

[2]

Roll No. ....

Total Printed Pages - 3

**F-3967**

**B.C.A. (Part - III) Examination, 2022**

**(New Course)**

**PAPER FIFTH**

**Data Structure**

**(305)**

*Time : Three Hours]*

*[Maximum Marks : 80*

**Note : All questions are compulsory. Attempt any two (2) questions from each unit. All questions carry equal marks.**

**Unit - I**

1. (a) What is an algorithm? What are the characteristics of a good algorithm?
- (b) Discuss various types of operation in data structure.

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- (c) Discuss the concept of mathematical notation with respect to data structures.

**Unit - II**

2. (a) What do you mean by pointers? Specify with example.
- (b) Differentiate between static array and dynamic array.
- (c) Discuss the concept of Multidimensional array with example.

**Unit - III**

3. (a) Write an algorithm to insert a node in the beginning of the linked list.
- (b) Write a procedure to reverse a singly linked list.
- (c) Implement a Queue using a singly linked list L. The operations INSERT and DELETE should still take  $O(1)$  time.

**Unit - IV**

4. (a) How do you rotate a Binary Tree? Explain right and left rotations with the help of an example.

**F- 3967**

[3]

- (b) Taking a suitable example to explain how a general tree can be represented as a Binary Tree?
- (c) Write an algorithm to determine if two Binary Trees are similar.

### Unit - V

5. (a) Write short notes on Insertion sort and Quick sort.
- (b) Clearly specify with example the difference between bubble sort and heap sort.
- (c) What do you mean by hashing? Explain **any five** popular hash functions.