PAPER ID-311287

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

BTECH
(SEM III) THEORY EXAMINATION 2023-24
BASICS DATA STRUCTURE & ALGORITHMS

TIME: 3HRS **M.MARKS: 70**

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

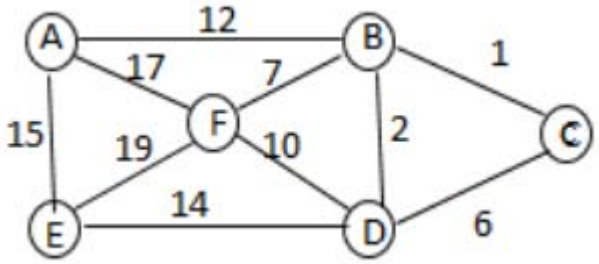
SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

Q no.	Question	Marks	CO
a.	Define Data structure. Describe various types of it.	2	1
b.	What is big oh in asymptotic notation?	2	1
c.	Convert the following arithmetic infix expression into its equivalent prefix expression. Expression: A-B/C+D*E+F	2	2
d.	What do you understand by stable and in place sorting? Explain.	2	3
e.	Define complete binary tree with suitable example.	2	4
f.	Define Threaded binary tree with advantage over binary tree.	2	4
g.	How graphs are represented in memory? Explain with the help of example	2	5

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Explain Sparse Matrix and its representation.	7	1
b.	Define queue. Explain various operations performed on queue with suitable example	7	2
c.	Use quick sort algorithm to sort 15,22,30,10,15,64,1,3,9,2. Is it a stable sorting algorithm? – Justify.	7	3
d.	Define spanning tree. Also construct minimum spanning tree using prim's algorithm for given graph. 	7	4
e.	Insert the following elements in initially empty B-tree of degree 5: 4,12,45,33,25,30,7,1,14,56,26,65,31,38,44	7	5

SECTION C

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

a.	Write a C program to insert a node at starting and particular position of singly linked list with n numbers of nodes.	7	1
b.	Write a C function to perform insertion and deletion in an array.	7	1

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

a.	State Tower of Hanoi problem. Write recursive algorithm to solve it.	7	2
b.	Translate the infix string (a+b^c^d)*(e+f/d) to reverse polish notation using stack by showing every step.	7	2

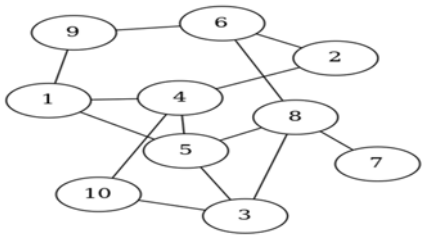
5. Attempt any *one* part of the following: 7 x 1 = 7

a.	Consider a hash table with 9 slots. The hash function is h(k)=kmod9. The collisions are Resolved by chaining. The following 9 keys are inserted in the order 5,28,19,15,10,33,12, 17,10. What are the maximum, minimum and average chain lengths in the hash table.	7	3
b.	How binary search is different from linear search. Perform binary search to find element 30 in the list: 12, 16, 20,27,30,32,40	7	3

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

a.	What is Binary Search Tree? Write the algorithm to delete an element from the Binary Search Tree.	7	4
b.	Draw a binary tree which following traversal with each and every step: In order: DBHEAIF J CG Preorder: ABDEHCFIJG	7	4

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

a.	Write an algorithm for BFS Traversal. Consider the graph given in figure. Perform Breadth first search beginning at vertex 1. List the vertices in which they are visited.  	7	5
b.	Explain Warshal's algorithm with the help of example.	7	5