Data Structure Using C (313301)

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

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. Classify data structures with a diagram.

b) Differentiate between stack and queue. (Any two points)

c) Define binary search tree.

d) State any two advantages of circular queue over linear queue.

e) Write the syntax of node declaration of a doubly linked list in ‘C’.

f) Define the following terms w.r.t. tree: i) Level of a node ii) In-degree of a node

g) Define searching. Name its two methods.

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

a) List different sorting techniques. Explain selection sort with the example {33, 11, 44, 22}.

b) Explain different operations performed on a singly linked list.

c) Explain PUSH and POP operations of stack using array with example.

d) Draw the expression tree for the following expression: (a + b * c) / (d − e ^ f)

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

a) Write a ‘C’ program to sort an array using bubble sort.

b) Convert the following infix expression into postfix form using stack. Show each step: ((P + Q) * R) ^ (S − T)

c) Explain heap with example. Construct a max heap for the elements 30, 50, 20, 60, 10.

d) Compare static and dynamic memory allocation. (Any four points)

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

a) Find the position of element 19 using binary search in the array A = {3, 9, 14, 19, 27, 31, 40, 52}. Show each step.

b) Construct a binary search tree for 70, 50, 90, 40, 60, 80, 100, 55 and write its preorder traversal.

c) Write an algorithm to delete a node from the beginning of a singly linked list.

d) Show the effect of PUSH and POP on a stack of size 6 containing 5, 15, 25 (25 at top): i) PUSH 35 ii) POP iii) POP iv) PUSH 45

e) Explain the different types of queue.

Q.5 Attempt any TWO of the following: **12**

a) Write a 'C' program to implement a circular queue using array with insert, delete and display operations.

b) Sort the following numbers using insertion sort and write the output after each iteration: {52, 18, 39, 7, 64, 25}

c) Distinguish between singly linked list, doubly linked list and circular linked list. (Any six points)

Q.6 Attempt any TWO of the following: **12**

a) Evaluate the following postfix expression using stack. Show the stack at each step: 8, 3, 2, ^, +, 6, 2, /, −

b) Create a singly linked list of 18, 27, 36, 45. Insert a new node 30 after node 27. Show each step with diagram.

c) For the tree shown in Fig. 1 find: i) Leaf nodes ii) Degree of node Q iii) Level of node V iv) Height of tree v) Siblings of S vi) Inorder traversal

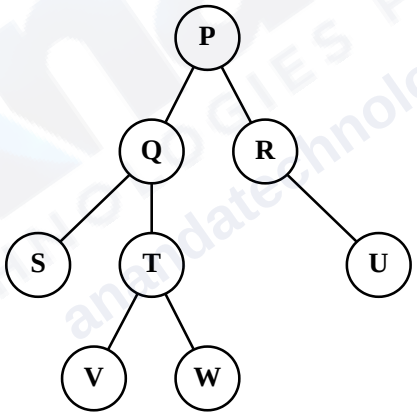

Fig. 1

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