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

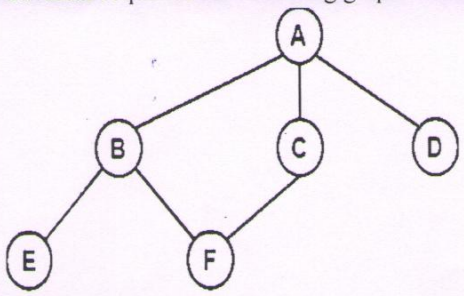
End Semester Exam
November – December 2021

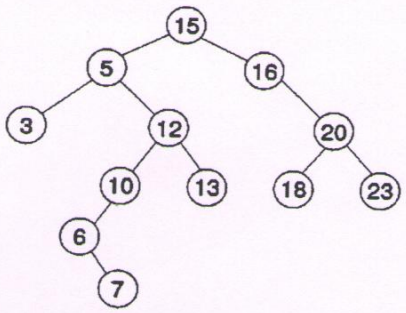
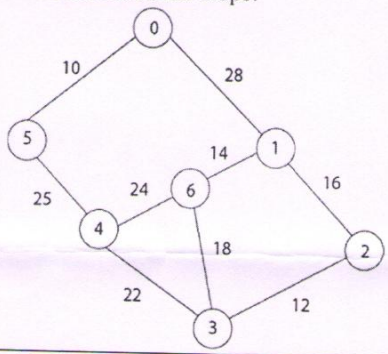
B.Tech. (Information Technology)

Examination: SY - Semester III
Course Code: 1UITC302 and Course Name: Data Structures and Analysis
Duration: 03 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 threaded binary 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. 	8	CO1	AN

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)	Create and implement singly linked list dynamic data structure to enter student data using following structure. Write algorithms to Create, Display and Insert beginning functions on entered data items. 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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