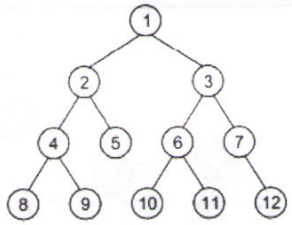
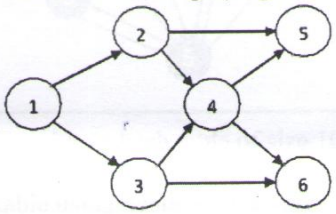
K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)
End Semester Exam
~~April - May 20~~ / Nov – Dec 2021
(B.Tech/~~M.Tech~~.) Program: AI&DS
Examination: ~~FY~~/SY/~~TY/LY~~ Semester: ~~I/II~~/III/~~IV/V/VI/VII/VIII~~
Course Code: **1UAIC303** and Course Name: **Data Structure**
Duration: **03 Hours**
Max. Marks: **60**

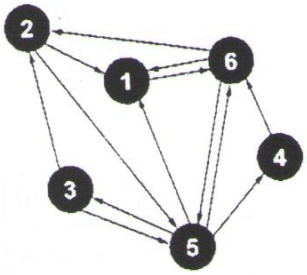
Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight**	**12**		
i)	What is meant by a) traversing and b) searching a data structure?	**2**	CO1	1
ii)	Consider a stack which is allotted N=8 memory cells. Let the contents of the stack be STACK: P, Q, R, S, T, --, --, --. P is the first element and T is the last element. a) What will the contents of the stack be after the following operations? POP() , PUSH (Z) b) When will the stack overflow?	**2**	CO2	2
iii)	what does the following code do? a) char * p; p= malloc(sizeof(char)) b) char * p; p=calloc(20,sizeof(char))	**2**	CO3	2
iv)	construct the expression tree for A+B*C+D*E	**2**	CO4	3
v)	Differentiate between directed and undirected graph	**2**	CO5	2
vi)	What are the properties of a good hash function?	**2**	CO6	1
vii)	Write the pseudocode for pop()	**2**	CO2	3
viii)	What is balance factor of AVL tree? Demonstrate with example of a tree with 4 nodes.	**2**	CO4	3

Q.2	**Solve any four questions out of six.**	**16**		
i)	List the applications of a queue. Differentiate between enqueue, dequeue and deque.	**4**	CO1	2
ii)	what do you understand by the following terms a) BST b) Hash c) Collision d) probing	**4**	CO2	2

iii)	What is the output of the following program segment/
	struct node
	{
	int val;
	struct node *next;
	} x, y, z, *p;
	x.val = 10;
	y.val = 20;
	z.val = 30;
	x.next = &y;
	y.next = &z, z.next = NULL;
	p = x.next;
	while (p != NULL) {
	printf ("%d \ n ", p->val);
	p = p->next;
	}
		4	CO3	4

iv)	What is preorder traversal of the given tree? 	**4**	CO4	3
v)	Find DFS for the graph given 	**4**	CO5	3
vi)	Hash the following data in a table of size 10 using division method. 52, 92, 14, 37, 53, 77, 23, 55, 10,64	**4**	CO6	3

Q.3	**Solve any two questions out of three.**	**16**		
i)	Convert the given infix expression to postfix expression using stack (A*B-(C-D))/F. Show the stack and the resulting expression at every step	**8**	CO2	3
ii)	write short notes about priority queues and double ended queues	**8**	CO1/ CO2	2
iii)	a) For a linked list, what will be the output for the following algorithm? Step 1: [INITIALIZE] SET COUNT =0 Step 2: [INITIALIZE] SET PTR = START Step 3: Repeat Steps 4 and 5 while PTR != NULL Step 4: SET COUNT =COUNT+ 1 Step 5: SET VAL=VAL*COUNT Step 5: SET PTR = PTR → NEXT [END OF LOOP] Step 6: Write COUNT, VAL Step 7: EXIT b) Write the algorithm to insert a node after a node that has the value BIG	**4+4**	CO3	4 3
Q.4	**Solve any two questions out of three.**	**16**		
i)	Construct the AVL tree for the following data by inserting each of the following data item one at a time: 10, 20, 15, 12, 25, 30, 14, 22, 35, 40. Show the tree after each insertion with balance factors.	**8**	CO4	3
ii)	Analyse the graph given below and find the adjacency matrix 	**8**	CO5	4
iii)	Consider a hash table of size 10. Using linear probing, insert the keys 72, 27, 36, 24, 63, 81, 92, and 101 into the table using quadratic hashing.c1=1 c2=2. Let the size of hash table be 10	**8**	CO6	3