National Institute of Technology Goa

B.Tech-IV Semester - End Semester Examinations

Course Name: Object Oriented Programming   **Course Code:** CS252
Date: May 10, 2021.   **Time:** 9.30 A M
Duration: 3 Hours   **Max. Marks:** 100

Instructions:
1. *Write legibly. Unnecessary details attracts penalty*
2. *You must complement your explanation with the short fragments of C++ code where appropriate*
3. *Your programs should compile on any standard C++ compiler and be executed.*
4. *You should assume that appropriate headers and namespace std are included in each program.*
5. *The question paper is of **Six** pages.*

1.

   a) Consider a class myclass with two data members each of type int. Write a C++ program, so that the following statements get executed. You can assume that following are present in main ().

   > Ob4=++Ob1+ Ob2-Ob3++;
   > cout<<Ob1<<Ob2<<Ob3<<Ob4;

   Where, Ob1, Ob2, Ob3 and Ob4 are objects of class myclass. You are supposed to make the required functions as member functions wherever possible. **(10)**

   b) State whether each of the following is true or false. If false, explain why. **(5)**

   i. All virtual functions in an abstract base class must be declared as pure virtual functions.
   ii. Referring to a derived-class object with a base-class handle is dangerous.
   iii. A class is made abstract by declaring that class virtua1.
   iv. If a base class declares a pure virtual function, a derived class must implement that function   become a concrete class.
   v. Polymorphic programming can eliminate the need for switch logic.

2.

   A player rolls two dice. Each die has six faces. These faces contain 1, 2, 3, 4, 5 and 6 spots. After the dice have come to rest, the sum of the spots on the two upward faces is calculated. If the sum is 7 or 11 on the first roll, the player wins. If the sum is 2, 3 or 12 on the first roll (called "craps"), the player loses (i.e., the "house" wins). If the sum is 4, 5, 6, 8, 9 or 10 on the first roll then that sum becomes the player's "point." To win, you must continue rolling the dice until you "make your point." The player loses by rolling a 7 before making the point. **(5)**

3.

a) What are abstract classes? Can you instantiate an abstract class? Justify. Give a scenario wherein you will be using abstract classes. Differentiate function overloading and overriding **(4)**

b) How to achieve run-time polymorphism in C++? With an example program explain run-time polymorphism. How static binding is realized in C++? **(6)**

c) Consider the following program. Correct the program using all possible approaches, if the program is incorrect. If the program is incorrect, reason why it is incorrect.**(8)**

#include<iostream>
using namespace std;
 	
   class base{
   public :
   int i;
};
	class derived1 : public base{
	public:
	int j;
	};
		class derived2: public base
		{
		public:
		int k;
		};

class derived3: public
derived1, public
derived2{
public:
int sum;
};
	int main()
	{
	derived3 ob;
	ob.i=10;
	ob.j=20;
	ob.k=30;
	/* the rest of the code is on
	right side*/
		/* continuation of main()*/
		ob.sum= ob.i+ob.j+ob.k;
		cout<<ob.i<< " " <<ob.j<< " ";
		cout<<ob.k<< " "
		cout<<ob.sum;
		return 0;
		} /*End of main()*/

4.

a) Why exception handling is important? How C++ supports exception handling? With an example program explain the concept of exception handling supported by C++. When terminate () and unexpected () functions are invoked and what are their default actions? **(6)**

b) How derived class exceptions are handled in C++? Explain with a program example. How to check whether an exception thrown is caught or uncaught? **(4)**

5.

a) What are the features of Java programming language? How Java achieves platform independence? Write a Java program to multiply two integers. The numbers should be passed as command line arguments. You have to put your program in a package called MyPackage. Also, mention how to run this program? **(6)**

b) In Java classes are often organized as packages. The members of a class of a package can have default, public, protected and private access specification. Elaborate on the visibility of various members under various access specifications to the class, classes within a package, and classes outside a package. While elaborating on visibility control, you have to take inheritance also into consideration. For convenience, you can use table to elaborate visibility control.**(6)**

c) What is multithreaded programming? How multithread programming can be done in Java. With a suitable Java program explain the same. The Java thread will be in several states during its lifetime. Elaborate on the life cycle of Java thread. **(5)**

6. Note: Assume that all the relevant header files are included corresponding C/C++ Program, along with using namespace std (for C++) wherever missing; QUESTIONS SHOULD BE ANSWERED IN SEQUENCE. Justification is needed for the answers.

a) What is the output of the following program? **(2)**
 	
``c
struct marks
{
    int p:3;
    int c:3;
};
int main()
{
    struct marks s={2,-6};
    printf("%d %d",s.p,s.c);
    return 0;
}
``
	b) Give the output of the following program. **(2)**
	
