C **Reg. No. :** | | | | | | | | | | |

Question Paper Code:53202

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2019

Third Semester

Computer Science Engineering

15UCS302 -DATA STRUCTURES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is known as CO1- U

   (a) Full binary tree. (b) AVL tree. (c) Threaded tree. (d)Complete binary tree.

2. The order of a B-Tree with 2, 3, 4 or 5 children in every internal node is CO2- R

   (a) 2 (b)3 (c)4 (d)5

3. In a max-heap, element with the greatest key is always in _____ CO3- R

   (a) Leaf node (b) First node of left sub tree

   (c) Root node (d) First node of right sub tree

4. If h is any hashing function and is used to hash n keys in to a table of size m, where n<=m, the expected number of collisions involving a particular key x is CO4- R

   (a) less than 1. (b) less than n. (c) less than m. (d) less than n/2.

5. The spanning tree of connected graph with 10 vertices contains CO5- R

   (a) 11 edges (b) 9 edges (c) 10 edges (d)9vertices

PART – B (5 x 3= 15Marks)

6. What are threaded binary trees? Explain inorder threading using an example. CO1- R

7. Define B-tree of order m? When is it preferred to use B-trees? CO2- R

8. How will you represent a max-heap sequentially? Explain with an example. CO3-App

9. Explain extendible hashing with an example. CO4- R

10. Compare BFS and DFS. CO5- R

PART – C (5 x 16= 80Marks)

11. (a) (i) Construct a binary tree whose nodes in inorder and preorder are given as follows: CO1- U (12)

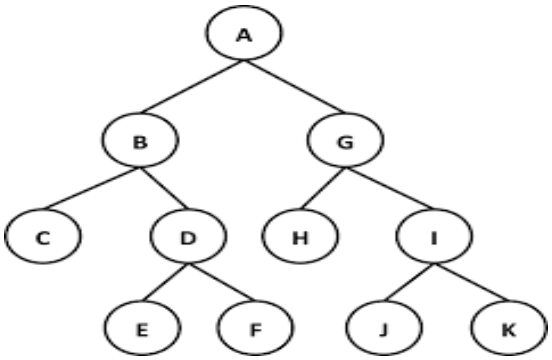
Inorder : 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50

Preorder: 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50.

(ii) Write short notes on leaf and Non- leaf nodes. CO1- U (4)

Or

(b) (i) Give the in order, preorder and post order sequences for the given tree. CO1- App (8)



(ii) Summarize the concept of threaded binary tree. CO1-U (8)

12. (a) (i) Show the result of inserting values 9 2 90 53 4 64 95 59 into an empty splay tree. Show the tree at the end of each insertion. Show each rotation.. CO2-U (8)

(ii) Make a BST for the following sequence of numbers. 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48. Traverse the tree in Preorder, Inorder and postorder. CO2-U (8)

Or

(b) Define balance factor. Explain the types of rotations in AVL tree with suitable example. CO2-U (16)

13. (a) Construct a Huffman tree for the codes a, b,…, g occurring with the following frequencies: CO3-U (16)

	a	b	c	d	e	f	g
Frequency	37	18	29	13	30	17	6

Or

(b) (i) Build a Huffman tree from the following frequency table: CO3- App (10)

A	.20
B	.04
C	.07
D	.11
E	.32
F	.06
G	.05
H	.15

(ii) Write short notes on game tree CO3- U (6)

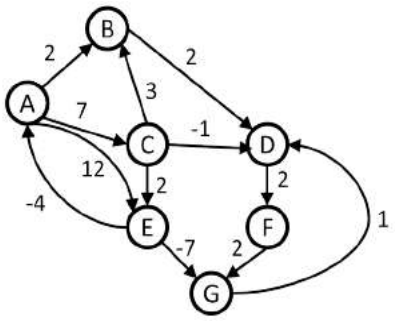
14. (a) Perform the operations given below, in the given order, on an initially empty hash table of size 13using linear probing with c(i) = iand the hash function: h(key) = key % 13: insert(18), insert(26), insert(35), insert(9), find(15), find(48), delete(35), delete(40), find(9), insert(64), insert(47), find(35) CO4- U (16)

Or

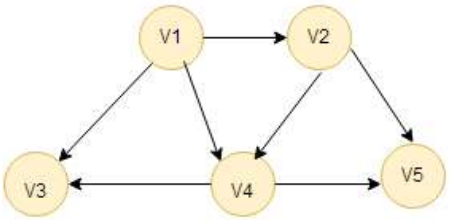
(b) (i) Draw the 11-item hash table resulting from hashing the keys 12,44,13,88,23,94,11,39,20,16 and 5 using the hash function h(i) = (2i+5) mod 11. CO4- App (8)

(ii) Load the keys 23,13,21,14,7,8 and 15 in a hash table of size 7 using separate chaining with a hash function h(key)= key %7. CO4- App (8)

15. (a) (i) Execute Dijkstra's algorithm on the following graph assuming the source vertex to be A, find the shortest path to all the remaining vertices. CO5- App (8)



(ii) Find the topological ordering for the following graph. CO5- App (8)



Or

(b) Find out the shortest path from vertex '0' to all other vertices using Dijkstra's shortest path algorithm. CO5- App (16)