

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

Subject Code: AIC303

Subject Name: Data Structures

Date: 8/12/2022

Nov – Dec 2022

(B.Tech) Program: Artificial Intelligence and Data Science

Examination: SY Semester: III

Course Code: AIC303 and Course Name: Data Structure

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.

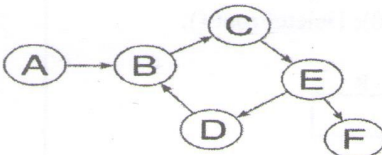
		Max. Marks	CO	BT level						
Q 1	Solve any six questions out of eight:	12								
i)	Define ADT. List the various types of Primitive and Non-Primitive Data structures	2	CO1	R						
ii)	After performing these sets of operations, what will be the contents of the double ended queue? InsertFront (16); InsertRear (33); InsertRear (40); DeleteFront (); InsertRear (25); <div style="display: flex; justify-content: space-between; width: 100px;"> F R </div> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>							2	CO4	U
iii)	Given an array of type integer, A [] = {69, 78, 63, 98, 67, 75, 66, 90, 81}. Calculate address of A [5] if base address is 1600.	2	CO2	U						
iv)	Insert the keys 8, 14, 28, 52, 36, 56, and 25 in a <i>chained</i> hash table of 10 memory locations	2	CO5	A						
v)	Represent the following Polynomial using a Singly Linked List: $10x^4 + 36x^2 + 91x + 11$	2	CO6	A						
vi)	What is a balanced tree? Why do we need it? When do we say an AVL tree is balanced?	2	CO1	U						
vii)	Represent the expression using a tree structure $\left(\frac{x+6}{8}\right) - (4x + 2)$	2	CO3	A						
viii)	Define Graph. For the directed graph given below, what are the in degrees and out degrees for nodes 1, 4 and 5. <div style="text-align: center;"> </div>	2	CO1	U						

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

Subject Code: AIC303

Subject Name: Data Structures

Date: 8/12/2022

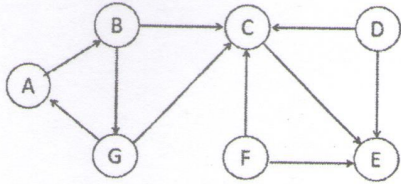
Q.2	Solve any four questions out of six.	16		
i)	Write short notes on primitive data structures	4	CO1	U
ii)	Evaluate the following postfix expression using stack. Show the steps and contents on the stack at every step. $15 - \frac{(6*5)-3}{9}$	4	CO6	A
iii)	Define circular queue. Assume a circular queue with a capacity 6, currently having the elements 50 and 70 at locations 2 and 3 respectively. Show with example, the queue full and queue empty conditions by performing necessary operations.	4	CO4	A
iv)	Write the algorithm to inset at end, delete at end and delete Kth element of an array	4	CO2	R
v)	Give adjacency matrix and adjacency list for the following graph 	4	CO3	U
vi)	An array contains the elements – 8,13,17,26,44,56,88,97. Using binary search algorithm, trace the steps followed to find number 56. At each step, show the contents of low, high & mid array after each iteration	4	CO5	A
Q.3	Solve any two questions out of three.	16		
i)	Write the algorithms for enqueue, dequeue and traversal operations performed on a queue using array.	8	CO4	R
ii)	Briefly explain the following two applications of stack a) recursion b) parenthesis checker	8	CO6	A
iii)	Write C functions (only function) for performing insertion operation and deletion operation at the beginning of a singly linked list. Draw suitable diagrams.	8	CO2	A

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

Subject Code: AIC303

Subject Name: Data Structures

Date: 8/12/2022

Q.4	Solve any two questions out of three.	16		
i)	Create a AVL tree for the sequence: 16,25,9,11,36,54,8163,72. Show the tree after each insertion with balance factors.	8	CO3	A
ii)	Apply BFS algorithm to the graph given below. Show the steps clearly. Construct the tree obtained after BFS. Starting node is A. 	8	CO4	A
iii)	Populate the hash table using Division method for the values given below. Use linear probing to resolve collisions. The size of the list=10 34, 45, 23, 56, 29, 37, 83, 24, 63, 94	8	CO5	A
