K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

May / June 2023

B.Tech. (Information Technology)

Examination: SY - Semester III

Course Code: ITC302 and **Course Name:** Data Structures and Analysis **Date:** 27-05-2023

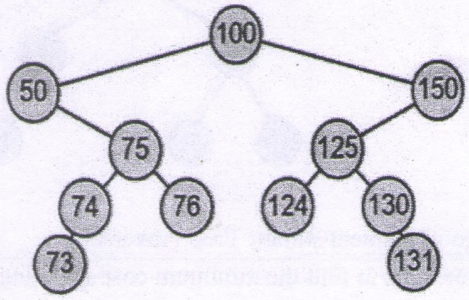
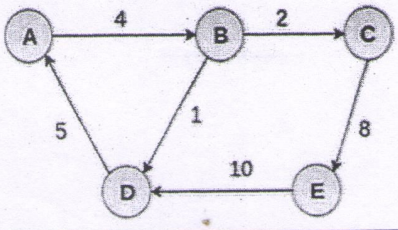
Duration: 2.5 Hours Max. Marks: 60

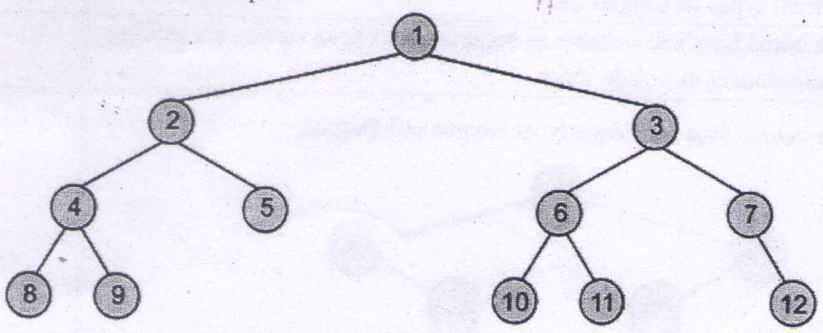
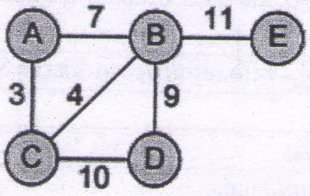
Instructions:

(1) All questions are compulsory.

(2) Draw neat diagrams wherever applicable.

(3) Assume suitable data, if necessary.

Ques. No.	Question	Max. Marks	CO	BT Level
Q1.	**Solve any six questions out of eight:**	**12**		
i)	Describe the necessary characteristics of an algorithm.	2	CO1	U
ii)	Write applications of Stack data structure.	2	CO2	U
iii)	Explain the need of Double Ended Queue.	2	CO2	U
iv)	Explain different types of Linked Lists.	2	CO3	U
v)	Explain the Linked List best suitable to implement a photo viewer for looking at photos continuously in a slide show.	2	CO3	U
vi)	Consider the below Tree and identify its Height and Degree. 	2	CO4	U
vii)	Mention data structures used for BFS and DFS Graph traversal strategies. Explain the need of these strategies.	2	CO5	U
viii)	Explain Divide and Conquer strategy with reference to Merge Sort.	2	CO6	U
Q2.	**Solve any four questions out of six:**	**16**		
i)	Compare static and dynamic data structures.	4	CO1	AN
ii)	Write an algorithm to perform ENQUEUE operation on Queue.	4	CO2	U
iii)	Sketch the process of insertion at the in a Circular Linked List.	4	CO3	A
iv)	Explain Binary Search Trees.	4	CO4	U
v)	Sketch the Adjacency List and Adjacency Matrix for the below Graph: 	4	CO5	A

vi)	Apply Selection Sort on the elements 22, 37, 9, 76, 48, 3 and comment on its time complexity.	4	CO6	A
Q3.	**Solve any two questions out of three:**	**16**		
i)	Apply the Linear and Binary search method for the following list of elements and hence search the element 37. Write an algorithm for the same. Comment on its complexity. 1, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59. Describe the Asymptotic Notation for its Upper and Lower Bound.	8	CO1	AN
ii)	Apply unparenthesized Infix to Postfix conversion algorithm on the expression a + b * c + d / b + a * c + d. Also calculate the rank of the expression.	8	CO2	A
iii)	Apply suitable concepts of linked lists for adding a new player to the game and write an algorithm for the same. (Assume storing only the player ID to the list).	8	CO3	A
Q4.	**Solve any two questions out of three:**	**16**		
i)	Apply the Binary Tree Traversal techniques on the below tree and find: a. Preorder traversal sequence b. Inorder traversal sequence c. Postorder traversal sequence  Also write functions to implement Binary Tree Traversal.	8	CO4	A
ii)	Apply Prim's and Kruskal's algorithms to find the minimum cost spanning tree. Show all intermediate steps.  	8	CO5	A
iii)	Explain Hashing. Apply Division method and Mid Square method to find hash values of the elements 22, 89, 15, 94, 31, 68, 23, 55, 86 considering hash table size = 10. Use suitable methods to resolve collisions, if any.	8	CO6	A

****