This question paper contains 4 printed pages.

Sl. No. of Ques. Paper : **42** **G**

Unique Paper Code : **234261**

Name of Paper : **Data Structure (Computer Sc. – II)**

Name of Course : **B.Sc. (Prog.) Physical / Mathematical Sciences**

Semester : **II**

Duration : **3 hours** *Maximum Marks* : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A is compulsory.
Attempt any five questions from Section B.

SECTION A

1. (a) Write full form of FIFO and LIFO. Which method does stack use— FIFO or LIFO? 2

   (b) Evaluate the following postfix expression. Assume A=1, B=2, C=3.

   ABC+*CBA−+* 2

   (c) In worst case which search is better, linear search or binary search and why? 2

   (d) Write class definition for a node of doubly linked list in C++. 2

   (e) List two main differences between singly and doubly linked list. 2

   (f) If a binary tree contains *m* nodes at level L, how many nodes does it contain, at most, at level L+1? 2

P. T. O.

(g) Define the following:—

(i) Depth of Binary tree

(ii) Binary search tree

(iii) Strictly Binary tree

(iv) Height of Binary tree. 4

(h) Write a recursive function to traverse a binary search tree in preorder. 4

(i) Differentiate between the following:—

(i) Linear Search and Binary Search

(ii) Stack and Queue. 5

SECTION B

Attempt any five questions.

2. (a) Convert the following infix expression into postfix form showing intermediate status of the stack after every step in tabular form:—

$$(A+B)*(C/(D-E)+F)-G$$ 5

(b) List advantages and disadvantages of linked list implementation of stack over array implementation. 4

(c) Name the data structure used for the implementation of recursion. 1

3. (a) Write a function that uses stack to find whether a string is a palindrome or not. (For example, MADAM is palindrome, ANT is not a palindrome.) 5

(b) Give the linked list implementation of a queue.

Write the function to delete an element from the queue. 5

4. (a) Write a function in C++ to count the number of elements in a linked list. 5

(b) Use array implementation to write the push() and pop() function of Stack. 5

5. (a) Define the following terms:—

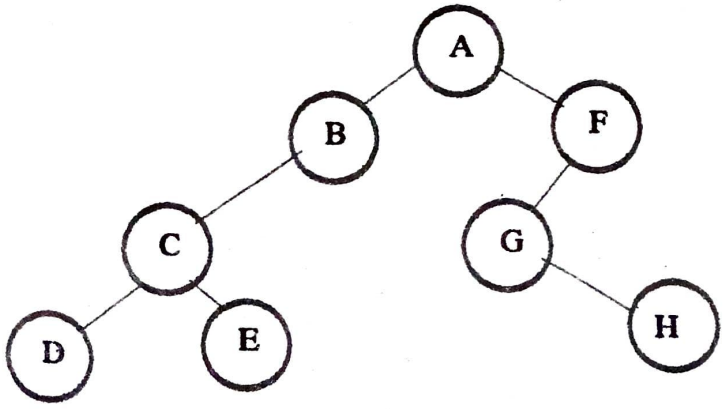
(i) Circular Queue

(ii) Dequeue (Double Ended Queue)

(iii) Linked List. 3

(b) If a binary tree contains *m* nodes at level L, how many nodes does it contain, at most, at level L+1? 2

(c) Perform the Preorder and Postorder traversal of the following binary tree. 5



6. (a) What are the conditions used to determine the overflow and underflow of a queue? How are these conditions handled in case of circular queue? 5

(b) List various ways of implementing priority queues using array implementation.

Write the linked list implementation of priority queue. 5

7. (a) Show the sequence of steps involved in sorting the elements using Insertion sort. The list of elements is as follows:—

7, 12, 3, 2, 4, 9 5

(b) Create a binary search tree using the following values:—

15, 3, 22, 5, 4, 34, 7, 2, 8

Show all the intermediate trees. 5

8. (a) Write a function in C++ for bubble sort.

5 (b) Write a function in C++ for binary search using recursion. 5