



Progressive Education Society's
Modern College of Arts, Science & Commerce Ganeshkhind, Pune – 16
End Semester Examination: Nov / Dec. 2023
Faculty: Science and Technology

Program : B.Sc.Computer Science Code (BScComp05)
Program (Specific) : Computer Science
Class : S.Y.B.Sc. Computer Science
Name of the Course : Data Structures and Algorithms - I
Time : 2Hrs

Semester : III **SET : A**
Course Type : CC
Max.Marks: 35
Course Code : 23 - CS -231
Paper : I

Instructions to the candidate:

- 1) There are 4 sections in the question paper. Write each section on a separate page.***
- 2) All Sections are compulsory.***
- 3) Figures to the right indicate full marks.***
- 4) Draw a well labeled diagram wherever necessary.***

SECTION : A

Q1) Solve the following multiple choice questions:

[5]

- i) ADT stands for :
 - a. Abstract Data Type
 - b. Advanced Data Type
 - c. Advanced Digital Type
 - d. Abstract Digital Type
- ii) Which of the following requires data to be in the sorted order?
 - a. Binary Search
 - b. Sentinel Search
 - c. Sequential Search
 - d. Probability Search
- iii) Which of the following is the correct statement to insert newnode after the header node?
 - a. head->next = newnode;
 - b. newnode->next = head;
 - c. newnode->next = head->next; head->next = newnode;
 - d. head->next = newnode; newnode->next = head;
- iv) Stack is a
 - a. LIFO
 - b. FIFO
 - c. FILO
 - d. LILO
- v) Removing an element from an empty queue results in _____ condition.
 - a. Overflow
 - b. peek
 - c. Underflow
 - d. isempty

Q2) Answer ANY FOUR of the following:

[4]

- i. State the types of data.
- ii. List the comparison-based sorting algorithms.
- iii. Define Best Case of an algorithm.

- iv. State the principle on which a Merge Sort works.
- v. List applications of queue.
- vi. Define Backtracking in Stack.

SECTION : B

Q3) Answer ANY FOUR of the following:

[8]

- i. Explain Linear and Non-Linear data structures.
- ii. State the condition for the partition of array in Quick Sort
- iii. "Linked list can be accessed randomly". State true/false and Justify.
- iv. Solve the given infix expression into prefix and postfix : $A*B-C*D+E$
- v. Differentiate between singly linked list and doubly linked list.
- vi. Use the following polynomial and represent it in a Generalized Linked List

$$M(p,q,r) = 25p^3q^2r^4 + 8p^2q^2r^4 + 9p^3qr + 2p^2qr + 14pqr$$

SECTION : C

Q4) Answer ANY FOUR of the following:

[8]

- i. Show the steps of stack contents for the following infix expression and convert it into a postfix expression. Consider the expression : $p * q - r / s$
- ii. Compare Array and Linked List.
- iii. Define Linear Queue.
- iv. What is Top of the stack?
- v. State the best case and worst case time complexity of Quick Sort.
- vi. Explain Time Complexity.

SECTION : D

Q5) Answer ANY TWO of the following:

[10]

- i. Show the steps of sorting the following data using Bubble Sort : 45,98,29,10,21
- ii. Explain Binary Search Technique.
- iii. Write a menu driven program to apply the following operations on singly linked list.
 - a. Create
 - b. Insert node at last position.
- iv. Write a menu driven program to apply the following operations on queue.
 - a. Create
 - b. Reverse the elements.