Summer-2023

National University

of Computer & Emerging Sciences Peshawar Campus

Student Name: Shahid Iqbal Roll No: 20P-0087

Program: BCS-2A
Semester: Summer-2023
Time Allowed: 15 mins
Course: Object Oriented Programming

Examination: Quiz 01
Total Marks: 10 Weightage: 2
Date:
Instructor: Usman Wajid

NOTE: Attempt all questions.

9/10

Q1. Consider the following statements:

```
struct NameType{
        string first;
        string last;
};
```

```
struct CourseType{
        string name;
        int callNum;
        int credits;
        char grade;
};
```

```
struct StudentType {
        NameType name;
        double gpa;
        CourseType course;
};
```

```
int main(){
        StudentType student;
        StudentType classList[100];
        CourseType course;
        NameType name;
}
```

Question: Considering the above code snippet, mark the following statements as valid or invalid. If a statement is invalid, explain why:

a. student.course.callNum = "CSc230";

invalid because string cannot be assigned to integer type variable.

b. cin>>student.name;

invalid

Because we have to further specify i.e. we that cin>>student.name. first or last, depending upon our requirement.

c. classList[0] = name;

invalid

Because at each index of the classList array there is a StudentType instance therefore we need to specify that to which data member we are assigning that Na we need to use dot operator. nam

d. classList[1].gpa = 3.45;

valid

e. name = classList[15].name;

valid

f. student.name = name;

valid

g. cout<<classList[10]<<endl;

invalid

we cannot print whole structure at once we have to specify what we print through dot operator

h. for (int j=0; j<100; j++)
classList[j].name = name;

i. classList.course.credits = 3;

invalid

we have to mention ~~index~~

j. course = StudentType.course;

~~valid~~.

Because class name we must create an object and then access it like that

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Student Name: Shahid Iqbal Roll No: 20P-0087

Program: BCS
Semester: Summer-2023
Time Allowed: 15 mins
Course: Object Oriented Programming

Examination: Quiz 02
Total Marks: 5 Weightage: 2
Date: 6th July, 2023
Instructor: Usman Wajid

NOTE: Attempt all questions.

Q1. Write the output of the following code snippet:

```
#include <iostream>

using namespace std;

class A {

        public:
                static int x;
                int y;
                static void print();
                A(){
                        x = 1; y = 5;
                        cout<<"Start\t"<<x<<"\t"<<endl;
                }
                ~A(){
                        cout<<"End\t"<<x<<"\t"<<y<<endl;
                }
};

int A::x=5;
void A::print(){
        cout<<"Static print function x: "<<x<<endl;
}

int main() {
        A obj1, obj2, obj3;
        A::x++;
        obj2.x++;
        obj2.y++;
        obj1.y = obj2.y *2;
        obj3.y = obj2.x *3;
        obj2.y++;
        obj1.y = obj1.y - obj2.x;

        cout<<"x : "<<obj2.x<<endl;
        obj2.print();
        A::print();
}
```

5

output

```
start   1
start   1
start   1

x : 3

Static print function x : 3

Static print function x : 3

End     3       9
End     3       7
End     3       9
```

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Student Name: Shahid Iqbal Roll No: 20P-0087

Program: BCS
Semester: Summer-2023
Time Allowed: 15 mins
Course: Object Oriented Programming

Examination: Quiz 03
Total Marks: 5 Weightage: 2
Date: 19th July, 2023
Instructor: Mr. Usman Wajid

NOTE: Attempt all questions.

Q 1. Write the **output** of the following code snippet in C++, where **&array[0] = 0x61ff04:**

```
int array[3] = {2, 5, 7};
int * p = new int;
p = array;

cout<<*(p++)<<endl;
cout<<p<<endl;
cout<<*(p+2)<<endl<<endl;

cout<<*(--p)<<endl;
cout<<p<<endl;
cout<<*p<<endl<<endl;

*(p+1) = 9;

cout<<*(p++)<<endl;
cout<<p<<endl;
cout<<*p<<endl;
delete p;
```

2.5 Mam

+0.5

(1) 5 ✗
(2) 0x61ff08 ✗ ✓
(3) Some garbage ✓
(4) 2 ✓
(5) 0x61ff04 ✗ ✓
(6) 2 ✓
(7) 5 ✗ ✓
(8) 0x61ff08 ✗
(9) 9 ✓

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Student Name: Shahid Iqbal Roll No: 20P-0087

Program: BCS
Semester: Summer-2023
Time Allowed: 15 mins
Course: Object Oriented Programming

Examination: Quiz 04
Total Marks: 10 Weightage: 2
Date:
Instructor: Mr. Usman Wajid

