TDC (CBCS) Even Semester Exam., 2023

COMPUTER SCIENCE

(Honours)

(2nd Semester)

Course No. : CSCHCC-202T

(Data Structure)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *ten* questions : 2×10=20

1. Define data structure. What are the objectives of studying data structure?

2. Define single- and multi-dimensional arrays. Give the formula to find the address of a particular location in one-dimensional array.

3. Give the prefix form of the following infix expression :

$$A * B + C / D - E$$

4. What are the basic operations that can be performed on stack? Why and when is stack data structure used instead of array/list?

5. Define doubly linked list. Give an example.

6. List out the applications of queue. What are the different types of queue in data structure?

7. Explain the implementation of problems in developing recursion.

8. What is a tree data structure? Give an example.

9. Define *(a)* root, *(b)* degree, *(c)* leaves, *(d)* height (or depth) of a tree.

10. Define 'almost complete binary tree'. Give an example.

11. What is the difference between selection sort and bubble sort?

12. Mention some real-life examples of selection sort.

13. What are the importances of hashing?

14. What do you mean by hash table?

15. Define rehashing in data structure.

SECTION—B

Answer any *five* questions : 6×5=30

16. *(a)* Why is sparse matrix used instead of simple matrix? 1

(b) Discuss in brief stack representation as array. Give example. 3

(c) Why are postfix/prefix expressions faster than infix? 2

17. *(a)* Write an algorithm to insert and delete an element in array. 3

(b) Show the stack implementation to convert the following infix expression into postfix form : 3

$$P = A * (B + C) + (D + E) * F / G$$

18. *(a)* Explain about the use and representation of header node in linked list. 4

(b) Define priority queue. Give an example. 2

19. Write an algorithm to insert and delete an item from a circular queue using array.

20. Explain the following : 3+3=6

(a) Strictly binary tree

(b) Complete binary tree

21. Given the following in-order and pre-order traversals :

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

(a) Construct the corresponding binary tree. 4

(b) Determine the post-order traversal of the tree drawn. 2

22. Write an algorithm for insertion sort. How does it work? Explain with an example.

23. Using selection sort algorithm, sort the following unsorted elements :

50, 33, 44, 22, 77, 35, 60, 40

Also write down the time complexity of selection sort algorithm.

24. Explain the concept of hashing division method of hashing. Store the following values in a hash table of size :

11, 25, 45, 96, 101, 102, 162, 197, 201

25. *(a)* Mention a real-world example of hashing. 1

(b) What is the format of hash? 1

(c) What are the two types of hashing in data structure? Define. 4

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