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

Question Paper Code: 53802

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

Third Semester

Information Technology

15UIT302 - DATA STRUCTURES AND ALGORITHMS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The following postfix expression with single digit operands is evaluated using a stack: CO1- R

   8 2 3 ^ / 2 3 * + 5 1 * -

   Note that ^ is the exponentiation operator. The top two elements of the stack after the first * is evaluated are:

   (a) 6, 1 (b) 5, 7 (c) 3, 2 (d) 1, 5

2. The property of binary tree is CO2- R

   (a) The first subset is called left sub tree (b) The second sub tree is called right sub tree

   (c) The root cannot contain NULL (d) Any note in a tree can have almost 2 children

3. What is the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0. CO3- R

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

4. The search technique that takes 0 (log n) time to find a data is CO4- R

   (a) Linear search (b)Binary search (c)Hashing (d) Tree search

5. Time complexity of Depth First Traversal of is CO5- R

   (a) Θ(|V|+|E|) (b) Θ(|V|) (c) Θ(|E|) (d) Θ(|V|*|E|)

PART – B (5 x 3= 15 Marks)

6.	Mention the applications of stack.	CO1- R	
7.	For the set of {1, 4, 5, 10, 16, 17, 21} of keys, draw binary search trees of heights 2, 3, 4, 5, 6.	CO2- App	
8.	A priority queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is: 10, 8, 5, 3, 2. A new element 7 is inserted into the heap in that order. What is the level order traversal of heap after inserting 7?	CO3- R	
9.	What is collision? Explain any one technique to resolve it.	CO4- R	
10.	Define minimum spanning tree. Explain Kruskal's algorithm with an example.	CO5- R	

PART – C (5 x 16= 80Marks)

11.	(a)	Write a C function search(L,x) that accepts a pointer L to a list of integers and an integer x and returns a pointer to a node containing x, if it exists, and the null pointer otherwise. Write another function, srchinsert(L, x), that adds x to L if it is not found and always returns a pointer to a node containing x.	CO1- App	(16)
		Or		
	(b)	Show how to implement a queue of integers in C by using an array queue[100], where queue[0] is used to indicate the front of the queue, queue[1] is used to indicate its rear, and queue[2] through queue[99] are used to contain the queue elements. Show how to initialize such an array to represent the empty queue and write routines remove, insert, and empty for such an implementation.	CO1- App	(16)
12.	(a)	The following three are known to be the preorder, inorder and postorder sequences of a binary tree. But it is not known which is which. I. MBCAFHPYK II. KAMCBYPFH III. ABCKYFPH Find which is preorder, inorder and postorder. Write the routines to perform inorder, preorder and postorder traversal in a binary tree.	CO2- App	(16)
		Or		

(b) (i) Write the algorithm for pre-order and post-order traversals of a binary tree. CO2- Ana (8)

(ii) Suppose the following sequences list nodes of a binary tree T in preorder and inorder, respectively : CO2- Ana (8)

Preorder : A, B, D, C, E, G, F, H, J
Inorder : D, B, A, E, G, C, H, F, J
Draw the diagram of the tree.

13. (a) Write the algorithms to perform insertion and deletion operations in Min heap and apply the same to insert 10,12,1,14,6,5,8,15,3,9,7,4,11,13 and 2, one at a time into an empty min binary heap. Show the tree after deleting the elements 15, 3 and 11. CO3- App (16)

Or

(b) Define AVL tree? Construct AVL tree for following data 1, 2, 3, 4, 8, 7, 6, 5, 11, 10, 12. CO3- App (16)

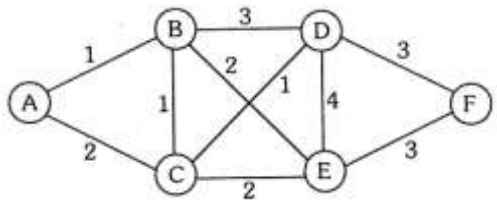
14. (a) (i) Formulate an ADT to perform for the Union and find operations of disjoint sets. CO4-App (8)

(ii) Describe about Union-by-rank and Find with path compression with code. CO4-App (8)

Or

(b) Show the result of inserting the keys 10111101, 00000010, 10011011, 10111110, 01111111, 01010001, 10010110, 00001011, 11001111, 10011110, 11011011, 00101011, 01100001, 11110000, 01101111 into an initially empty extensible hashing structure with M = 4. CO4-App (16)

15. (a) Write Dijkstra's algorithm and apply the same for the following graph. CO5-App (16)



Or

(b) Explain BFS and DFS algorithm with example. CO5-App (16)

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