D 31575 **(Pages : 3)** **Name.....**

Reg. No.....

THIRD SEMESTER (CUCBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2022

Computer Science

BCS 3B 04—DATA STRUCTURES USING C

(2017—2018 Admissions)

Time : Three Hours Maximum : 80 Marks

Part A

Answer **all** *questions.*
Each question carries 1 *mark.*

1. ADT stands for ————————.

2. The matrix with zeros as its dominating elements is called ————————.

3. What is the time complexity to count the number of elements in the linked list ?

   A) O (1). B) O (n).

   C) O (log n). D) O(n^2).

4. In circular linked list, insertion of node requires modification of ————————.

   A) One pointer. B) Two pointers.

   C) Three pointers. D) None of the above.

5. A data structure in which elements can be inserted or deleted at/from both ends but not in the middle is :

   A) Queue. B) Circular queue.

   C) Dequeue. D) Priority queue.

6. In a stack, if a user tries to remove an element from an empty stack it is called

   A) Overflow. B) Underflow.

   C) Garbage. D) None of the above.

7. The number of edges from the node to the deepest leaf is called of the tree.

   A) Height. B) Depth.

   C) Length. D) None of the above.

Turn over

8. Which of the following is non-liner data structure ?

   A) Stack. B) List.

   C) Tree. D) String.

9. The average case occurs in the linear search algorithm when ————————.

   A) Item is the last element in the array or item is not there at all.

   B) When the item is the last element in the array.

   C) When the item is not the array at all.

   D) When the item is somewhere in the middle of the array.

10. A person wants to visit some places. He starts from a vertex and then wants to visit every vertex till it finishes from one vertex, backtracks and then explore other vertex from same vertex. What algorithm he should use ?

    A) Depth First Search.

    B) Breadth First Search.

    C) In-order Traversal.

    D) None of the above.

(10 × 1 = 10 marks)

Part B

Answer **all** *questions.*
Each question carries 3 *marks.*

11. What is meant by complexity of an algorithm ? Explain how it is measured.

12. What is sparse matrix ? Explain how it is useful.

13. What is stack ? Explain its representation.

14. What is binary search tree ?

15. List any three applications of BFS algorithm.

(5 × 3 = 15 marks)

Part C

Answer any **five** *questions.*
Each question carries 5 *marks.*

16. What is data structure ? Explain the different categories of data structure with examples.

17. Represent the following matrix using row major order and column major order :

$$\begin{pmatrix} 10 & 20 & -32 \\ 03 & 99 & -22 \\ 21 & -4 & 89 \end{pmatrix}.$$

18. Explain the differences between two-way linked list and circular linked list.

19. Convert (A + B) * D + E/(F + A * D) + C to postfix expression showing the status of stack at each step in a tabular form.

20. Explain how circular queue is implemented using arrays.

21. What is binary search tree ? Construct a binary search tree with following data : 50, 33, 55, 20, 23, 60, 10, 45.

22. Explain DFS algorithm with suitable example.

23. Sort the list E, X, A, M, P, L, E in alphabetical order using selection sort.

(5 × 5 = 25 marks)

Part D

Answer any **three** *questions.*
Each question carries 10 *marks.*

24. What is a string ? Explain the different string handling functions in C.

25. What is single linked list ? Explain the different operations on single linked list with illustration.

26. Translate the following expression P, written in postfix notation : P: 12, 7, 3, -, /, 2, 1, 5, +, *, + to infix expression using stack. Also evaluate the expression using stack and show the status of the stack on each step of the evaluation.

27. Compare and contrast linear search and binary search algorithms. Also evaluate the time complexity of the above two algorithms with suitable examples.

28. Explain different types of tree traversing algorithms. Explain each one with suitable example.

(3 × 10 = 30 marks)