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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF INFORMATION SCIENCE

**MAKE UP EXAMINATION JULY 2024**

**Course Code :** CSA2001

**Course Name :** Data structures and Algorithms

**Program :** BCA

**Date :** 12 JULY 2024

**Time :** 09.30AM to 12.30PM

**Max Marks :** 100

**Weightage :** 50%

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**PART A**

**ANSWER ALL THE QUESTIONS (5 X 2 = 10M)**

* 1. List the conditions to ckeck for queue full in ordinary queue and queue full in circular queue.

(CO2) [Knowledge]

* 1. Define Asymtotic notations with respect to best case and worst case.
  2. Define Circular Queue? List operations that can be perfomed in Circular Queue
  3. Define the following- strongly connected graph, loop, acyclic graph, size of a graph
  4. What is the time complexity if T(n)=8T(n/4)+n^2?

(CO3) [Knowledge] (CO1) [Knowledge] (CO3) [Knowledge] (CO3) [Knowledge]

**PART B**

**ANSWER ALL THE QUESTIONS (5 X 10 = 50M)**

* 1. Construct the binary tree given the values 100,50,60,125,75,85,30,78,145,167,190 and Explain the concept of root, leaves, edges, height of the tree, level of the tree, degree of a node, path.

(CO3) [Comprehension]

* 1. Write the recursive function of binary search? Explain masters theorem and find the time complexity of binary search using masters theorem.

(CO3) [Comprehension]

* 1. In a hotel the person incharge of the service hall divides the table among the robots, each robot will take care of 5 tables. If the table is empty and a new customer arrives then the robot will serve the customers. Implement functions for the robot to read the table number(insert rear), delete the table number(delete front), display the table numbers currently being served.(circular queue)

(CO3) [Comprehension]

* 1. The students of gaming and graphics wanted to create a gaming application where there will be a box with a number which has to be added either at the begining, or at the end or inbetween, even the deletion also will happen in the same way and the traversal happens in single direction only. Implement the functions to add the box at the last(insert rear), delete the box of a particular value and display the box numbers.

(CO2) [Comprehension]

* 1. Mr. ABC is defining a new programming language. He has to write a function to make work the recursion properly, that means, which ever the recent fucntion is called after the completion of that fucntion the control goes back to the recent calling function. Which is the best data structure to implement the above scenario. Write the fucntions to store the address of a function, delete the address once the execution is over and display the function address currently in the memory.

(CO1) [Comprehension]

**PART C**

**ANSWER ALL THE QUESTIONS (2 X 20 = 40M)**

* 1. In an office the files have to be arranged according to the file number. Given the particular file number they have to store the files in such a way that a file with a file number less than the first file number should be stored towards the left and the files with file number greater than the first file towards right. Implement the proper data structure to create this system, to read the file number and create the data structure, traversing the data structure in inorder, preorder, and postorder

(CO3) [Application]

* 1. The employee details (Employee-int)is to be maintained in a office. Any time if the data is required we can access by traversing in both the directions. Implement a C program to maintain the records where we can add the employee id to the database from last(insert rear), delete the employee id who is at the begining(delete front), display the employee ids from begining to last, and display the employee ids from last to first.

(CO3) [Application]