Indian Institute of Technology Kharagpur
Class Test III 2022-23

Name: _____

Roll Number: _____

Instructions

   i. **Please write your name and roll number above before attempting any solution**.

  ii. Write your answers in this question paper itself. It has been given a booklet form for this purpose.

 iii. Use of electronic calculators only is permitted. No extra resources viz. graph papers, log-tables, trigonometric tables would be required.

 iv. **All questions are compulsory.** Be brief and precise. Mysterious or unsupported answers will not receive full marks.

  v. **A few extra blank sheets are provided at the end**. Please use them, if for any question, you need extra space.

Question:	1	2	3	Total
Points:	5	5	5	15
Score:				

1. (5 points) Consider the following program:

```cpp
#include <iostream>
#include <exception>
using namespace std;
class A {};
class B : public A {};
int main() {
    try {
        //throw A();
        //throw B();
        //throw 127;
        //throw bad_cast();
        //throw range_error("range_error");
    }
    catch (logic_error&) {
        cout << "caught logic_error" << endl;
    }
    catch (runtime_error&) {
        cout << "caught runtime_error" << endl;
    }
    catch (exception&) {
        cout << "caught exception" << endl;
    }
    catch (A&) {
        cout << "caught A" << endl;
    }
    catch (B&) {
        cout << "caught B" << endl;
    }
    catch (...) {
        cout << "default" << endl;
    }
    cout << "end of program";
    return 0;
}
```

Write the outputs for each of the throws, when uncommented individually:

```cpp
//throw A();
```

> **Solution:** Output:
>
> Caught A

```cpp
//throw B();
```

> **Solution:** Output:
>
> ```
> Caught A
> ```

```
1 //throw 127;
```

> **Solution:** Output:
>
> ```
> default
> ```

```
1 //throw bad_cast();
```

> **Solution:** Output:
>
> ```
> Caught exception
> ```

```
1 //throw range_error("range_error");
```

> **Solution:** Output:
>
> ```
> Caught runtime_error
> ```

2. (5 points) Consider the following program:

```cpp
1  #include <iostream>
2  using namespace std;
3
4  class A {
5      int a;
6      public: A(int i = 0) : a(i) { cout<<"a: "<< a <<endl; }
7  };
8  class B : public A {
9      int b;
10     public: B(int i = 0) : b(i) { cout<<"b: "<<b<<endl; }
11 };
12 class C { A a;
13     B b;
14     public: C(int i1 = 1, int i2=2) : a(i1), b(i2) { }
15 };
16 int main() {
17     C c;
18     return 0;
19 }
```

What will be the output if you compiled and executed the above program:

> **Solution:** Output:
> a: 1
> a: 0
> b: 2

3. (5 points) Consider the following program:

```cpp
1  #include <iostream>
2  using namespace std;
3
4  class A {
5      public: int a;
6      A(int i = 1) : a(i) { }
7      virtual ~A() {}
8      void print() {cout << "a: "<<a<<endl;}
9  };
10 class B : public A {
11     public: int b;
12     B(int i = 2) : b(i) { }
13     void print() {cout <<"a: "<<a<<" b: "<<b<<endl; }
14 };
15 int main() {
16     A a;
17     B b;
18     A *pa;
19     B *pb;
20
21     //pa=static_cast<A *>(&b); pa->print();
22     //pa=dynamic_cast<A *>(&b); if(pa != NULL) pa->print();
23     //pb=static_cast<B *>(&a); pb->print();
24     //pb=dynamic_cast<B *>(&a); if(pb != NULL) pb->print();
25     //pb=dynamic_cast<B *>(&b); if(pb != NULL) pb->print();
26 }
```

Write the outputs for each of the cast operators, when uncommented individually:

```cpp
1      //pa=static_cast<A *>(&b); pa->print();
```

> **Solution:** Output:
>
> a : 1

```cpp
1      //pa=dynamic_cast<A *>(&b); if(pa != NULL) pa->print();
```

> **Solution:** Output:
>
> ```
> a : 1
> ```

```
1    //pb=static_cast<B *>(&a); pb->print();
```

> **Solution:** Output:
>
> ```
> [garbage]
> ```

```
1    //pb=dynamic_cast<B *>(&a); if(pb != NULL) pb->print();
```

> **Solution:** Output:
>
> ```
> [Nothing]
> ```

```
1    //pb=dynamic_cast<B *>(&b); if(pb != NULL) pb->print();
```

> **Solution:** Output:
>
> ```
> a: 1 b: 2
> ```