

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), November 2016

B.Tech. and B.Tech. + M.Tech. In Computer Science and Engineering, Semester III

Roll No.....

CSE301: DATA STRUCTURES

Time: 03 hours

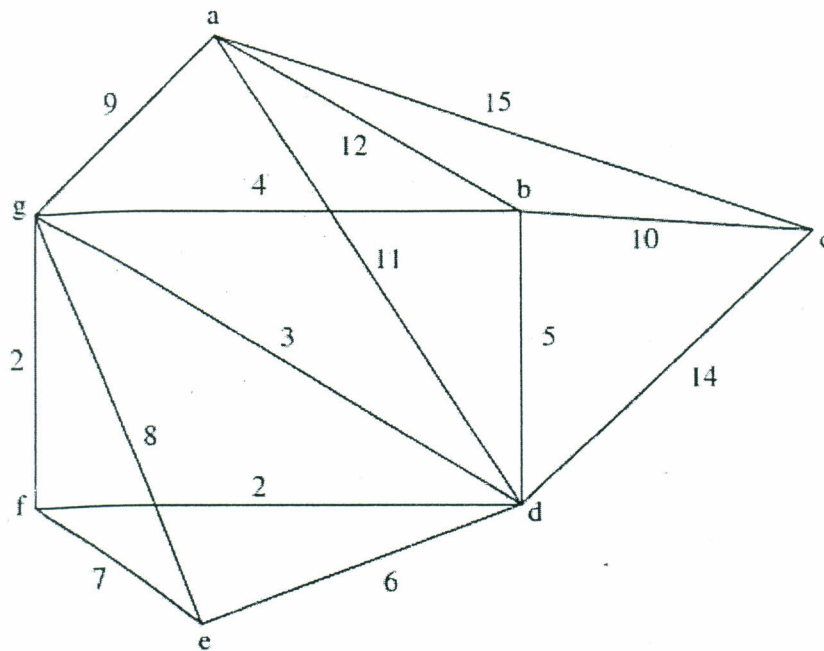
Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

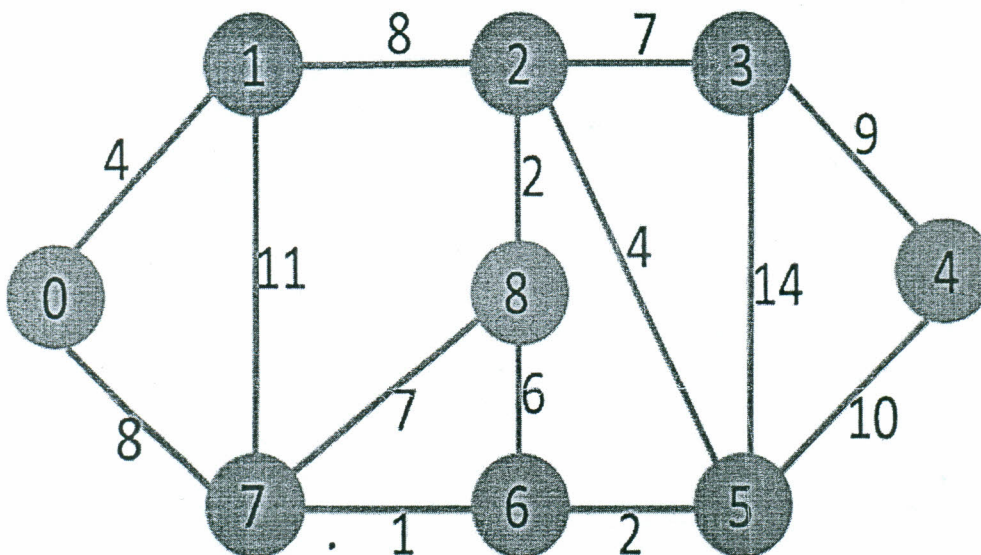
Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The result of evaluating the postfix expression 6, 3, 7, +, *, 4, 12, 3, /, +, * is (A) 600. (B) 480. (C) 650. (D) 588.	
ii.	One way to eliminate all clustering is (A) Quadratic rehash (B) Rehashing (C) Hashing (D) Double hashing	
iii.	The worst case of quick sort has order (A) $O(n^2)$ (B) $O(n)$ (C) $O(n \log_2 n)$ (D) $O(\log_2 n)$	
iv.	Which of the following statements about binary trees is NOT true? A. Every node has at most two children. B. Every non-empty tree has exactly one root node. C. Every binary tree has at least one node. D. Every non-root node has exactly one parent.	
v.	Let G be connected undirected graph of 100 vertices and 300 edges. The weight of a minimum spanning tree of G is 500. When the weight of each edge of G is increased by five, the weight of a minimum spanning tree becomes _____. A 1000 B 1995 C 2000 D 995	
vi.	You have a sorted array and now you are given an element to be placed in that array so that the resulting array is also sorted, the best sorting technique in this case is A. Merge Sort B. Quick Sort C. Insertion Sort D. Bubble Sort	
vii.	If every node u in G is adjacent to every other node v in G, A graph is said to be A. isolated	

