B.Sc. Honours Examinations 2021

(Under CBCS Pattern)

Semester - III

Subject : COMPUTER SCIENCE

Paper : C 5 - T & P

DATA STRUCTURES

Full Marks : 60 (Theory - 40 + Practical - 20)

Time : 3 Hours

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

(Theory)

Group-A

A. Answer any *three* of the following questions :   12×3=36

1. (a) What is array? Mention its properties.

    (b) Each element of an array ITEM [30][40] requires 4 bytes of storage. Base address of ITEM is 1700, determine the location of ITEM [15][20] when the array is sorted as (i) Row major & (ii) Column major,

    (c) What are sparse matrices? ()   4+6+2

2. (a) What is a stack?

   (b) Write the algorithms for PUSH and POP.

   (c) Transform the following infix expression to their equivalent postfix expression.

   (i) (A – B) / C* (C – D / C + D)

   (ii) (A + B) *D+E/ (F + G + D)   2+6+4

3. (a) What is binary tree? Define different types of binary tree.

   (b) Construct a BST with following sequence of keys : 10, 9, 23, 22, 27, 25, 15, 50, 95, 60, 40 and 29.   6+6

4. (a) Construct an AVL tree with the sequence of keys: 3, 5, 11, 8, 4, 1, 12, 7, 2, 6 and 10.

   (b) What do you mean by hashing? Give a brief introduction about mid square method with example.   6+6

5. What is the advantage and average efficiency of quick sort? Apply Quick sort on the following data and show the contents of the array every pass.   4+8

   48 7 26 44 13 23 98 57 100 5 32

6. What do you mean by recursion. How stack is used in recursion. Explain with an example.   2+4+6

Group - B

B. Answer any *two* of the following questions :   2×2=4

1. What do you mean by mallco() and realloc() functions?

2. What is the condition of stack overflow & underflow?

3. What do you mean by depth of tree?

4. What are the application of priority queue.

(Practical)

Answer any *one* of the following questions :
20×1=20

1. Write a program to insert a node after a specified position in a linked list.

2. Write a program to sort a list of numbers using quicksort algorithm.

3. Write a program to create the following tree and display it in inorder traversal.

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