1483 / III

B.C.A. (PART-II) IIIrd SEMESTER EXAMINATION, 2024-25

(BCA 303 : DATA STRUCTURE)

Paper : III

Time : Three Hours]   [Maximum Marks : 70

Note: (i)   Answer **five** questions in all.

(ii)   Question No.-1 is **compulsory**.

(iii) Answer remaining **four** questions, selecting **two** from each Section 'A' and 'B'.

(iv)   All questions carry equal marks.

1.   Answer all parts of the following :

(a)   What is data structure ? What are the various types of data structure ?

(b)   Write the algorithm of insertion sort.

(c)   What is an algorithm ? What are the criteria of an algorithm ?

(d)   Write the difference between priority queue and D-Queue.

Section-A

2. What is stack ? Write its applications. Also write the following operations in C programming language.

   (a) Push operation

   (b) Pop operation

3. What is Binary tree ? Write the inorder, preorder and post order traversal of the following tree.
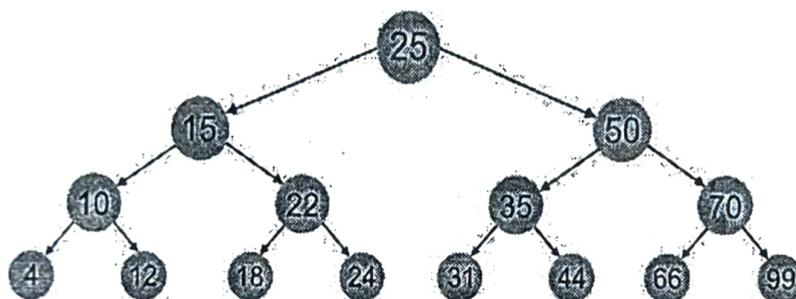
4. What is recursive and non-recursive algorithm ? Find the time complexity of the following recurrence relation.

$$T_{(n)} = T(\sqrt{n}) + 1$$

5. Explain the various types of asymptotic notation for the analysis of an algorithm with diagram. Arrange the following three functions in the increasing order of asymptotic notation.

$$f_1 = 10^n, f_2 = n^{\log n}, f_3 = n^{\sqrt{n}}$$

Section-B

6. (a) What is an array ? Write down the algorithm/ programming of Linear and Binary search.

   (b) Differentiate between the sparse matrix and dense matrix in data structure.

7. (a) What is Linked List ? Explain the various types of Linked List with diagram.

   (b) Write a program/Algorithm to insert or delete a node at the end of the list.

8. (a) Write the algorithm of prim and find the MST and its cost in the following graph (Fig-1).
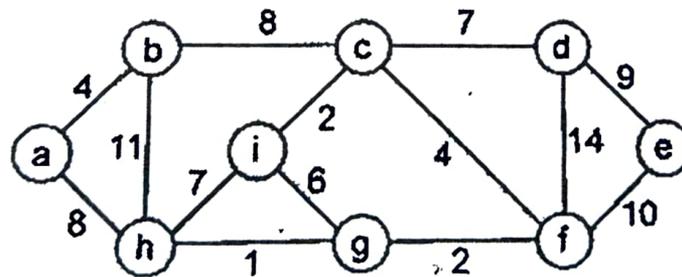
(Fig-1)

   (b) Write the algorithm of Kruskal and find the MST and its cost in the above graph (Fig-1). Show each steps efficiently.

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9.   Write notes on any two of the following :

(a)   Enque and deque operation

(b)   BFS and DFS

(c)   Differentiate among-Graph, B-Tree and MST

(d)   Algorithm/Program of Bubble sorting.

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