U –54371

Register No. | | | | | | | | |

BE Degree Examination November 2019

Third Semester

Computer Science and Engineering

18CST31 – DATA STRUCTURES

(Regulations 2018)

Common to BTech Information Technology

Time: Three hours | Maximum: 100 marks

Answer all Questions

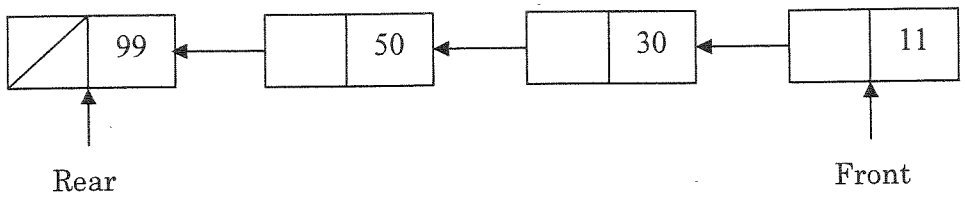
Part – A (10 × 2 = 20 marks)

1. Consider two polynomials $A(x) = 2x^{1000} + 1$ and $B(x) = x^4 + 10x^3 + 3x^2 + 1$. Show how these polynomials are stored in the linked list. [CO1,K2]

2. Write an algorithm to count the number of nodes in the given linked list. [CO1,K2]

3. Evaluate the postfix expression: ab/c-de*+ac*+ where a=6, b=3, c=1, d=2 and e=4. [CO2,K3]

4. Write a routine to display the content shown in the following diagram. [CO2,K2]



5. Given inorder sequence:DJGBHEAFKIC [CO3,K3]

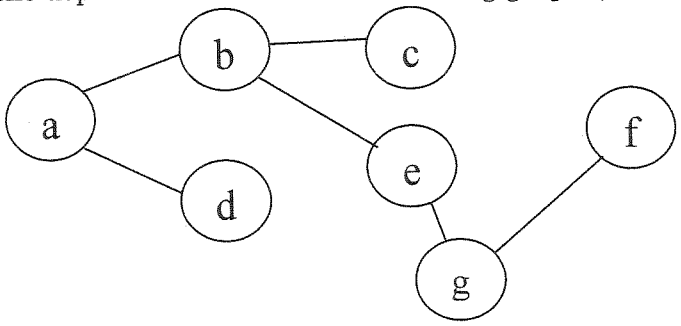
   Postorder sequence: JGDHEBKIFCA. Draw the binary tree.

6. Write a routine to find maximum in the binary search tree. [CO3,K2]

7. Draw the diagramatic linked list representation of the given sparse matrix [CO4,K2]

	a	b	c	d
a	0	1	1	0
b	1	0	0	1
c	0	0	0	0
d	0	0	1	0

8. Find the depth first search of the following graph (start node:a) [CO4,K3]



9. Define collision. [CO5,K1]

10. Mention the type of rotations in splay tree. [CO5,K1]

Part – B (5 × 16 = 80 marks)

11. a. i) Draw a node structure for linked representation of polynomial. Write an algorithm to subtract a polynomial from other polynomial. (10) [CO1,K3]

ii) Write an algorithm to reverse a linked list. (6) [CO1,K3]

(OR)

b. i) Given two singly linked list LIST1 and LIST2. Write an algorithm to form a list LIST3 using LIST1 ∪ LIST2. (10) [CO1,K3]

ii) Write an algorithm to clone a linked list. (6) [CO1,K3]

12. a. i) Write an algorithm to convert the infix expression into postfix. (8) [CO2,K2]

ii) Convert the following infix expression into postfix expression (8) [CO2,K2]

1) $(a + b * c) + (d / e + f)$

2) $x * y / z + a * (b + e) / (x + 2)$

3) $((a + b) * c) + e * (a + b + c)$

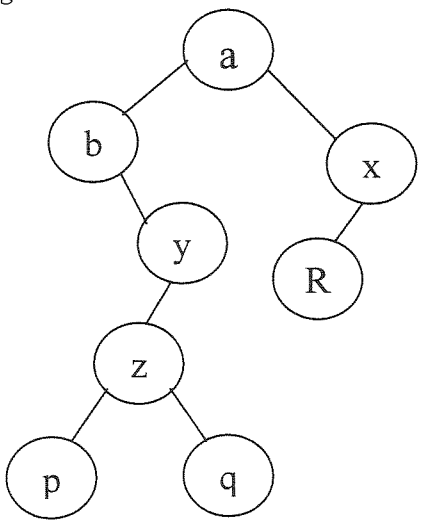
(OR)

b. i) Write the tower of Hanoi algorithm. (8) [CO2,K2]

ii) How do you reverse the stack using queue? (8) [CO2,K2]