	``c
	int main()
	{
	    char *str="c-pointer";
	    printf("%*.*s",10,7,str);
	    return 0;
	}
	``

	c) What is the output of the following C program? **(2)**
	
	``c
	#include <stdio.h>
	
	int main(){
	    int class=150;
	    int public=25;
	    int private=30;
	    class = class >> private - public;
	    printf("%d",class);
	    return 0;
	}
	``

e) What is the output of the following Program?**(2)**
 	
``c
int main()
{
    printf("%s", "c" "question" "bank");
    return 0;
}
``	

f) What is the output of the following program? **(2)**
```
int main()
{
    int a=-12;
    a=a>>3;
    cout<<a;
    return 0;
}
```

d) What is the output of the program? **(2)**
```
int main()
{
  try
  {
    throw 'a';
  }
  catch (int param)
  {
    cout << "int exception";
  }
  catch (...)
  {
    cout << "default exception";
  }
  cout << "After Exception";
  return 0;
}
```

g) What is the output of the program? **(2)**
```
#include<iostream>
#include<string.h>
using namespace std;

int main()
{
   cout<<sizeof("string")<<"\n"<<strlen("string");
   return 0;
}
```

h) What is the output of the program? **(2)**
```
int main()
{
   int i=0;
   if(i= =0)
   {
     i=((5,(i=3)),i=1);
     cout<<i;
   }
   else
   cout<<"Equal";
}
```

j) What is the output of the program? **(2)**
```
int main()
{
   int a=1;
   int b=(1,2);
   cout<<a<<" "<<b;
   return 0;
}
```

k) What is the output of the following program? **(2)**
```
#define call(x)  #x
int main()
{
   cout<<call(c/c++);
   return 0;
}
```

l) What is the output of the following Program? **(2)**
```
template <typename T>
T max(T x, T y)
{
   return (x > y)? x : y;
}
int main()
{
   cout << max(3, 7) << std::endl;
   cout << max(3.0, 7.0) << std::endl;
   cout << max(3, 7.0) << std::endl;
   return 0;
}
```

i) What is the output of the C program? **(2)**

```c
int main()
{
    int i=10;
    static int x=i;
    if(x==i)
    printf("Equal");
    else if(x>i)
    printf("Greater than");
    else
    printf("Less than");
    return 0;
}
```

m) Consider the following declaration : **(2)**
```c
struct addr {
char city[10];
char street[30];
int pin ;
};
struct info{
char name[30];
Int gender ;
struct addr locate ;
} person , *kd = &person ;
```
Then *(kd -> name +2) can be used instead of

    i)   person.name +2   ii) kd -> (name +2)

   iii) *((*kd).name + 2)

   iv) either (i) or (ii), but not (iii)

n) What is the output of the following? **(2)**

```cpp
int main()
{
    try
    {
        try
        {
            throw 20;
        }
        catch (int n)
        {
            cout << "Inside Caught ";
            throw;
        }
    }
    catch (int x)
    {
        cout << "Outside Caught";
    }
    return 0;
}
```

o) What is the output of the following? **(2)**
```cpp
class Test
{
    static int count;
    int id;
    public:
    Test()
    {
        count++;
        id = count;
        cout << "Constructing object number " << id << endl;
        if(id == 4)
        throw 4;
    }
    ~Test() {
        cout << "Destructing object number " << id << endl;
    }
};
int Test::count = 0;

int main()
{
    try
    {
        Test array[6];
    } catch(int i) {
        cout << "Caught " << i << endl;
    }
}
```

5

p) What is the output of the following? **(2)**

```cpp
void square (int *x)
{
   *x = (*x)++ * (*x);
}
void square (int *x, int *y)
{
   *x = (*x) * --(*y);
}

int main ( )
{
   int number = 30;
   square(&number, &number);
   cout << number;
   return 0;
}
```

q) Assume A and B are non-zero positive integers. What does the following code segment compute?**(2)**

```cpp
while ( A != B )
{
     If ( A> B )
          A -= B ;
     else
          B -= A ;
}
cout<<A;
```

r) What is the output of the program? **(2)**

```cpp
int main()
{
   int i=0;
   if(i==0)
   {
      i=((5,(i=3)),i=1);
      cout<<i;
   }
   else
   cout<<"Equal";
}
```

s) What is the out of the program? **(2)**

```cpp
class Test
{
   private:
   int x;
   int y;
   public:
   Test(int x = 0, int y = 0) {
    this->x = x; this->y = y;
   }
   static void function1() {
     cout << "Inside function1()"; }
   static void function2()
   {
cout << "Inside function2()"; this->function1();}
};

int main()
{
   Test obj;
   obj.function2();
   return 0;
}
```

t) What is the output of the following? **(2)**

```cpp
class Test {
   int x;
public:
   void* operator new(size_t size);
   void operator delete(void*);
   Test(int i) {
      x = i;
      cout << "Constructor called \n";
   }
   ~Test() { cout << "Destructor called \n"; }
};
 void* Test::operator new(size_t size)
{
   void *storage = malloc(size);
   cout << "new called \n";
   return storage;
}

void Test::operator delete(void *p )
{
   cout<<"delete called \n";
   free(p);
}
 int main()
{
   Test *m = new Test(5);
   delete m;
   return 0;
}
```

*********************************All the Best*********************************