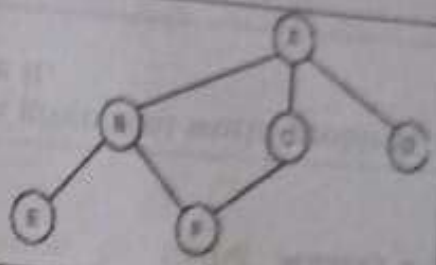
	Level	Nos.	
Analysis algorithm using time and space complexity	L1,L4	Q1a,b,c Q2a,c	10
Understanding and effectively use ADT, Java collection, Sorting and Searching	L1,L3,L4	Q3a,b,c, Q4a,b,c Q10a,b	16
Applying linked list, Stack, Queue on different problem solving	L1,L2,L3,L4	Q5a,b,c Q6a,b,c Q7a,b,c Q8a,b Q10c	24
Applying priority queue, Tree, Graph on problem solving	L3,L4	Q8c Q9a,b,c	8
Understanding algorithm design techniques	L1	Q2b	2
Applying design technique on problem solving			

*Bloom's taxonomy levels: Knowledge (L1), Comprehension (L2), Application (L3), Analysis (L4), Evaluation (L5), Creation (L6)

Answer all questions. Each question carries equal mark.

1.	(a)	If f(n)=3n+2 and g(n)=n, then show that **$f(n)=\Omega(g(n))$** .	2
	(b)	Write a program to find all permutations of an integer list recursively.	2
	(c)	Write a algorithm to explain **Tower of Hanoi** problem.	2
2.	(a)	**$T(n)=16T(n/4)+n$** , Solve this equation by using **Master's theorem**.	2
	(b)	You have to design an algorithm for a given real world problem, then what are the approaches to solve it.	2

	(c)	Write a program to create an array list of integer type and perform display the list operation on it.	2
3.	(a)	Write a java program to convert a decimal to binary equivalent using stack (Stack Collection)	2
	(b)	Write a program to create a hash map insert some element into it and display it.	2
	(c)	Explain **Heapsort** with an example.	2
4.	(a)	Given an array of n-element print duplicate element in array.	2
	(b)	Write a program for given an unsorted list of n elements, find the first element which is repeated.	2
	(c)	Write a program for given an array of integers, find a triplet whose sum=0.	2
5.	(a)	Explain search operation in single linked list.	2
	(b)	Write a program to check if is there a loop present or not in a linked list.	2
	(c)	Write a program to reverse of a linked list.	2
6.	(a)	Evaluate the given postfix expression **10 5 + 60 6 / * 8 -**	2
	(b)	Write a program to implement stack using linked list.	2
	(c)	Write a function to reverse the stack.	2
7.	(a)	Expláin insertion operation in **circular linked list.**	2
	(b)	Write a program to check if the parenthesis is balanced or not.	2
	(c)	Implement queue using stack.	2
8.	(a)	Write a program to reverse a queue using stack.	2
	(b)	There are five persons (Samendu,Tushar,Subham,Arnab and Ratul) standing in a queue waiting to be executed. The counting begins at the front of the queue. In each step k number of people are removed and again added one by one from the queue.Then the next person is executed. The execution proceeds around the circle until only the last person remains	2

		who will be winner. Find that position where you want to stand and become winner. Analyse it's **time complexity** if number of person=n.	
	(c)	Find **DFS** (Depth first search) order for given graph. NOTE: A is starting node. 	2
9.	(a)	Write a program to print all the paths from root to the leaf for a binary tree.	2
	(b)	State the difference between **Inorder** ,**Preorder** and **Postorder** traversal of a tree.	2
	(c)	Construct a binary search tree for given values **50,15,62,5,20,58,91,3,8,37,60,24**.	2
10.	(a)	**9,6,5,0,8,2,7,1,3** Sort these elements by using **Bubble Sort** and count the number of swaps.	2
	(b)	In a array of positive integer, write a program to find a pair whose absolute value of difference is equal to a given value.	2
	(c)	In a **DANZA** event, there is possibility that a celebrity had visited it. A celebrity is a person who doesn't know anyone in the event and everyone in the event knows celebrity. You want to find celebrity in the event. You are allowed to ask only one question **DoYouKnow(X,Y)**, which means to X you can ask only one question that Do You Know Y. X will answer the question as Yes or No. Write the program for this question.	2
		"End of Questions"	