Registration No:

Total Number of Pages: 02

B.Tech
RCS3C002

3rd Semester Regular / Back Examination: 2021-22

DATA STRUCTURE

BRANCH(S): CSE, CSEAIME, CST, ELECTRICAL & C.E, ELECTRONICS & C.E, IT

Time: 3 Hour

Max Marks: 100

Q. Code: OF784

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right-hand margin indicate marks.

Part-I (2×10)

Q1 **Answer the following questions:**

a) What do you understand by the complexity of an algorithm?
b) Differentiate between DFS and BFS?
c) What are the applications of a linked list?
d) Define Big Oh, Big Omega and Big Theta Notations.
e) Differentiate between abstract and concrete data structure.
f) Write a recursive algorithm to perform preorder traversal.
g) What is a Priority Queue?
h) What is a Binary Search Tree (BST)?
i) Explain the concept of DEQUEUE?
j) Differentiate between Graph and Tree?

Part-II (6×8)

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**

a) Define hashing? What are the properties of a good hash function? With necessary example explain any one hashing techniques.
b) Write an algorithm for evaluating a postfix expression and evaluate the following postfix expression using the algorithm **AB+CD/AD-EA^ + *** where A=2, B=7, C=9, D=3, E=5
c) Give an algorithm to perform binary search. Using the algorithm, search for elements 23 and 47 in the given set of elements [12, 23, 27, 35, 39, 42, 50].
d) Design an algorithm for selection sort? Illustrate the working of selection sort on the following array with seven elements [30,45, 25, 32, 55, 60, 49].
e) Explain Merge Sort algorithm/pseudocode with the help of an example? Mention the best case and worst case time complexity of Merge sort algorithm?
f) Write an algorithm to insert an element into a Heap? Derive the complexity of a Heap sort.
g) List out the difference between doubly linked list and singly linked list? Explain with example of following with doubly linked list.
   (i) Insert node at the beginning.
   (ii) Delete the node with given value.
h) How can you reverse a string using stack? Give one example and show how you can reverse a given string using stack.

i) What is stack ? What are the basic operations associated with stack? Convert following arithmetic infix expression into postfix by using stack :
a*(b+c)+(b/d)*a+z*u

j) With a suitable example, explain how polynomials are added using linked lists.

k) Create max heap for the following elements 33, 14, 65, 02, 76, 69, 59, 85, 47, 99, 98.

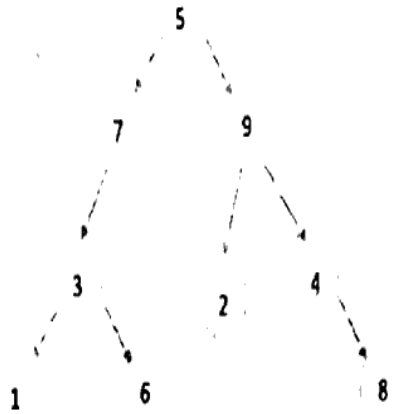
l) Write the algorithm for Prim's and Kruskal' Minimum Spanning Tree and explain with example?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Write algorithm for Insertion sort and Bubble sort? Illustrate the insertion sort algorithm and bubble sort algorithm on input [30,20,10,60,70,40]. **(16)**

Q4 Write the non-recursive preorder traversal algorithm? What is the output obtained after preorder, inorder and postorder traversal of the following tree. **(16)**



Q5 What is AVL tree? Find the complexity to complexity of insertion, deletion and searching in AVL tree. Construct AVL Tree for the following sequence of numbers - 50, 20, 60, 10, 8, 15, 32, 46, 11, 48. **(16)**

Q6 What is Quicksort? Write an algorithm to perform Quicksort with an example. Compare its complexity with bubble sort **(16)**