K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai
(An Autonomous Institute Affiliated to the University of Mumbai)

End Semester Exam
November – December 2022

B.Tech. (Information Technology)

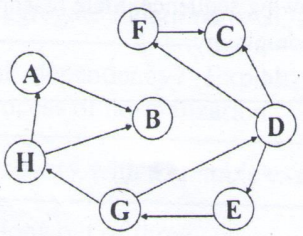
Examination: SY - Semester III

Course Code: ITC302 and **Course Name**: Data Structures and Analysis **Date**: January 30, 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)	What is algorithm? Explain need of algorithm.	2	CO1	U
ii)	Write algorithm for push function of stack data structure.	2	CO2	U
iii)	Compare stack and queue.	2	CO2	U
iv)	Explain singly linked list with suitable application of it.	2	CO3	U
v)	List various applications of stack data structure.	2	CO3	U
vi)	Define sibling nodes, height of tree, subtree, leaf node with suitable tree example.	2	CO4	U
vii)	Explain complete graph with example.	2	CO5	U
viii)	Elaborate Linear Search with example.	2	CO6	U
Q2.	**Solve any four questions out of six:**	**16**		
i)	Compare graph and tree data structures.	4	CO1	AN
ii)	Write an algorithm for insert and delete function of queue.	4	CO2	U
iii)	Elaborate graph representation methods with suitable examples.	4	CO3	A
iv)	Explain Binary Search tree.	4	CO4	U
v)	Explain binary search technique with example. Comment on the complexity.	4	CO5	A
vi)	Write any four Hashing functions.	4	CO6	A
Q3.	**Solve any two questions out of three:**	**16**		
i)	Write algorithm steps for BFS traversal and apply BFS traversal and find traversal sequence for following graph considering node D as the source. Show all steps. 	8	CO1	AN

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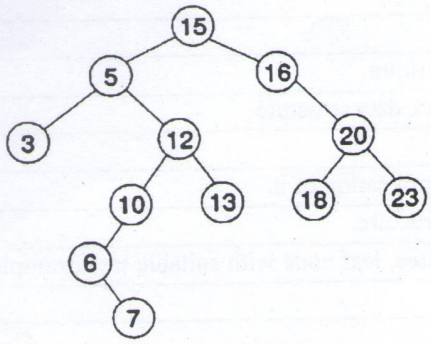
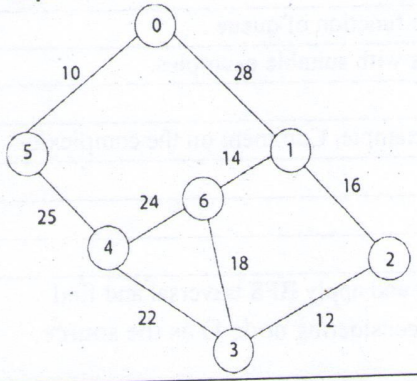
ii)	Apply Infix to Postfix conversion algorithm on the expression given as: **(A + B) * C - (D - E) * (F + G)**. Find postfix string of given infix expression.	8	CO2	A

iii)	Write algorithms to Create, Display and Insert the following record of students in a Singly Linked List.
	struct student
	{
	int rno;
	int sname[20];
	int marks[3];
	};
		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  	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)	Select any two suitable methods to sort following sequence. State reason of selecting the methods and comment on the complexity. Given sequence is: 10, 14, 27, 33, 35, 19, 42, 44.	8	CO6	A

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