

B.Sc. Semester-III Examination, 2022-23**COMPUTER SCIENCE [Honours]**

Course ID : 31511

Course Code : SH/CSC/301/C-5

Course Title : Data Structures – Theory

Time : 1 Hour 15 Minutes

Full Marks : 25

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*Answer **all** the questions.**UNIT-I**1. Answer any **five** of the following questions:

1×5=5

- a) Write one parameter which can be used to distinguish between sequential list and linked list.
- b) Why are so many data structures required instead of only one?
- c) State a real life application of stack.
- d) "The terminating condition of a recursive algorithm must be non-recursive"—Comment.
- e) Express the computation time of the function $f(n)=n+\log_2(n)$ using big-Oh notation.

- f) What do you mean by threaded binary tree?
- g) What is the average case complexity of hashing?
- h) Name an online sorting technique.

UNIT-II2. Answer any **two** of the following questions :

5×2=10

- a) Write an algorithm to merge two sorted arrays in such a way that output appears as a sorted array
- b) Express the generating function of a Fibonacci series as a recursive formula. Prove that the recursive definition of Fibonacci series yields exponential time complexity. 2+3=5
- c) Represent queue as a circular array. Then write algorithms overflow and underflow detection. 2+3=5
- d) What is the pre-condition for binary search? Write binary search algorithm. 1+4=5

UNIT-III

3. Answer any **one** of the following questions :

$$10 \times 1 = 10$$

- a) Write an algorithm to delete a specific information carrying node from a binary search tree. Using insertion sort algorithm arrange the following array in ascending order:

8 7 1 9 12 5 2 6

$$5 + 5 = 10$$

- b) Describe hashing with reference to the following features:

$$2 + 5 + 3 = 10$$

- i) Introduction
- ii) Hashing and Rehashing strategies
- iii) Hash functions
