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Question Paper Code: 53802

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

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. A linear list of elements in which deletion can be done from one end (front) and insertion can take place only at the other end (rear) is known as _____. CO1- R
(a) Stack (b) Queue (c) Linked List (d) Tree
2. The number of edges from the node to the deepest leaf is called _____ of the tree. CO2- R
(a) Height (b) Length (c) Depth (d) Width
3. Which of the following is not an advantage of priority queue? CO3- R
(a) Easy to implement
(b) Processes with different priority can be efficiently handled
(c) Applications with differing requirements
(d) Easy to delete elements in any case
4. Path Compression algorithm performs in which of the following operations? CO4- R
(a) Create Operation (b) Find Operation (c) Insert Operation (d) Delete Operation
5. A connected planar graph having 6 vertices, 7 edges contains _____ regions. CO5- R
(a) 3 (b) 8 (c) 6 (d) 9

PART – B (5 x 3= 15Marks)

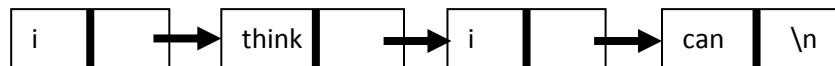
6. What Does Abstract Data Type Mean? CO1- R
7. Why it is said that searching a node in a Binary Search Tree is efficient than that of a simple Binary Tree? CO2- R
8. List the types of rotations available in Splay Tree? CO3- R
9. What is the need for Extendible Hashing? CO4- R
10. In a complete graph with n vertices, show that the number of spanning Tree s is at least $2^{(n-1)} - 1$. CO5- R

PART – C (5 x 16= 80Marks)

11. (a) Write the modules to implement the following using Stack data structure: CO1- App (8)
 - (i) Check if the given string is palindrome
 - (ii) Sort the given set of integers CO1- App (8)

Or

- (b) Consider the circular list given below with string data: CO1- App (16)



Write a function which will display the output in following fashion:

```

i think i can
think i can
i can
can
  
```

At each line, the function should display data from all the nodes present. After printing each line, an appropriate node has to be deleted. After printing the last line, “last” pointer should be holding the NULL value.

12. (a) Create a binary search tree for the following numbers start from an empty binary search tree. 45,26,10,60,70,30,40 Delete keys 10,60 and 45 one after the other and show the trees at each stage. CO2- App (16)

Or

- (b) Construct an expression tree for the expression $(a+b*c) + ((d*e+f)*g)$. Give the outputs when you apply inorder, preorder and postorder traversals. CO2- App (16)

13. (a) (i) Illustrate How delete operation performed on binary heap? CO3- App (8)
- (ii) Write a suitable operation for percolate up and percolate down operations in a binary heap. CO3- App (8)

Or

- (b) Create a AVL Tree for: 50, 60, 80, 30, 20, 40, 70 Can you perform the three tree traversals on AVL tree? Justify your answer. CO3- App (16)

14. (a) (i) Explain dynamic equivalence problem in detail. CO4-U (8)
- (ii) What are the applications of disjoint set data structure? CO4-U (8)

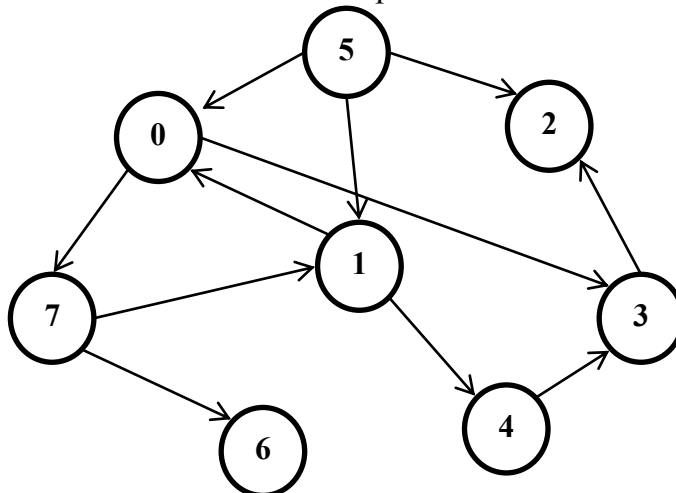
Or

- (b) Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(X)=X \pmod{10}$, show the resulting for

- (i) Separate chaining hash table
- (ii) Open addressing hash table using linear probing
- (iii) Open addressing hash table using quadratic probing
- (iv) Open addressing hash table with second hash function

$$h_2(X) = 7 - (X \pmod{7})$$

15. (a) For the given graph below perform the Depth First Search and Breadth First Search. Compare the two search method. CO5- App (16)



Or

(b) (i) Consider five cities:

CO5- App (8)

(1) New Delhi,

(2) Mumbai,

(3) Chennai,

(4) Bangalore, and

(5) Kolkata, and a list of flights that connect these cities as shown in the following table. Use the given information to construct a graph.

Flight No.	Origin	Destination
101	2	3
102	3	2
103	5	3
104	3	4
105	2	5
106	5	2
107	5	1
108	1	4
109	5	4
110	4	5

(ii) Explain the topological sorting of a graph G with an example. CO5- App (8)