	B. complete C. finite D. strongly connected.	
viii.	Given the following input (4322, 1334, 1471, 9679, 1989, 6171, 6173, 4199) and the hash function $x \bmod 10$, which of the following statements are true? i. 9679, 1989, 4199 hash to the same value ii. 1471, 6171 has to the same value iii. All elements hash to the same value iv. Each element hashes to a different value A i only B ii only C i and ii only D iii or iv	
ix.	Dijkstra's algorithm : A. Has greedy approach to compute single source shortest paths to all other vertices B. Has both greedy and Dynamic approach to find all shortest paths C. Has greedy approach to find all shortest paths D. Has both greedy and dynamic approach to compute single source shortest paths to all other vertices.	
x.	There are several factors that affect the efficiency of lookup operations in a hash table. Which of the following is not one of those factors? A. Number of elements stored in the hash table B. Size of elements stored in the hash table C. Number of buckets in the hash table D. Quality of the hash function E. All of the above factors affect the efficiency of hash table lookups	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	If you are using C language to implement the heterogeneous linked list, what pointer type will you use?	
ii.	What do you mean by complexity of an algorithm? Explain the meaning of worst case analysis and best case analysis with an example.	
iii.	What is the maximum possible total number of nodes in a Full binary tree having 4 levels?	
iv.	Which sorting algorithm is best if the list is already sorted? Why?	
Q.3A	What are circular queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays.	05
Q.3B	Write an algorithm for deleting after a given node and before a given node in doubly link list having N elements?	05
	OR	
Q.3B	What is minimum spanning tree? Execute Prim's and Kruskal's algorithm to find the minimum spanning tree of the following graph.	05

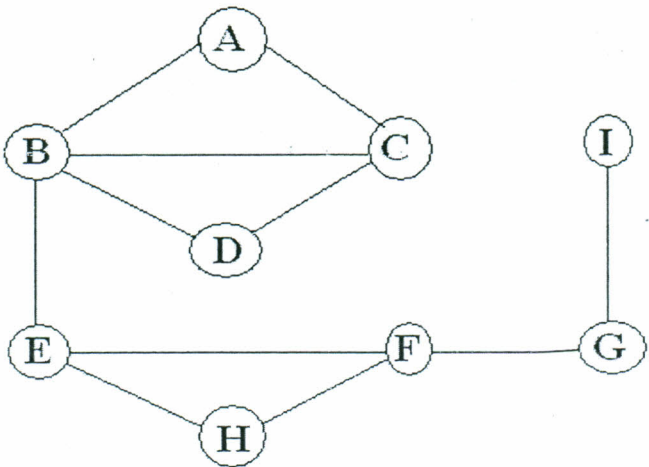


Q.4A	Convert the given expression in to Prefix and Postfix expressions using stack. $Q = [(A + B)/(C + D) - (E / F)] + (G + H) / I$	05
Q.4B	Draw an image of this hash table after the keys 5, 28, 19, 15, 16, 44, 88, 12, 23, 20, 33, 12, 17, and 10 have been inserted (in that particular order). Use the hash function $h(k) = k \bmod 9$, and use chaining to resolve collisions.	05
OR		
Q.4B	Sort the following sequence of keys using Selection sort. 66, 77, 11, 88, 99, 22, 33, 44, 55, 30 Also write time complexity of the selection sort algorithm.	05

