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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
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Question Paper Code: 5001

B.E. / B.Tech. DEGREE SUPPLEMENTARY EXAMINATIONS – FEB. / MAR. 2020
Third Semester

Computer Science and Engineering
U15CS305 – DATA STRUCTURES

(Common to Electrical and Electronics and Engineering, Electronics and
Communication Engineering & Information Technology)
(Regulation 2015)

Time : Three Hours

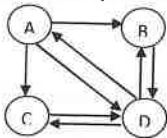
Maximum : 100 Marks

Answer ALL the questions

PART – A

(10 x 2 = 20 Marks)

1. Distinguish between stack and queue.
2. Define Doubly Linked List.
3. Define splay tree, B-tree.
4. State the merits and demerits of linear representation of binary trees.
5. What is a heap? What is the main use of heap?
6. What is hashing in data structure and what is the use of hashing function?
7. Define undirected graph and directed graph.
8. Give the adjacency list representation for the following



9. Name some simple algorithms used in external sorting?
10. What is the main idea behind selection sort?

PART – B

(5 x 13 = 65 Marks)

11. a) Assume that a singly linked list is implemented with a header node, but no tail node, and that it maintains only a pointer to the header node. Write an algorithm that includes methods to
- a. find previous position of the element in the linked list (3)
 - b. find next position of the element in the linked list (3)
 - c. test if a value x is contained in the linked list (1)
 - d. add a value x if it is not already contained in the linked list (3)
 - e. remove a value x if it is contained in the linked list (3)

(OR)

- b) i. Convert the given infix expression $A+B*C+(D*E+F)*G$ into postfix expression and show the structure of stack with each iteration. (7)
- ii. Write an algorithm that supports the stack push and pop operation and the third operation TOP element, which returns the top of the element in the data structure. (6)

12. a) Write the routine for insertion and deletion using binary search tree. Show the result of inserting 3, 1, 4, 6, 9, 2, 5, 7 into an initially empty Binary Search tree and show the result of deleting the root.

(OR)

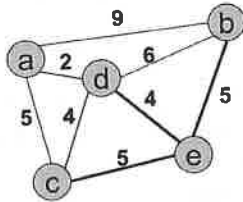
- b) Elucidate AVL tree with single rotation and double rotation with algorithm and Show the AVL tree that results after each of the integer keys 9, 27, 50, 15, 2, 21, and 36 are inserted, in that order, into an initially empty AVL tree. Clearly show the tree that results after each insertion, and make clear any rotations that must be performed.

13. a) Write an algorithm for leftist heap operations and explain it with an example.

(OR)

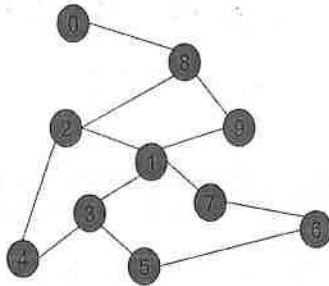
- b) Show the heap after inserting each of these keys in this order: 44,66,33,88,77,55,22 and obtain array from the natural map of each of the heaps for the above data.

14. a) Elucidate the minimum spanning tree with the help of prim's algorithm and show the result for the given graph



(OR)

- b) Perform BFS and shortest path problem for the following graph with algorithm.



15. a) Give an algorithm for insertion sort and perform the sorting with following data {34 8 64 51 32 21 }

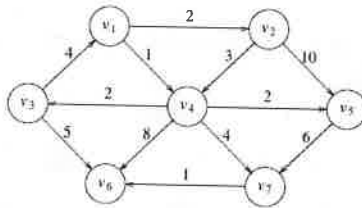
(OR)

- b) Delineate sorting? List some of the types of sorting and label each type? Build Quick sort for the following data {54 26 93 17 77 31 44 55 20 }

PART – C

(1 x 15 = 15Marks)

16. a) Write an algorithm of Dijkstra's in computing shortest path of weighted directed graph. Show the result for the given graph by the use of dijkstra's algorithm.



(OR)

- b) i. Discuss the algorithm for implementing queue using linked list. Also show linked list implementations for double ended queue. (10)
- ii. Narrate the concept of Tower of Hanoi problem and Write the algorithm for Tower of Hanoi problem. (5)