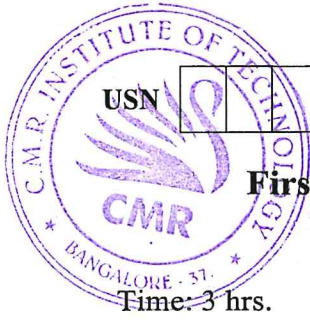


CBCS SCHEME

20MCA11



First Semester MCA Degree Examination, Feb./Mar. 2022 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 data structures. Explain the classification of data structures and its operations. (06 Marks)
- b. Define stack. List the primitive operations that are performed on a stack. Also write C – implementation. (10 Marks)
- c. What are the advantages of evaluation postfix expression? (04 Marks)

OR

- 2 a. Evaluate the postfix expression using stack
 $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ *\ 2\ \$\ 3\ +$ (05 Marks)
- b. Convert the given infix expression into prefix expression
 $A\ \$\ B\ *\ C\ -\ D\ +\ E\ / \ (G\ +\ H)$. (05 Marks)
- c. Write the algorithm to convert an expression from infix to postfix and convert the given expression from infix to postfix using stack $(A + B) * (C \$ (D - E) + F) - G$. (10 Marks)

Module-2

- 3 a. Define recursion. Write its properties. Write the recursion function in C to find the GCD of two numbers. (05 Marks)
- b. Find the factorial 4 using the recursive definition and trace the execution procedure using stack. (05 Marks)
- c. What is Queue? Explain the operations of queue. Also write the C implementation. (10 Marks)

OR

- 4 a. Explain the different variants of queue. (10 Marks)
- b. Write a C program to implement the following searching techniques using recursion,
 - i) Linear search
 - ii) Binary search. (10 Marks)

Module-3

- 5 a. What is linked list? Write the C function for :
 - i) Inserting a node at beginning
 - ii) Delete the last node from the list. (10 Marks)
- b. Write short note on getnode() and freenode() operations, Header nodes. (10 Marks)

OR

- 6 a. Write a C program to implement the operations of the stack using linked list. (10 Marks)
- b. Explain in detail about 2 types of memory management. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Explain the various stages of algorithm design and analysis process with the help of flow chart. (06 Marks)
 b. Write the general plan of analyzing the efficiency of recursive algorithm. Write an algorithm for tower of Hanoi problem and analyze. (08 Marks)
 c. Differentiate recursive and non – recursive algorithm. (06 Marks)

OR

- 8 a. List and explain the important problem types. (10 Marks)
 b. Define algorithm. Explain different asymptotic notations. (10 Marks)

Module-5

- 9 a. What is greedy technique? Write the prim's algorithm. Apply the algorithm to the following graph to construct minimum spanning free.

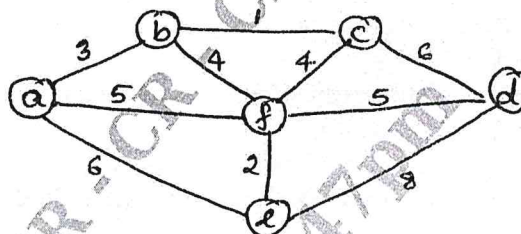


Fig.Q9(a)

- b. What is divide and conquer technique? Write an algorithm for quick sort. Analyze its efficiency. (10 Marks)

OR

- 10 a. What is decrease and conquer technique write DFS graph traversal algorithm and write a trace for the following graph.

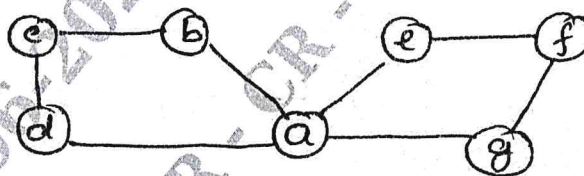


Fig.Q10(a)

- b. What is Brute force technique? Write algorithm for selection sort and analyze. (10 Marks)

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