

JK LakshmiPat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), November-December 2014
B. Tech. and B.Tech+MBA in Computer Science and Engineering, Semester III

Roll No.....

CSE301: DATA STRUCTURES

Time: 03 hours

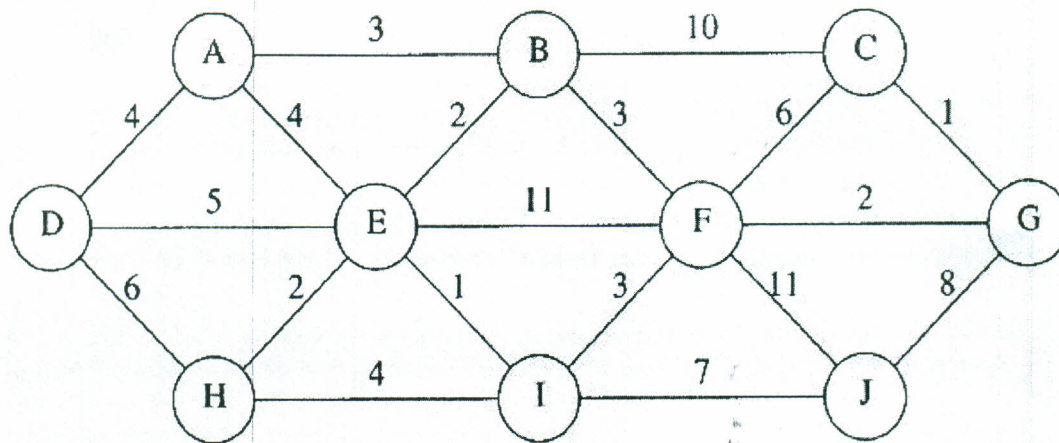
Max. Marks: 100

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.	A machine needs a minimum of 100 sec to sort 1000 names by quick sort. The minimum time needed to sort 100 names will be approximately? A. 50.2 sec B. 6.7 sec C. 72.7 sec D. 11.2 sec	
ii.	The way a card game player arranges his cards as he picks them up one by one, is an example of? A. bubble sort B. selection sort C. insertion sort D. merge sort	
iii.	The minimum no. of spanning trees in a connected graph with 'n' nodes is * A. n-1 B. n/2 C. 2 D. 1	
iv.	The number of interchanges required to sort 5, 1, 6, 2 4 in ascending order using Bubble Sort is (A) 6 (B) 5 (C) 7 (D) 8	
v.	Which of the following sorting algorithm is of divide-and-conquer type? a. Bubble sort b. Insertion sort c. Quick sort d. All of above	
vi.	A graph is a collection of nodes, called And line segments called arcs or That connects pair of nodes. A) edges, vertices B) vertices, edges C) vertices, paths D) graph node, edges	
vii.	In a circular queue the value of r will be A) $r=r+1$ B) $r=(r+1)\% [\text{QUEUE_SIZE} - 1]$ C) $r=(r+1)\% \text{ QUEUE_SIZE}$ D) $r=(r-1)\% \text{ QUEUE_SIZE}$	

viii.	What algorithm technique is used in the implementation of Kruskal solution for the MST? A. Greedy Technique B. Divide-and-Conquer Technique C. Dynamic Programming Technique D. The algorithm combines more than one of the above techniques	
ix.	Merging 4 sorted files containing 50, 10, 25 and 15 records will take____time (A) O (100) (B) O (200) (C) O (175) (D) O (125)	
x.	Which of the following is efficient in traversing a given graph by breadth first search? A. List B. Set C. Stack D. Queue	
Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
i.	A linear array A is given with lower bound as 1. If address of A[25] is 375 and A[30] is 390, then find address of A[16].	
ii.	Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes?	
iii.	What is the maximum possible number of nodes in a binary tree at level 6?	
iv.	Which sorting algorithm is best if the list is already sorted? Why?	
Q.3A	Draw a picture of the directed graph specified below: $G = (V, E)$ $V(G) = \{1, 2, 3, 4, 5, 6\}$ $E(G) = \{(1,2), (2,3), (3,4), (5,1), (5,6), (2,6), (1,6), (4,6), (2,4)\}$ Obtain the following for the above graph: (i) Adjacency matrix. (ii) Reachability matrix. (Path Matrix)	05
Q.3B	A Binary tree has 12 nodes. The in-order and preorder traversals of the tree yields the following sequence of nodes: Preorder : G, B, Q, A, C, K, F, P, D, E, R, H In order: Q, B, K, C, F, A, G, P, E, D, H, R Draw the tree. Explain your algorithm.	05
OR		
Q.3B	What is the difference between Prim's algorithm and Kruskal's algorithm for finding the minimum-spanning tree of a graph? Execute both Prim's and Kruskal's algorithms on the following graph	05



