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This question paper contains **4** printed pages]

Your Roll No..... 120459

658 ASHISH BANSAL

B.Sc. (Physical Sciences/~~Life Sciences~~) (Sem. II) A

Computer
~~CHEMISTRY~~—Paper CSPT-202

(Data Structures)

(Admissions of 2010 and Onwards)

Time : 3 *Hours* *Maximum Marks* : 75

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

Attempt *all* questions.

Parts of a question must be answered together.

1. (*a*) Convert the following infix expression to prefix : 3

((A + B)/(C – D) + E)*F

(*b*) Evaluate the following postfix expression using a stack, showing the contents of stack at each step : 5

7 3 + 6 – 2 5 + * 2 /

(*c*) How is a stack used to implement function calls in a computer ? 2

P.T.O.

(*d*) Write a function to compute factorial of a number using : 5

(*i*) Recursive approach

(*ii*) Iterative approach.

What are the advantages of each approach ?

2. (*a*) Define a deque. List the advantages of a deque. 3

(*b*) Give a data structure declaration of a priority queue. Write a function to delete an element from a priority queue. 5

(*c*) Create a class in C++ to implement a linked queue of integers. The class should have inline functions for various queue operations. 7

3. (*a*) Write a function in C++ to concatenate two singly linked lists. 5

(*b*) What is an abstract data type ? Write declaration of a stack as an abstract data type. 4

(*c*) Define the following terms in the context of a binary tree : 3

(*i*) Leaf node

(*ii*) Complete binary tree

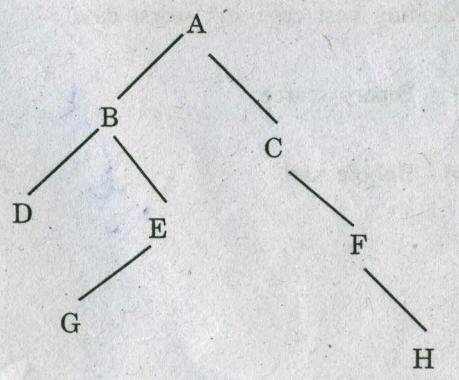
(*iii*) Sibling nodes.

(*d*) Write a C++ program to implement bubble sort in a list of integers. 3

4. (*a*) Create a binary search tree from the following sequence of input keys : 5

6, 2, 35, 89, 120, 5, 38, 7, 62, 19, 4

(*b*) Give the post order, preorder and inorder traversals of the following binary tree : 6



(*c*) Give appropriate C++ declaration of a doubly circular linked list. Show how the list will appear when only one node is in the list, using a diagram. 4

5. (*a*) Consider the following list of integers : 6

3, 11, 67, 9, 2, 15, 6, 21, 45, 13

Sort the above list in ascending order showing your steps using :

(*i*) Insertion sort;

(*ii*) Selection sort.

(*b*) Write a function in C++ for insertion sort. 5

(*c*) State the run-time complexity of the following algorithms, including best case and worst case : 4

(*i*) Binary search;

(*ii*) Bubble sort.