CBCS SCHEME

USN | | | | | | | | | | |

20MCA11

First Semester MCA Degree Examination, Feb./Mar. 2022
Data Structures with Algorithms

Time: 3 hrs. Max. Marks100

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/F/ (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)**

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.

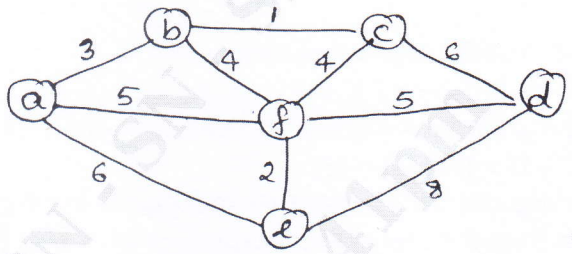

Fig.Q9(a) **(10 Marks)**

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.

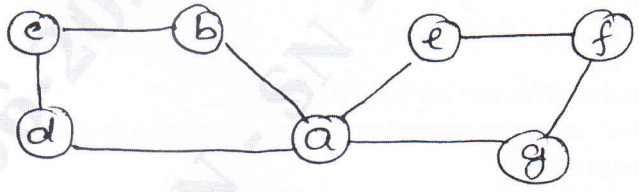

Fig.Q10(a) **(10 Marks)**

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

* * * * *