(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×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