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

~~Nov - Dec 2024~~ Jan / Feb 2025
Program: B.Tech Scheme: II B
Regular Examination: SY Semester: III
Course Code: ITC302 and Course Name: Data Structures and Analysis
Date of Exam: 31-01-25 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1)All questions are compulsory.
(2)Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

Q. No.	Question	Max. Marks	CO	BT level
Q 1	**Solve any two questions out of three: (05 marks each)**	**10**		
a)	Explain the characteristics of algorithm in detail.		1	U
b)	Apply the concept of Stack as ADT by explaining via diagram.		2	A
c)	Analyze at least 5 Application of Linked list in brief.		3	A
Q 2	**Solve any two questions out of three: (05 marks each)**	**10**		
a)	Explain Following Tree terminology (Draw Tree Structured if required to explain) 1. Path 2. Level of tree 3. Binary Tree 4. Height of Tree 5. In degree		4	U
b)	Utilize the concept of following graph terminologies using Graph 1. Closed Graph 2. Cycle 3. Isolated vertex 4. Directed Graph		5	A
c)	Construct binary search Tree with Algorithm and example.		6	A
Q.3	**Solve any two questions out of three. (10 marks each)**	**20**		
a)	Explain the all the types of Data structures come under Linear and non Linear category. Explain along with diagrams and operations.		1	U
b)	Write an algorithm and program to implement Dqueue. Analyze the utilization in real time of Dqueue based on its algorithm.		2	U,A

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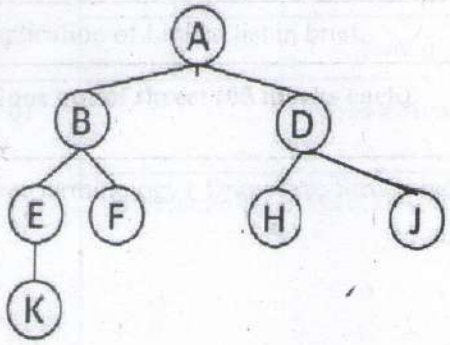
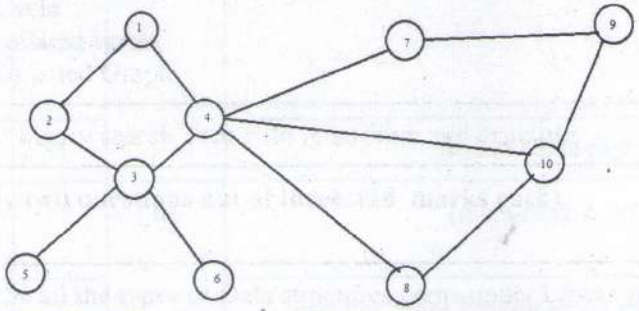
c)	Consider an information management system that maintains data of students (fields - Roll No and Name). Apply suitable concepts of linked lists and write an algorithm to insert a data record at the end of this list.		3	A
Q.4	**Solve any two questions out of three. (10 marks each)**	**20**		
a)	Explain the concept of Binary search Tree. Apply following traversal techniques on given graph and write down sequence. 1. In-order 2. Pre-order 3. Post-order 		4	U,A
b)	Travel the Given Graph Using BFS (show steps by Applying Queue) and DFS (show steps by Applying Stack) 		5	A
c)	Consider a hash table of size = 10. Using the hashing, insert the keys 72, 27, 36, 24, 63, 81, 92, and 101 into the table. By applying HASH Function: h = (k mod 10) + (k mod 8) Where k = Elements Given		6	A