Graph.	02	4
h.	Write different representations of graphs in the memory.	02	4
i.	How does bubble sort work? Explain	02	5
j.	Give example of one each stable and unstable sorting techniques.	02	5

SECTION B

2. Attempt any *three* of the following: **3 x 10 = 30**

Q no.	Question	Marks	CO
a.	Write a C function to perform insertion and deletion in an array.	10	1
b.	Describe tail recursion and non-tail recursion with suitable example. Also discuss the solution for Tower of Hanoi problem for 4 discs.	10	2
c.	Write an algorithm to construct binary tree and perform all types of traversals on an example.	10	3
d.	Differentiate between DFS and BFS. Draw the breadth First Tree for the above graph considering 1 as source node. 	10	4
e.	Write algorithms of insertion sort. Implement the same on the following numbers; also calculate its time complexity. 13, 16, 10, 11, 4, 12, 6, 7	10	5

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SECTION C

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

Q no.	Question	Marks	CO
a.	Write a C program to insert a node at n^{th} position in singly linked list.	10	1
b.	Define Sparse matrix? Explain how a Sparse matrix can be implemented?	10	1

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

Q no.	Question	Marks	CO
a.	Define queue? What are its applications? Write C function to perform insertion into it.	10	2
b.	Write a C program to implement stack using Array.	10	2

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

Q no.	Question	Marks	CO
a.	If the in order of a binary tree is B,I,D,A,C,G,E,H,F and its post order is I,D,B,G,C H,F,E,A then draw a corresponding binary tree with neat and clear steps from above assumption.	10	3
b.	Explain BST? How it is different from Binary Tree? Draw a BST for following sequence: 52, 62, 72, 58, 25, 45, 82, 15, 85 by showing each steps.	10	3

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

Q no.	Question	Marks	CO
a.	Describe Prim's algorithm and find the cost of minimum spanning tree using Prim's Algorithm on an example.	10	4
b.	Explain Dijikstra algorithm with each and every step. Implement it using an example	10	4

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

Q no.	Question	Marks	CO
a.	Write quick sort algorithm and its analysis. Use Quick sort algorithm to sort 10, 12, 11, 2, 40, 10, 6, 25, 35, and 32. Is it a stable sorting algorithm? Justify.	10	5
b.	Write an algorithm for Merge Sort. Explains with the help of suitable example.	10	5