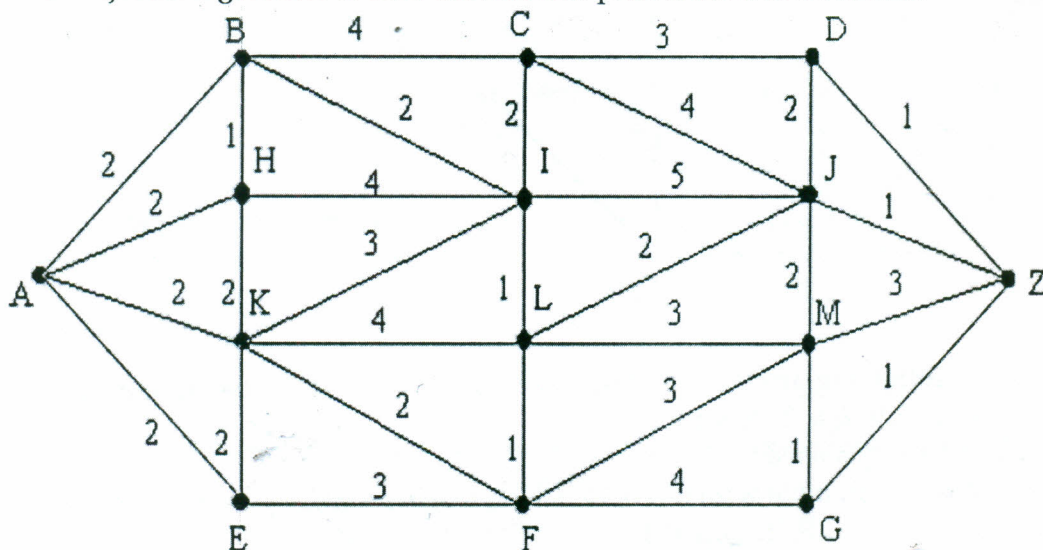
Q.4A Show the various passes of bubble sort on an unsorted list
11, 15, 2, 13, 6, 9 05

Q.4B Draw the 11 item hash table resulting from hashing the keys:
12, 44, 13, 88, 23, 94, 11, 39, 20, 16 and 5
Using the hash function $h(i) = (2i+5) \bmod 11$. 05

OR

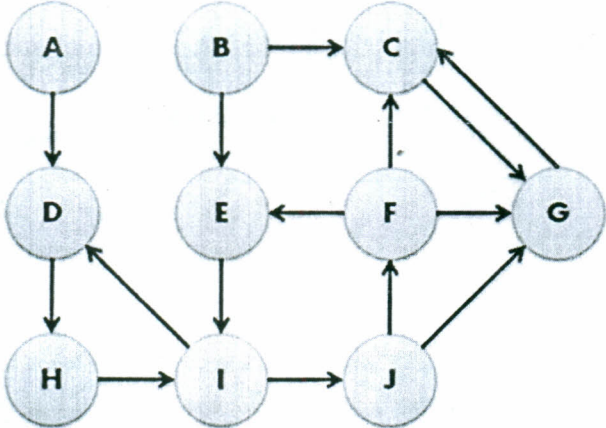
Q.4B Here is an array of ten integers:
5, 3, 8, 9, 1, 7, 0, 2, 6, 4,
Sort them using insertion sort (sorting from smallest to largest). 05

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



Q.5B Make a BST for the following sequence of numbers.
45,32,90,34,68,72,15,24,30,66,11,50,10
Traverse the BST created in Pre-order, In order and Post order. 05

OR

Q.5B	What do you mean by hashing? Explain any five popular hash functions	05
Q.6A	For every 2 balloons you are able to shoot, one new balloon is inserted in the board. So, if there were 20 balloons, after you shoot the first 2, there are 19 on the board. After you shoot the next 2, there are 18 on the board. How many balloons do you shoot before the board is empty?	05
Q.6B	Convert the following infix expressions to postfix notation (i) $A + ((B + C) * (D + E) + F / G)$ (ii) $A \uparrow B \uparrow C * D$	05
Q.7A	Write a C program to perform Quick sort for 15 input numbers? Also write its complexity?	05
Q.7B	Sort the following list using Heap Sort (Min Heap & Descending order) 73, 145, 47, 20, 50, 90, 60, 11, 77, 30, 45, 65.	10
OR		
Q.7B	Write an algorithm for binary search. What are the conditions under which sequential search of a list is preferred over binary search?	10
Q.8A	Insert the following sequence of elements into an AVL tree, starting with an empty tree: 14, 17, 11, 7, 53, 4, 13, 12, 25, 30 and 8. Delete 30 in the AVL tree that you got.	05
Q.8B	Perform BFS and DFS starting from the node A?	05
		
Q.9A	Sort the following array of elements using Insertion sort (show all the passes) {3, 1, 4, 1, 5, 9, 2, 6, 5, 3, 5, 8}	05
Q.9B	Why indexing is used? Consider a hash table with size = 11. Using double hashing insert the keys 27, 72, 63, 42, 36, 18, 29 and 101 into the table Take $h_1 = K \bmod 10$ and $h_2 = K \bmod 8$	10