SPRING END SEMESTER EXAMINATION-2023

6th Semester B.Tech (Open Elective-I/Minor-I)

OBJECT ORIENTED PROGRAMMING

IT2005

(For 2021 (L.E), 2020 & Previous Admitted Batches)

Time: 3 Hours Full Marks: 50

Answer any SIX questions.
Question paper consists of four SECTIONS i.e. A, B, C and D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions. [1 × 10]

(a) What is a zero argument constructor? Justify whether it is mandatory to write a zero argument constructor with suitable example?

(b) If a base class contains a member function baseFunc() and derived class does not contain a function with same name, can an object of the derived class access baseFunc()? Explain with appropriate example.

(c) What is a pure virtual function? What are the merits and demerits of defining and declaring a pure virtual function in a program?

(d) Find the output of the following code

```
#include<iostream>
using namespace std;
class P {
public:
void print(){ cout <<" Inside P"; }
};
class Q : public P {
public:
void print() { cout <<" Inside Q"; }
};
class R: public Q { };
int main(void)
{
R r;
r.print();
return 0;
}
```

(e) How are friend functions used to carry out overloading of operators? In which situation are they helpful?

(f) What is the output of the following pseudo code?

```
#include<iostream>
using namespace std;

template<class T>
class TEST
{
        T VAL;
        TEST<T> *PTR;
        public:
static int COUNT;
                TEST()
                {
                        COUNT++;
                }
};
template<class T>
int TEST<T>::COUNT=5;
int main( )
{
```

```
        TEST<int>A;
        TEST<int>B;
        TEST<double>C;
        TEST<double>D;
        cout<<TEST<int>::COUNT;
cout<<TEST<double>::COUNT;
}
```

(g) What is the output of the below program? Justify your answer

```
#include<iostream>;
using namespace std;
class Base1
{
public:
char data;
};
class Base2
{
public:
int data;
};
class Child: public Base1, public Base2
{
public:
void show()
{
cout<<Base2::data;
}
};
int main(void)
{
Child d;
d.show();
return 0;
}
```

(h) List any four differences between object-oriented programming and procedure-oriented programming.

(i) Find the error(s) in the below program.[Assume the necessary header files and namespace included]

```
#include<iostream>
using namespace std;
class base {
protected:
void myfun1() {cout<<"In Base myfun1();";}
void myfun2() {cout<<"In Base myfun2();";}
};
class derived: protected base{
public:
void myfun2(){
base::myfun2(); }
};
int main() {
derived d;
d.myfun2();
d.myfun1();
return 0;
}
```

(j) What is the output of the following pseudo code

```
#include<iostream>
using namespace std;

class A{ };
int main()
{
        int X;
        float Y;
        try
        {
                try
                {
                throw A( );
          }
          catch (int){cout<<"ERROR1"; throw A();}
          catch(float){cout<<"ERROR2";
         throw X;}
          catch(A){cout<<"ERROR3";throw Y;}
        }
```

```
catch(int){cout<<"ERROR4";}
catch(float){cout<<"ERROR5";}
catch(A){cout<<"ERROR6";}
}
```

a) ERROR3ERROR5
b) ERROR3ERROR6
c) ERROR1ERROR6
d) ERROR2ERROR5

SECTION-B

2. (a) Discuss any four features of OOP with suitable examples. [4]

(b) State the advantages of using inline function. [4]

Write a program in c++ to read a specific number n and print it digit by digit in words using inline function.

For example: consider the number 785,which should be printed as "Seven Eight Five"

3. (a) A book shop maintains the inventory of books that are being sold at the workshop. The list includes details such as author, title, price, publisher and stock position. Whenever a customer wants a book, the sales person inputs the title and author and the system searches the list and displays whether it is available or not. If it is not, an appropriate message is displayed. If it is, then the system displays the book details and requests for the number of copies required. If the requested copies are available, the total cost of the requested copies is displayed otherwise the message "**Required copies not in stock**" is displayed. WAP using a class called Books with suitable member functions and constructors. [4]

(b) Define a class named as FRACTION that contains two data members that represent the numerator and denominator of a fraction, by defining necessary member functions. Write a program to add and subtract. [4]

The add accepts the objects using call by-value technique and subtract accepts objects using call-by-reference technique.

SECTION-C

4. (a) WAP that defines a shape class with a constructor that gives value to width and height. Then define two sub-classes triangle and rectangle that calculate the area of the shape. In the main, define two variables a triangle and one variable of rectangle and then call the area() function for those variables. [4]

   (b) WAP by creating an abstract base class Account which has virtual function Deposit, Withdrawal and non virtual function Balance. Saving Account, Current Account, Recurring Account and Term Deposit Account (called account type) are the derived classes of Account. Deposit is to add the balance into the account and Withdrawal is to get the withdrawal amount. Write member function to deposit a specific amount, withdraw specific amount after checking the minimum balance of Rs. 10,000 and to display the balance information for respective account. There are 5 customers in the bank currently and customer can have more than one account type. [4]

5. (a) Write a program to create class which stores an integer array. Overload the following operators [4]

   given below:

   i. Unary minus to negate all the elements of the array.

   ii. Binary multiplication to multiply an integer number to all the elements of the array and store in another object. [OBJ2=OBJ1*10].

(b) Create a class which stores id, name, age and basic salary of an employee. Input data for n number of employees. Calculate the gross salary of all the employees and display it along with all other details in a tabular form. Use of constructor and destructor as per requirement. [4]

[Gross salary= Basic salary + DA + HRA,

DA = 75% of Basic salary

HRA=15% of Basic salary]

6. (a) WAP to explain virtual function by creating a base class Account which has virtual function deposit() and withdrawal(). Two classes Saving and Current Account derived from Account and they have deposit() and withdrawal(). Deposit is to add the balance into your account and Withdrawal is to get the withdrawal amount. Write a member function to get the deposit and withdrawal amount and to update the balance information for current and savings etc. Write a member function to display the balance information for respective account. [4]

(b) WAP to explain virtual function by creating a base class polygon which has virtual function area(). Two classes rectangle and triangle derived from polygon and they have area() to calculate and return the area of rectangle and triangle respectively. [4]

SECTION-D

7. (a) Write a program to enter the email ID from the keyboard in international format: [4]

-it must have the @ in the middle. The @ should not be present from the beginning or end.

- the email id should end with ".ac.in" or ".com".

-it should have minimum one digit, but not from the beginning.

If user deviates from the above then exception should be thrown separately for different categories and separate error messages should be displayed.

(b) Write a program to create a Array class object. Overload '+' operator to insert an element to the Array object and overload '-' operator to delete an element from the Array. Check for overflow and underflow condition while doing insertion and deletion operations. Define suitable data members and member functions. [4]

8. (a) Write a program to create a function template for sort( ) function which can sort array of integers, array of float or array of doubles. [4]

(b) What is a stream? Draw the stream hierarchy. Suppose two file has the content of 05 students details i.e. students' name, roll no, branch, CGPA each. Create a third file and store the content of the two existing files. [4]

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