

[This question paper contains 7 printed pages.]

Your Roll No. ....

6606A

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**B.Sc. (H) COMPUTER SCIENCE / II Sem.**

Paper-201 : DATA STRUCTURE

(Admissions of 2001 and onwards)

Time : 3 Hours

Maximum Marks : 75

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

Question No. 1 is compulsory. Attempt any *Four* questions out of the remaining Q. Nos. 2 to 7.

Part of a question must be answered together.

1. (a) Find the error in the following code and correct it : 3

```
class XYZ
{
int i, j;
public :
friend int mult (XYZ X1);
XYZ (int a, int b)
{ i = a; j = b; }
};
int XYZ :: mult (XYZ X1)
{ return X1.i * X1.j; }
int main( )
{ XYZ X2 (3, 4);
cout<<mult(X2);
return 0;
}
```

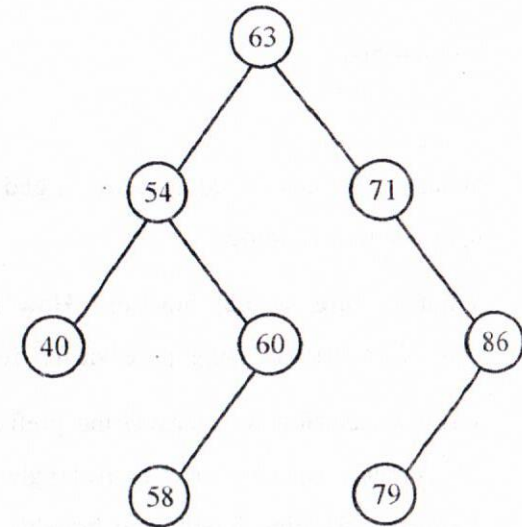
[P. T. O.]

(b) Find the output of the following codes : 5

(i) class X  
 { int a;  
 public :  
 X(int b) { a = b; }  
 int inc\_a( )  
 { return a++; }  
 };  
 int main( )  
 { X ob = 99;  
 cout<<ob.inc\_a( );  
 return 0;  
 }

(ii) void act(int \*i);  
 int main( )  
 { int x;  
 x = 10;  
 cout<<x;  
 act(&x);  
 cout<<x;  
 return 0;  
 }  
 void act(int \*i)  
 { \*i = - \*i; }

- (c) Write a code to find product of rational number using operator overloading. 6
- (d) How can the classes and functions be made generic? Illustrate with the help of an example. 5
- (e) Write an algorithm to insert a node as a middle of a Doubly Linked List. Assume that the list contain even number of elements. 6
- (f) Write a function to delete an element from Queue. 5
- (g) Consider the following Binary Search Tree : 5

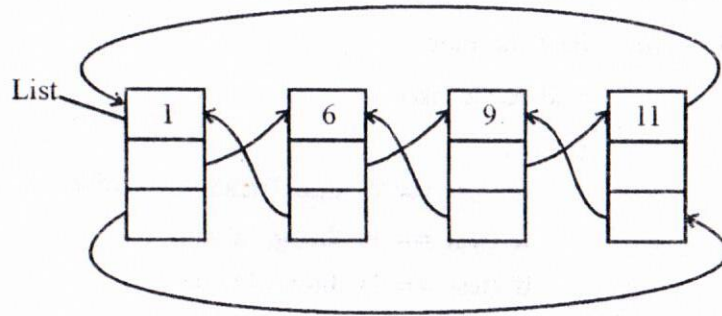


Write the order in which the nodes are visited if tree is traversed in (i) preorder, and (ii) postorder.

2. (a) Write a program algorithm for sorting list using bubble sort. 5
- (b) What is typedef statement? What is its advantage? 3
- (c) What is the output of the following code? 2
- ```
void sput(char *s)
{
    register int t;
    for(t = 0; s[t]; ++t)
        putchar(s[t]);
}
```
3. (a) What is the advantage of using friend function in operator overloading? 2
- (b) What is pure virtual function? How are abstract classes described using pure virtual functions? 3
- (c) Write a function to overload the prefix version of ++ operator relative to class rectangle having two member variables length and breadth. 5
4. (a) How can static member variables and functions of a class be accessed in the main( ) function? Illustrate with an example. 5

- (b) Write a recursive function that calculates and returns the length of a linked list. 5
5. (a) Find the output : 5
- ```
void X(int test)
{ try {
    if (test == 0) throw test;
    if (test == 1) throw 'a';
    if (test == 2) throw 423.06;
    }
    catch(int i)
    { cout<<"caught an integer\n"; }
    catch(...)
    { cout<<"caught one!\n"; }
    }
int main( )
{
    cout<<"start \n";
    X(0);
    X(1);
    X(2);
    cout<<"End \n";
    return 0;
}
```
- (b) Describe self-organising-lists used to speed up the searching process in a Linked List, 5

6. (a) A circular doubly Linked List is given as : 5



Indicate the changes made in the list after doing each of the following assignments one after the other :

- (i) List  $\rightarrow$  next  $\rightarrow$  next = List  $\rightarrow$  prev;
- (ii) List  $\rightarrow$  prev  $\rightarrow$  prev = List  $\rightarrow$  next;
- (b) Using an empty stack S of size 3, show the following operations on stack S : 5
- push(5)
- push(6)
- pop( )
- push(10)
- pop( )
- push(12)
- push(15)
- push(20)

7. (a) Write a recursive function to create a mirror image of a binary search tree. 5
- (b) A  $n \times n$  lower triangular matrix is stored in one-dimensional array of size  $m$ , write the mapping function to store  $(i, j)$ th element of matrix into the index  $k$  of one-dimensional array. 5