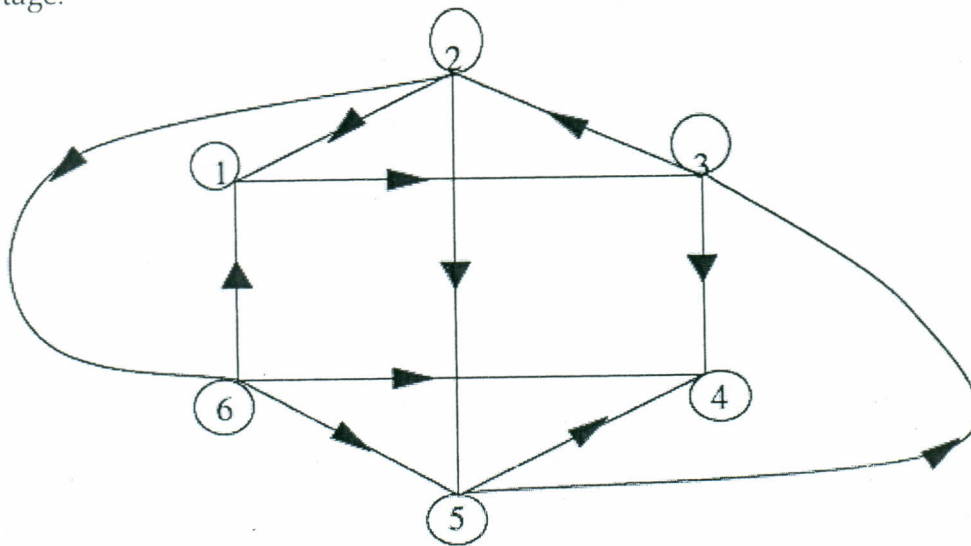
Q.5A Use Dijkstra algorithm to find the shortest path from all nodes to all nodes. 05



Q.5B Write down the algorithm of quick sort. Sort the following list using Quick Sort technique. 05

	20, 12, 25, 6, 10, 15, 13, 45, 89 Also write time complexity of quick sort of all cases.	
	OR	
Q.5B	Give the adjacency matrix and adjacency list of the following graphs. 	05
Q.6A	Four men want to cross a bridge. They all begin on the same side. It is night and they have only one flashlight with them. At most two men can cross the bridge at a time and any party, who crosses, either one or two people, must have the flashlight with them. The flashlight must be walked back and forth: it cannot be thrown, etc. Each man walks at a different speed. A pair must walk together at the speed of the slower man. Man 1 need 1 minute to cross the bridge, man 2 needs 2 minutes, man 3 needs 5 minutes, and man 4 needs 10 minutes. For example, if man 1 and man 3 walk across together, they need 5 minutes. How can all four men cross the bridge in 17 minutes?	05
Q.6B	Given the following Inorder and preorder traversal reconstruct a binary tree Inorder sequence - D, G, B, H, E, A, F, I, C Preorder sequence - A, B, D, G, E, H, C, F, I Also find its Postorder.	05
Q.7A	Write an algorithm to test whether a Binary Tree is a Binary Search Tree.	05
Q.7B	Construct binary search tree for the following data 1, 7, 6, 2, 11, 5, 10, 13, 12, 20, 16, 24, 3, 4, 18, 19, 14, 25 Find its Inorder, preorder and Postorder traversal Define Hashing. How do collisions happen during hashing? Explain the different techniques resolving of collision.	10
	OR	
Q.7B	Why indexing is used? Consider a hash table with size =20. Using double hashing insert the keys 35, 54, 69, 44, 52, 17, 84, 76, 45, 58, 43, 59, 72, 163, 174 and 121 into the table Take $h_1 = K \bmod 12$ and $h_2 = K \bmod 7$ Also write time complexity of both algorithms.	10
Q.8A	Sort the following sequence of keys using merge sort. 66, 77, 11, 88, 99, 22, 33, 44, 55 Also write all cases complexity of insertion sort?	05
Q.8B	Show the result of running BFS and DFS on a directed graph given below using vertex 1 as source. Show the status of the data structure used at each	05

stage.



Q.9A	Sort the following list using Heap Sort 66, 33, 40, 20, 50, 88, 60, 11, 77, 30, 45, 65.	05
Q.9B	Draw an AVL tree for the following values inserted in this order. Illustrate each rotation that occurs: 65, 13, 16, 52, 28, 11, 20, 14, 87, 50, 26, 8, 4 Give definition of a) Complete binary tree b) Height of tree C) Strictly Binary Tree	10