

(This paper contains 2 printed pages)

Roll No:

1940

C

**BSc. (H) Comp Sc. II Semester (Old Course)  
Paper 201: Data Structures**

Time : 3 hrs

Max marks: 75

(Attempt all questions. Parts of a question may be answered together. )

- 1 (a) What is the difference between a function template and a macro? Explain with the help of a suitable example. 4
- (b) Write a C++ function to implement the standard library function strcpy(s1,s2). 4
- (c) Write a C++ function to add two matrices by overloading the operator "+". 4
- (d) What is a reference type? What is its purpose? Give example. 3
- 2 (a) Differentiate between
  - (i) stacks and queues 3
  - (ii) char \* s and char s[10] 3
  - (iii) arrays and linked lists 3
  - (iv) call by value and call by reference 3
- (b) Why can static member functions access only static data of that class? Justify your answer. 3
- (c) Write a C++ program to calculate area of a triangle, circle and rectangle using Function overloading. 5
- 3 (a) Give an algorithm to reverse the order of elements in a stack s using one additional queue. Show the contents of the stack and the queue at each step. 5
- (b) Write a recursive function in C++ that calculates and returns the length of a linked list. 5

(c) Give template class definition for a doubly linked list. Write a member function to delete a particular node from this linked list. 5

(d) A tridiagonal matrix  $D$  of dimension  $n \times n$  has all non-zero entries on the three central diagonals. Suppose this matrix is mapped to a one dimensional array  $A$  by diagonals, starting with the lowest diagonal. Obtain the formula for the location of an element  $D(i, j)$  in  $A$ . 5

4 (a) Write member functions to perform the following operations on a Binary Search Tree:-

(i) Insertion. 4

(ii) Calculating the height of the tree. 4

(iii) Counting the no. of right children. 4

(iv) Preorder Traversal. 4

(b) Following are the Preorder and Inorder traversals of a BST. Draw the tree. 4

Preorder traversal : J C A E G F M R

Inorder traversal : A C E F G J M R