# CS101: Autumn 2017 Quiz 2

13th October 2017, 8:15 am to 9:15 am

Name: _____UMESH BELLUR_____

Roll number: _____ Lab Batch:_____

*Write all your answers in the space provided. Do not write irrelevant answers. Answers must be written in pen (not pencil). You are allowed extra sheet only under special circumstances like total cancellation of a previously written answer. Write your roll number on all pages including any extra sheet you may use.*

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## DO NOT WRITE IN THE TABLE BELOW

| Q # | Marks | TA |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |
| 11 | | |

TOTAL MARKS =

| Q # | Marks | TA |
|---|---|---|
| 12 | | |
| 13 | | |
| 14 | | |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |

Roll number:_____

1. The following program will output ___0____ **[1 pt]**

```
int add(float a, float b) { return a+b; }
main_program{
      int (*fp) (float, float);
      fp = add;
      float a = 10.2 + 20.3;
      cout << (fp(10.5,20) == a);
}
```

2. Which of the following statement(s) is(are) valid about function pointer? **[1 pt]**
   (I) A function pointer can be argument of another function.
   (II) The following code is syntactically correct assuming arg1 and arg2 have been declared.

```
void foo();
void (*func_pointer)();
func_pointer = foo;
 (*func_pointer)( arg1, arg2 );
```

   a) Only (I) is correct. ✔
   b) Only (II) is correct.
   c) Neither (1) nor (II) are correct.
   d) Both (1) and (II) are correct.

3. Fill in the blanks to produce an output of 500. **[2+1 pts]**

```
int mystery( int a, int b, int (*fn)(int,int) ) {
      return ((*fn)(a,b));
}
int sumofsquares(int x, int y) {
      return (x*x + y*y);
}
main_program{
      cout << mystery(10, 20,sumofsquares);
}
```

4. The output of the following program will be _100___. **[2 pts]**

```
int fun1(int a){ return a; }
int fun2(int a){ return a*a; }
int fun3(int a){ return a*a*a; }
main_program{
      int (*fun[3])(int) = {fun1, fun2, fun3};
      int (**fpp)(int) = fun;
      cout<<(*++fpp)(10);
}
```

Roll number:_____

5. The output of the following program will be _0 1__ **[1 pt]** **0.5 point each.**

```
class Demo{
      public:
            static int s_value;
};
int Demo::s_value = 0;
main_program{
      Demo first;
      Demo second;
      cout << first.s_value++ << " " << second.s_value;
}
```

6. Fill in ONE line of code in the blank space **that only calls methods of Test** so that the program outputs 0 5. **[2 pts]** **NO PARTIAL POINTs**

```
class Test{
      static int x;
public:
      Test() { x++; }
      static int getX() { return x; }
};
int Test::x = 0;
main_program{
   cout << Test::getX() << " ";
     Test t[5]; OR
     Test t1, t2, t3, t4, t5; OR
     for(int i = 0; i<5; i++) Test t;
   cout << Test::getX();
}
```

7. Fill in the blanks to implement the **postfix** increment operator for the class shown.**[1+1+1 pts]**

```
class T{
      int x;
      public:
            T(int x){this->x = x;}
            T operator ++(int){ // signature of postfix++
                  T retval(x); OR T retval = *this;
                  x++;
                  return retval;

            }
};
```

Roll number:_____

8. Complete the following program to add members of two objects to print 6,4 as a output **[0.5 + 0.5 pt]**

```
class sample {
            public:
                  int x, y;
                  sample(int, int);
                  sample operator + (const sample&);
 };
sample::sample (int a, int b){
            x = a;
            y = b;
}
sample sample::operator + (const sample& obj){
            sample temp;
            temp.x = x + obj.x;
            temp.y = y + obj.y;
            return (temp);
}
main_program{
            sample a(4,1), b(2,3), c(0,0);
            c = a + b;
            cout << c.x << "," << c.y;
}
```

9. Write down the missing signature of the operator to make this program compile and run. **[2 pts]**

```
#include <iostream>
using namespace std;
class Fraction
{
    int num, den;
public:
    Fraction(int n,  int d) { num = n; den = d;
    // conversion operator: return float value of fraction
   operator float(){ // NO PARTIAL POINTS
        return float(num) / float(den);
      }
};

int main() {
    Fraction f(2, 5);
    float val = f;
    cout << val;
    return 0;}
```

Roll number:_____

10. Complete the blank lines of the class to create an operator << to print an object of the following class (only the signature is needed here): **[1+1 pts]**

```
class Complex {
      float real, im;
      public:
            Complex(){real = im = 0.0;}
            Complex(float r, float i):real(r), im(i) { }
           ~Complex(){}
           friend ostream& operator << (ostream& o, const Complex& c) ;
};
ostream& operator << (ostream& o, const Complex& c); // 1 point for friend declaration and one point for the correct signature.
```

