2022

1st Semester Examination

MCA

Paper : MCA 103

(Data Structure and Algorithm)

Full Marks : 70 Time : Three Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

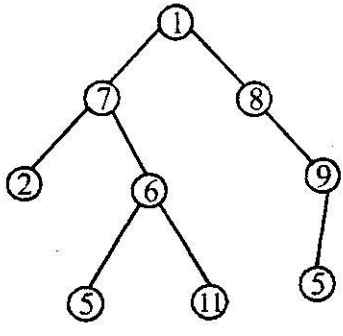
Group - A

Answer any ***five*** questions : 2×5=10

1. (i) Define complete binary tree with an example.

   (ii) What are the important features of an algorithm?

   (iii) Show the level order traversal of the following tree



P.T.O.

(iv) What do you mean by asymptotic analysis of an algorithm?

(v) How is a problem solved using branch and bound technique?

(vi) What is the necessity of approximation algorithm?

(vii) What do you mean by peep operation in a stack?

(viii) What are the advantages of linked list over array?

Group - B

Answer any ***four*** questions : 15×4=60

2. Convert the following infix expression into postfix expression. Show each step in detail.

$$(A+(B*C-(D/E\wedge F)+G)*H)$$

Write down the algorithm of quicksort. Explain why worst case time complexity of quicksort is more than the average case. 5+8+2

3. Explain operations on doubly linked list in detail with function for add and delete from doubly linked list. Why a tail recursive function is preferred to its non-tail recursive equivalent? What is threaded binary tree? Explain how a binary tree is transform into a threaded binary tree with an example. 7+3+2+3

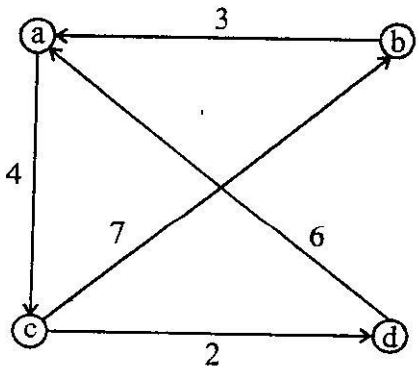
4. Write an algorithm to check wheather a given list is palindrome or not using stack. Explain dynamic programming approach using a suitable example. 8+7

5. Implement radix sort on the following numbers :

   23, 55, 29, 41, 36, 90 12 7+8

   Briefly explain how Kruskal's algorithm is used to find out the minimum spanning tree of a graph using a suitable example.

6. Derive the all-pair shortest path from the following graph by Floyd-Warshall algorithm using dynamic programming approach.



   Write short notes on : polynomial addition using array. 8+7

7. Derive the longest common subsequence from the string "BCDABC" and "CBADCA" using dynamic programming approach. What do you mean by sparse matrix? Why do we need different representation for sparse matrix. 10+3+2

P.T.O.

8. Explain greedy approach with a suitable example. What is the difference between performance analysis and performance measurement? How can we achieve performance analysis? 9+3+3

9. What do you mean by tractable problems? Define class P and class NP problems. What do you mean by reduction? When a problem is called a NP-complete problem? Define row-major and column-major representation of a matrix. 2+5+2+3+3

2022

1st Semester Examination

MCA

Paper : MCA 197

(Practical)

Full Marks : 100 Time : Three Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer any *two* questions : 2×35=70

1. Write a program in Python to search an element in an array using linear search technique.

2. Demonstrate multiple inheritances using a program in Python.

3. Write a program to calculate factorial of a number using recursion.

4. Illustrate method overriding in Python programming language.

5. Perform addition of two complex numbers using + operator overloading using a program in Python.

P.T.O.

6. Write a program in Python to illustrate multilevel inheritances.

7. Demonstrate parameterized constructors in Python programming language.

8. Write a program in Python to illustrate destructor.

9. Write a program to check whether a number is palindrome or not.

10. Illustrate method overloading in Python programming language.

11. Write a program in Python to create a dictionary with integer keys.

12. Demonstrate how can we achieve getters and setters behavior using property in Python programming language.

PNB - 10

VIVA-VOCE - 20