

Data Structure Using C (313301)

MSBTE Diploma · K-Scheme · Model Question Paper — Set A

Time: 3 Hours**Max. Marks: 70****Instructions:**

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following:**10**

- a) Define data structure. Give any two examples of linear data structure.
- b) State any two differences between linear search and binary search.
- c) Define Abstract Data Type (ADT).
- d) State the LIFO principle of stack with one real-life example.
- e) List any four types of queue.
- f) Define the following terms w.r.t. tree: i) Leaf node ii) Degree of a node
- g) State any two advantages of linked list over array.

Q.2 Attempt any THREE of the following:**12**

- a) Describe the working of bubble sort. Sort the following numbers using bubble sort and show each pass: 40, 20, 50, 10, 30
- b) Describe the concept of linked list with the terms: node, next pointer, null pointer and empty list. Draw a neat diagram.
- c) Explain stack overflow and stack underflow conditions with example.
- d) Draw the expression tree for the following expression: $(4p - 3q)^2 * (a + 6b)^3$

Q.3 Attempt any THREE of the following:**12**

- a) Write a 'C' program to search an element in an array using binary search.
- b) Convert the following infix expression into postfix form using stack. Show the stack at each step: $(A + B) * C - D / E \wedge F$
- c) Differentiate between linear and non-linear data structures. (Any four points)
- d) Write an algorithm to insert a new node at the beginning of a singly linked list.

Q.4 Attempt any THREE of the following:**12**

- a) Find the position of element 47 using binary search method in the array: A = {11, 18, 25, 32, 47, 56, 63, 78}. Show each step.
- b) Construct a binary search tree for the following elements and show each step of construction: 45, 25, 65, 15, 35, 55, 75, 30
- c) Show the effect of PUSH and POP operations on a stack of size 8. The stack contains 10, 20, 30 and 40 with 40 at the top. Show diagrammatically the effect of: i) PUSH 50 ii) PUSH 60 iii) POP iv) PUSH 70
- d) Draw the structure of: i) Singly linked list ii) Doubly linked list iii) Circular singly linked list iv) Circular doubly linked list
- e) Describe circular queue with a neat diagram. State its advantage over linear queue.

Q.5 Attempt any TWO of the following:

12

- a) Write a 'C' program to implement a linear queue using array with insert, delete and display operations.
- b) Evaluate the following postfix expression using stack. Show the stack contents at each step: 6, 2, 3, +, -, 3, 8, 2, /, +, *
- c) Differentiate between singly linked list and doubly linked list. (Any six points)

Q.6 Attempt any TWO of the following:

12

- a) Sort the following numbers in ascending order using insertion sort and write the output after each iteration: {28, 12, 45, 6, 33, 19}
- b) Construct a binary search tree for 50, 30, 70, 20, 40, 60, 80, 35 and write its inorder, preorder and postorder traversal.
- c) Write a 'C' program to delete a node from the beginning and from the end of a singly linked list.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in