TDC (CBCS) Odd Semester Exam., 2023

B.VOC (Information Technology)

(3rd Semester)

Course No. : BVoc(IT)GE–302T

(Data Structure)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* What is the difference between linear and non-linear data structures? 5

(b) Define abstract data type (ADT). Mention the features of ADT. 2+5=7

(c) What are the ways of implementing linked list? 2

2. *(a)* What are the types of linked list? How can the doubly-linked list be represented? Explain with example. 1+5=6

(b) What are the advantages and disadvantages of array over linked list? 4+4=8

UNIT—II

3. *(a)* Define stack. Write the routine to push an element into a stack. 2+4=6

(b) Distinguish between stack and queue. 4

(c) What are the applications of priority queues? 4

4. *(a)* Convert the infix

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

into its equivalent postfix expression. 7

(b) Explain linked list implementation of queues. 7

UNIT—III

5. *(a)* What is the balance factor of AVL tree? 2

(b) What is meant by binary search tree? 2

(c) Write the advantages of threaded binary tree. 4

(d) Given the following inorder and preorder traversal :

Inorder sequence : *D, G, B, H, E, A, F, I, C*
Preorder sequence : *A, B, D, G, E, H, C, F, I*

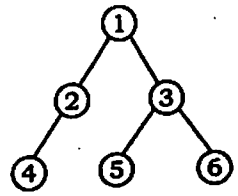
Construct a binary tree. 6

6. *(a)* Construct the binary search tree using the following elements :

35, 15, 40, 7, 10, 100, 28, 82, 53, 25, 3

Show diagrammatically each step of construction of BST. 8

(b) From the given tree complete the following : 6



(i) Degree of tree : _____

(ii) Degree of node 3 : _____

(iii) Level of node 5 : _____

(iv) Indegree of node 3 : _____

(v) Outdegree of node 3 : _____

(vi) Height of tree : _____

UNIT—IV

7. *(a)* Sort the following sequence of keys using selection sort : 7

66, 77, 11, 88, 99, 22, 33, 44, 55

(b) Sort the following array elements using quick sort method : 7

24, 56, 47, 35, 10, 90, 82, 31

8. *(a)* Sort the following array elements using heap sort : 8

66, 33, 40, 20, 50, 88, 60, 11, 77, 30, 45, 65

(b) Consider an array :

arr [ ] = {2, 5, 8, 12, 16, 23, 38, 56, 72, 91}

Show the steps to search the target element 23. 6

UNIT—V

9. *(a)* The following values are to be stored in a hash table :

25, 42, 96, 101, 102, 162, 197

Describe how the values are hashed by using division method of hashing with a table size of 7. Use chaining as the method of collision resolution. 10

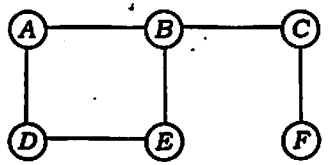
(b) Weight matrix of a directed graph is given below :

$$\begin{bmatrix} 0 & 0 & 3 & 0 \\ 5 & 0 & 1 & 7 \\ 2 & 0 & 0 & 4 \\ 0 & 6 & 8 & 0 \end{bmatrix}$$

Draw the graph using this matrix. 4

10. *(a)* Explain the various collision resolving techniques. 8

(b) Determine the DFS and BFS traversals of the graph shown below : 6



★★★