20MCA11

USN ☐☐☐☐☐☐☐☐☐☐

First Semester MCA Degree Examination, June/July 2023
Data Structures with Algorithms

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Define Stack. Explain with code primitive operating on stack.   **(08 Marks)**
     b. Write a C program to evaluate a postfix expression.   **(06 Marks)**
     c. Illustrate with an example conversion from Infix to postfix expression.   **(06 Marks)**

OR

2   a. Explain linear and nonlinear data-structures with example.   **(08 Marks)**
     b. Write a C program to convert an expression from infix to postfix.   **(06 Marks)**
     c. Explain different ways of stack representation in memory.   **(06 Marks)**

Module-2

3   a. Define recursion. Write a recursive functions for factorial of a number tower of honoi. Give illustration with example.   **(10 Marks)**
     b. Write a short note on priority queues, double ended queue, along with code snippet.
                                                                                          (10 Marks)

OR

4   a. Define circular queue. Explain its advantages over the ordinary queue. Write a function to demonstrate insert, delete operation on circular queue.   **(10 Marks)**
     b. Write a C program for demonstrate applications queue.   **(10 Marks)**

Module-3

5   a. What is disadvantage of array? Write a note on malloc, calloc, realloc free with syntax and example.   **(10 Marks)**
     b. Write a C program for demonstrating singley linked list with insert front delete front and display node function.   **(10 Marks)**

OR

6   a. Write a C program for demonstrating queue with insert, delete display operation using linked list.   **(10 Marks)**
     b. Write a note on header node with example for it.   **(04 Marks)**
     c. Write code snippet for inserting and rending nocks in linked list based on data. **(06 Marks)**

Module-4

7   a. Explain various steps in fundamental of algorithmic problem solving.   (10 Marks)
    b. Explain any 5 important problem types in the study of algorithms.   (10 Marks)

OR

8   a. Discuss various asymptotic notation and basic efficiency classes.   (10 Marks)
    b. Explain mathematical analysis of recursive algorithm with suitable example for it. (06 Marks)
    c. Differentiate recursive and non recursive algorithm.   (04 Marks)

Module-5

9   a. Define brute force technique of problem solving. Write algorithm for selection sort, bubble sort.   (10 Marks)
    b. Write an algorithm for quick sort and analyze its efficiency.   (10 Marks)

OR

10 a. Write an algorithm for merge sort, find time complexity of merge sort and example for it.   (10 Marks)
    b. Write Krushkal's algorithm and explain Krushkal's algorithm with suitable example for it.   (10 Marks)

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