2024/FYUG/EVEN/SEM/
CSCDSC–151T/062

FYUG Even Semester Exam., 2024

COMPUTER SCIENCE

(2nd Semester)

Course No. : CSCDSC–151T

(Data Structure)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *ten* questions : 2×10=20

1. What is multidimensional array? How is multidimensional array represented in memory?

2. Write down the limitations of array.

3. Write the postfix notation of $(A-B)+C$.

4. What do you mean by input-restricted and output-restricted dequeue?

5. Define doubly linked list with example.

6. State the differences between array and linked list.

7. Define height-balanced tree.

8. Write down the properties of binary search tree.

9. Write the advantages and disadvantages of threaded binary tree.

10. Write down the differences between linear search and binary search.

11. What do you mean by best case and worst case time complexities of an algorithm?

12. Discuss the time complexity of selection sort.

13. Define hashing.

14. What is chaining?

15. When do collision occur in hashing?

SECTION—B

Answer any *five* questions : 10×5=50

16. *(a)* What is stack? What are the different types of operations that are performed on a stack? Write the algorithms for stack operations. 1+1+4=6

(b) What is recursion? Write the advantages of recursion. 2+2=4

17. *(a)* Write an algorithm to insert an element at the end of an array. 4

(b) Consider the following arithmetic expression *P*, written in postfix notation :

P : 12, 7, 3, –, 1, 2, 1, 5, +, *, +

(i) Translate *P* into equivalent infix expression.

(ii) Evaluate *P* using stack. 3+3=6

18. What is circular linked list? Write an algorithm to insert and delete an element in a circular linked list. 2+4+4=10

19. Write short notes on the following : 5×2=10

(a) Priority queue

(b) Self-organizing list

20. *(a)* Let E denote the following algebraic expression :

$$E = [a+(b-c)]*[(d-e)/(f+g-h)]$$

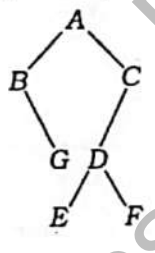
(i) Draw the corresponding binary tree of the given expression.

(ii) Give the pre-order and post-order traversals of the tree. 6

(b) What is binary tree? Construct a binary search tree from the following node values : 4

40, 20, 60, 30, 10, 80, 50, 44, 55, 32

21. *(a)* Find the preorder and inorder traversals of the following binary tree : 4



(b) Write down the step-by-step procedure to construct the AVL tree of the following data : 6

21, 26, 30, 9, 4, 14, 28, 18,
15, 10, 2, 3, 7

(Continued)

22. Write an algorithm for binary search. Show the steps to search the element 45 from the following elements stored in an array : 5+5=10

15, 16, 20, 30, 35, 45, 50, 55

23. Write an algorithm for insertion sort. Show the steps to sort the following numbers using bubble sort algorithm : 5+5=10

30, 60, 50, 35, 15, 25

24. *(a)* What is hash function? Discuss different types of hash functions. 7

(b) Differentiate between open addressing and closed addressing. 3

25. *(a)* Discuss about the collision resolution strategies. 5

(b) Consider a hash table of size 10. Using linear probing, insert the keys

72, 27, 36, 24, 63, 81, 92 and 101

into the hash table. 5

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