11. For the same class Complex shown in the previous problem, write down the signature and implementation (in ONE line of code) of a operator * that multiplies a float with a complex number. In other words I want to enable the following: **[1.5 + 1.5 pts]**

```
Complex c1(3.1, 4.2);
float f = 6.24;
Complex c2 = f * c1;  // will make c2.real = 3.1*6.24 and
                      // c2.im = 4.2*6.24
 Class Complex {
….
friend Complex operator * (float f, Complex& c); // inside the class declaration.
}
Complex operator * (float f, Complex& c){ // outside the class.
      return Complex(f*c.real, f*c.im);
}
```

OR

```
class Complex {
      …
      public:
      Complex operator * (float f) {
            return Complex(f*real , f*im)l
      }
};
Complex operator * (float f, Complex& c) {
      return c*f;}
```

Roll number:_____

12. What will be the output of the program? __Two__ **[1 pt]**

```
class A{
      public:
            A(){
                  cout << "One" << endl;
            }
};
class B {
            static A a;
       public:
            B(){
                  cout << "Two" << endl;
            }
};
 int main(){
            B b;
            return 0;
}
```

13. Which of the following is a valid destructor of the class named Country? **[1 pt]**

a. `int ~Country()`

b. `void Country()`

c. `~Country(Country obj)`

d. `~Country()` ✔

14. What will be output of the following program? **Compile Time Error.** **[1 pt]**

```
int add(float a, float b) {  return a+b;  }
int add(int a, int b){  return a+b; }
main_program{
      cout<<(add(10,20) == add(10.5, 20.5));
}
```

a. 1

b. 0

c. Compile Time error ✔

d. 30

15. In C++ which of the following pairs of overloaded functions are NOT legal? Check mark all answers next to the choices only. Only an all correct answer gets points. **[2 pts]**

Roll number:_____

✔ a. `int fun(int x, int y);  void fun(int x, int y);`

✔ b. `int fun(int x, int y);  static int fun(int x, int y);`

✔ c. `int fun(int *ptr, int n); int fun(int ptr[], int n);`

✔ d. `int fun( int x, int y);  int fun( int x, int y = 10);`

16. What will be the output of the following program? ___8___ **[1 pt]**

```
int fun(int i=0, int j = 3);
main_program
{
      cout << fun(5.6);
 return 0;
}
int fun(int x, int y) { return (x+y); }
```

17. What will be the output of following program? **[1 pt]**

```
class Test{
      int x;
      Test() { x = 5;}
};
int main(){
      Test *t = new Test;
       cout << t->x;
}
```

a. Compiler Error ✔ (Constructor is private)

b. 5

c. Garbage value

d. 0

Roll number:_____

18. Which of the following is/are valid ways to allocate memory for one integer and initialize its value to 100 by dynamic memory allocation in C++? Check one choice. **[2 pts]**

```
a) int *p = new int(100);
b) int *p; p = new int; *p = 100;
c) int *p = NULL; p = new int; *p=100;
```

I. Only a and b
II. a, b and c. ✔
III. Only b and c.
IV. Only a and c.

19. Predict the output of the following program (check one choice below). **[1 pt]**

```
class Test
{
private:
            int x;
            int y;
public:
            Test(int x = 0, int y = 0) {
                  this->x = x; this->y = y;
            }
            static void fun1() { cout << "fun1"; }
            static void fun2() {
                  cout << "fun2"; this->fun1();
            }
};

int main()
{
  Test obj;
  obj.fun2();
  return 0;
}
```

a. fun2fun1
b. fun2
c. fun1fun2
d. Compiler error. ✔ **(cannot access this in a static method)**

Roll number:_____

20. Predict the output of the program shown by picking one choice from the set given below. **[2 pts]**

```
template <typename T>
void fun(const T&x)
{
    static int count = 0;
    cout << x << "    " << count << endl;
    ++count;
    return;
}

int main()
{
    fun<int> (1);
    fun<int>(1);
    fun<double>(1.1);
    return 0;
}
```

✔ 1. 1 0
1 1
1.1 0

2. 1 0
1 0
1.1 0

3. 1 0
1 1
1.1 2

4. Compiler Error

Roll number:_____

21. Predict the output by choosing one of the choices below assuming an integer is 4 bytes. **[2 pts]**

```
template<class T, class U>
class A  {
    T x;
    U y;
};
int main()  {
   A<char, char> a;
   A<int, int> b;
   cout << sizeof(a) << "    " << sizeof(b);
   return 0;
}
```

1) 4  16
2) 2  8 ✔
3) Compiler Error – A template cannot have more than 1 template arguments.
4) 8  8

22. The output of the following program is: **___bar___** **[1.5 pts]**

```
class Empty { };

int main() {
    Empty a, b;
    if (&a == &b) cout << "foo" << endl;
    else cout << "bar" << endl;
   return 0;
}
```

23. The output of the program shown below is: **___goinggoinggoing__**; **[1.5 pts] No partial**

```
class A {
        int x;
        public:
        A(){x=5;}
        ~A() {cout << "going";}
};
A globalA;
int main(){
        A a;
        A* b = new A;
        delete b;
}
```

24. The year in which IIT Bombay was founded was **_____1958_____** [2 points]