

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

~~Jan. - Feb. Nov - Dec 2026~~  
 Program: B.Tech Scheme: III  
**Supplementary** ~~Regular~~ Examination: SY Semester: III  
 Course Code: ITC302 and Course Name: Data Structures and Analysis  
 Date of Exam: ~~31/1/26~~ 31/1/26 Duration: 10:30 am to 01:00 pm 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
<b>Q 1</b>	<b>Solve any two questions out of three: (05 marks each)</b>	<b>10</b>		
a)	Explain the Linear and Non-linear Data Structures detail.		CO1	U
b)	Apply the concept of Stack as ADT by explaining via diagram.		CO2	A
c)	Analyze at least 5 Application of Linked list in brief.		CO3	A
<b>Q 2</b>	<b>Solve any two questions out of three: (05 marks each)</b>	<b>10</b>		
a)	Explain Any 5 Tree terminology with Diagram.		CO4	U
b)	illustrate and explain graph terminologies, Closed Graph, Cycle, weighted graph, Directed Graph		CO5	A
c)	Implement binary search algorithm, explain with Example		CO6	A
<b>Q.3</b>	<b>Solve any two questions out of three. (10 marks each)</b>	<b>20</b>		
a)	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: $h = (k \text{ mod } 10) + (k \text{ mod } 8)$ Where $k = \text{Elements Given}$		CO6	A
b)	Write an algorithm and program to implement Dqueue. Analyze the utilization in real time of Dqueue based on its algorithm.		CO2	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.	CO3	A	
<b>Q.4</b>	<b>Solve any two questions out of three. (10 marks each)</b>	20		
a)	Apply following traversal techniques on given graph and write down sequence. 1. In-order 2. Pre-order 3. Post-order		CO4	A
<pre> graph TD     50((50)) --&gt; 17((17))     50 --&gt; 72((72))     17 --&gt; 12((12))     17 --&gt; 23((23))     12 --&gt; 9((9))     12 --&gt; 14((14))     23 --&gt; 19((19))     72 --&gt; 54((54))     72 --&gt; 76((76))     54 --&gt; 67((67))         </pre>			CO5	A
b)	Travel the Given Graph Using BFS (show steps by Applying Queue ) and DFS (show steps by Applying Stack )	<pre> graph LR     1((1)) --- 2((2))     1 --- 4((4))     2 --- 3((3))     3 --- 4     3 --- 5((5))     3 --- 6((6))     4 --- 7((7))     4 --- 8((8))     4 --- 10((10))     7 --- 9((9))     8 --- 10     9 --- 10         </pre>		
c)	Implement Reversal of a String using Stack? Explain Time and Space Complexities.	CO2	A	