Course Code:	CST252	

Third Semester BE (Computer Science and Engineering) Examination

Data Structure and Algorithm

Time: 2 Hours]		[Max. Marks: 40

Instructions to Candidates:
1. All questions are compulsory.
2. Stepwise explanation will be appreciated

Question		Description of Question	Marks	CO

1	(a)	Consider a structure Array is declared as:
		struct Array
		{
		    int *A;
		    int length;
		    int size;
		}
		"A" stores array of integers, "length" stores number of elements in the array and "size" stores memory allocated to array. Write a C function to delete all the duplicate entries from the above specified array.
			3	CO1

	(b)	Consider array stores marks of 30 students in 4 subjects. Row represents subjects and Columns represents students. Base Address of the array is 2500. Lower bound for row and column is 0.
		    a. Compute the address of marks[3][5] in row major order.
		    b. Compute the address of marks[2][20] in column major order.
			3	CO1

2	(a)	Consider a Stack ADT is already created. Write a function to check whether the parentheses are balance or not. Balanced Parentheses : (( ) ( ) (( ))) Unbalanced Parentheses: (( ) ( ) (( ))	3	CO1, CO2
	(b)	Design a C program for storing **two** queues stored in one array. Queue1 grows from left to right and Queue2 grows from right to left. Properly specify the overflow and underflow conditions for both the queues.	4	CO2
3	(a)	Consider an integer linked list is already created. Write a C function to delete all the negative numbers from the linked list.	4	CO2
	(b)	Write an algorithm to interchange the kth and the $(k+1)^{th}$ node of a doubly linked list. Ensure that the nodes are swapped and not just values. Note: k^{th} node cannot be the last node.	3	CO2

4	(a)	A company maintains an array of employees which stores employee name, employee id and salary. The array is always kept in **sorted order according to employee ID**. Design a C function which will search and display the details of a particular employee when the employee ID is specified.	3	CO3
	(b)	Consider a hash table with size = 11. Using double hashing, insert the keys 27, 72, 63, 42, 44, 36, 38 and 101 into the table. Take h1 = k mod 10 and h2 = k mod 8.	3	CO3
5	(a)	Construct a B+ tree of order 5. The numbers are inserted in the sequence given below: 80, 40, 15, 25, 30, 90, 35, 50, 60, 70	3	CO4
	(b)	Consider a Binary tree is already created. Write a C function to check whether the root node is balanced or not.	4	CO4
6	(a)	Consider four cities: (1) New Delhi, (2) Mumbai, (3) Chennai, and (4) Bangalore, and a list of flights that connect these cities as shown in the following table. Use the given information to construct a graph. Using Dijkstra's algorithm, find the shortest path to each node from New Delhi	5	CO4
	(b)	Explain the following terms: a) Complete Graph b) Strongly connected directed graph	2	CO4

Table inside 6(a):

Flight No.	Origin	Destination	Cost
101	1	4	5
102	4	1	4
103	1	2	2
104	1	3	6
105	3	1	4
106	2	3	3
107	3	4	1
108	4	3	12