13. a. i) Insert the following numbers in the empty AVL tree 10,20,30,40,5,7,6,4,3,2. (8) [CO3,K3]

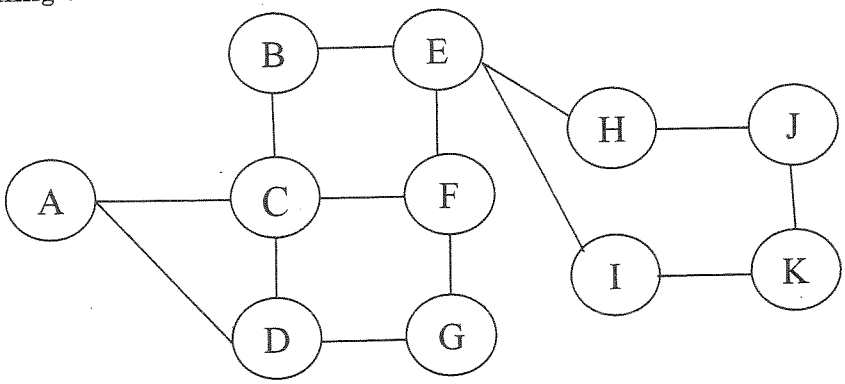
ii) Write preorder traversal of the binary tree. Find the preorder traversal of the following tree (8) [CO3,K3]



(OR)

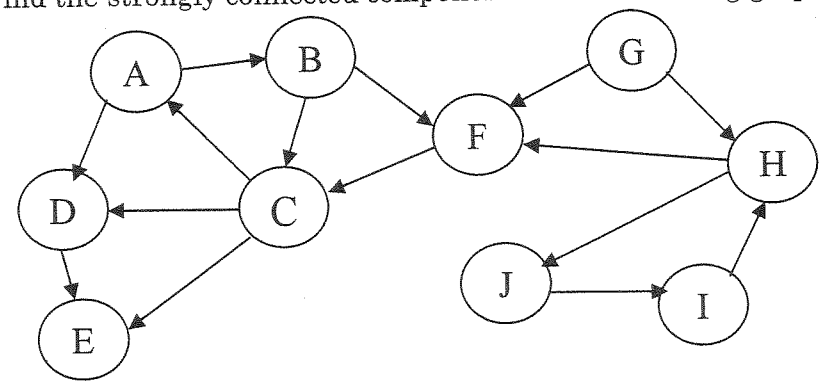
b. Construct the binary search tree with the following input 50, 2, 49, 10, 12, 4, 62, 80, 21, 39. Delete the following values 49, 12, 4, 62 and also write the binary search tree insertion algorithm. (16) [CO3,K3]

14. a. Find all the articulation point in the following graph. Show the depth first spanning tree and the values of Num and Low for each vertex. (16) [CO4,K3]



(OR)

b. Find the strongly connected components of the following graph (16) [CO4,K3]



15. a. i) Write the properties of red black tree and insert the following numbers in the red-black tree 100, 80, 70, 50, 46, 45, 42, 40, 30, 5. (10) [CO5,K3]

ii) Compare linear probing and quadratic probing. (6) [CO5,K2]

(OR)

b. i) Write the properties of B-tree and insert the following numbers in the B-tree with degree=2. (10) [CO5,K3]

10, 20, 3, 2, 1, 7, 8, 9, 15, 5, 4, 6 and also delete 5, 4.

ii) Compare double hashing and rehashing. (6) [CO5,K2]

Bloom's Taxonomy Level	Remembering (K1)	Understanding (K2)	Applying (K3)	Analysing (K4)	Evaluating (K5)	Creating (K6)
Percentage	2.2	30	67.7	-	-	-