University of Central Punjab

Faculty of Information Technology

Object Oriented Programming
Mid Term Examination – Fall 2021

Max Marks: 50 Time allowed: 90 minutes

Instructions:

1. This is a closed book and closed notes exam.
2. Cheat Sheet is NOT allowed.
3. Please provide answers of all questions on separate answer sheet.
4. Write to the point answers.
5. There are 5 questions in this exam.
6. **Solving Exam in sequence carries 5 marks.**

Question 1 – 10 Marks

a) Consider the class given below, write the values stored in variables **e, f and g** after creating one object of this class (3)

```
class EFG
{
public:
    int e;
    int f;
    int g;
EFG(): e(-30), f(++e), g(f++)    {    }
};
```

Answer:
e =
f =
g =

b) Write output of the following code snippets (7)

```
class Vortex
{
public:
    Vortex()
    {
        cout << "Default" << endl;
    }
    Vortex(const char* _n, double _marks)
    {
        cout << "Parameterized" << endl;
    }
    Vortex(const Vortex & ref)
    {
        cout << "Copy" << endl;
    }
};
```

```
Vortex& F1(Vortex  first,Vortex  second)
{
    cout << "Hello from F1" << endl;
    return first;
}

int main()
{
    Vortex v1("VTX", 1.8);
    Vortex v2 = v1;
    Vortex v4(v2);
    v2 = v1;
    Vortex v5 = F1(v2,v4);
    return 0;
}
```


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Question 2 – 10 Marks

a) Identify the error(s) if any, in code given below and explain it with logical reasoning. (3)

```
1. class SELF
2. {
3. private:
4.     SELF * me;
5. public:
6.    SELF()
7.    {
8.        this = me;
9.    }
10 };
```

b) Detect and correct error(s) (logical as well) in the following code. You are not supposed to change anything in the main function. (You may rewrite complete code after correction) (7)

```
class Exam {
        char *ExamName;
        int No_of_paper;
public:
        Exam() {
                ExamName = "Mid term - Spring 2019";
                No_of_paper = 5;
        }
        void setname(char* name) const  {
                ExamName = new char[strlen(name)+1];
                strcpy_s(ExamName, strlen(name)+1, name);
        }
        void setpaper(int paper) const {
                No_of_paper = paper;
        }
        char* getname() {
                return ExamName;
        }
        int getpaper() {
                return No_of_paper;
        }
        ~Exam() {
                delete ExamName;
        }
};


int main() {
        const Exam exam1;
        cout << " Exam = " << exam1.getname() << endl;
        cout << " Numbe of paper = " << exam1.getpaper()<< endl;
        return 0;
}
```


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Question 3 – 10 Marks

a) Constant member function of class cannot change values of data members of same class. Why? In constant member function data member of pointer type becomes constant pointer or pointer to constant? Explain with reason. (No code required) (3)

b) Static member function of class cannot access non static data members of same class. Why? Explain with reason. (No code required) (3)

c) Three operators (=, ++, --) of a user defined class use return by reference in their function definition. Which operators are these? Why is return by reference required in all these three operators? Provide logical reasons with examples. (4)

Question 4 – 10 Marks

There is a system in an office which has some information in it. Apply **Singleton** design pattern for this scenario so multiple clients can access same information stored in the system from any access point.

Note that:

- SystemInfo has only one attribute: **infoID: int***
- Further, SystemInfo has a **display()** function as well.

You are required to:

1. Draw the complete UML diagram of the scenario
2. Provide complete implementation of the class SystemInfo
3. Provide a main() function showing:
    a. 3 clients [c1, c2 and c3] accessing the display function of the class
    b. Afterwards, c1, c2 and c3 should stop accessing the information one by one.

Question 5 – 5 Marks

Overload the stream insertion << and stream extraction >> operators for the following class? Do write both prototype and body of operators.

```
class Date
{
        int day;
        int month;
        int year;
public:
        Date(const int _day=17,const int _month=12,const int _year =1995);
        Date(const Date & obj);
        ~ Date();
};
```


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