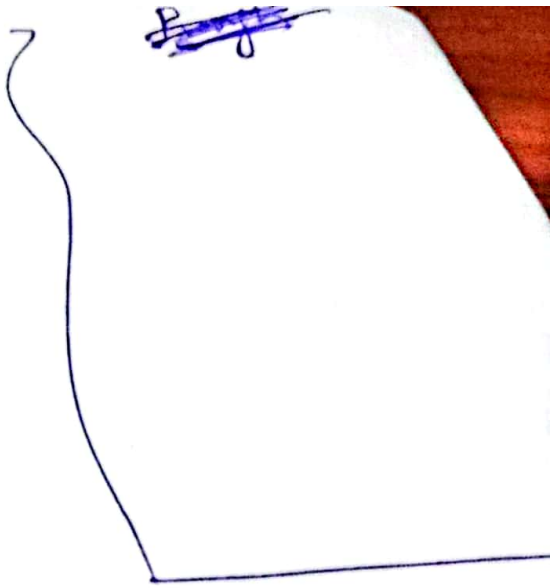
NOTE: Attempt all questions.

Q 1. Write the **output** of the following code snippet in C++:

10

```
#include <iostream>

using namespace std;

class A {
     public:
          A(){cout<<"Constructor of A\n";}
          void fun1(){cout<<"fun1 of class A"<<endl;}
          virtual void fun2() = 0;
          void fun3(){cout<<"fun3 of class A"<<endl;}
          ~A(){cout<<"destructor of A"<<endl;}
};


class B: public A {
     public:
          B(){cout<<"Constructor of B\n";}
          virtual void fun1() = 0;
          void fun2(){cout<<"fun2 of class B"<<endl;}
          void fun3(){cout<<"fun3 of class B"<<endl;}
          ~B(){cout<<"destructor of B"<<endl;}
};

class C: public B {
     public:
          C(){cout<<"Constructor of C\n";}
          void fun1(){cout<<"fun1 of class C"<<endl;}
          void fun2(){cout<<"fun2 of class C"<<endl;}
          virtual void fun3(){cout<<"fun3 of class C"<<endl;}
          ~C(){cout<<"destructor of C"<<endl;}

};


void outFun(A &obj){
     obj.fun1();
     obj.fun2();
     obj.fun3();
}
```

```
int main() {

      C  objC;
      outFun(objC);
      cout<<"this is test line\n";

}
```



output :-

1. Constructor of A
2. Constructor of B
3. Constructor of C
4. Fun1 of class A
5. Fun2 of class C
6. Fun3 of class A
7. This is test line
8. destructor of C
9. destructor of B
10. destructor of A

OOP - LAB Exam Summer

National University

of Computer & Emerging Sciences Peshawar Campus
DEPARMENT OF COMPUTER SCIENCE

Student Name: _____ RolloNo: _____

Program: BCS (9A)
Semester: Summer-2023
Time Allowed: 2 hours and 30 minutes
Course: CL1004-Object Oriented Programming Lab

Examination: Final Term
Total Marks: 100 Weightage: 45
Date: 4, Aug,2023
Instructor Name: Mazhar Iqbal

NOTE: Attempt all questions.
Only submit .cpp file of each question in a folder. Anyone who submits any other format file will get straight ZERO. Each question should have a separate **.cpp** file. Copy Paste or other UFM will also get ZERO. Use the following format for naming the folder Roll#_Name **(P18-1234_KASHIF)**.
Comment your code properly

Module I: Basic Programming & logics: (Marks: 40)

Question 01:

Part A:

The formula for converting a temperature from Fahrenheit to Celsius is
$C = 5/9 (F - 32)$
where *F* is the Fahrenheit temperature and *C* is the Celsius temperature. Write a function named **celsius** that accepts a Fahrenheit temperature as an argument. The function should return the temperature, converted to Celsius. Demonstrate the function by calling it in a loop that displays a table of the Fahrenheit temperatures 0 through 20 and their Celsius equivalents.

Part B:

Write a function named **coinToss** that simulates the tossing of a coin. When you call the function, it should generate a random number in the range of 1 through 2. If the random number is 1, the function should display "heads." If the random number is 2, the function should display "tails." Demonstrate the function in a program that asks the user how many times the coin should be tossed and then simulates the tossing of the coin that number of times.

Module II: (Marks:)

Question 01: (Marks 60)

NOTE: Make sure you have comments with each concept and with each logic.

Assuming that a year has 365 days, write a class named **DayOfYear** that takes an integer representing a day of the year and translates it to a string consisting of the month followed by day of the month. For example,
Day 2 would be January 2 .
Day 32 would be February 1 .
Day 365 would be December 31.

The constructor for the class should take as parameter an integer representing the day of the year, and the class should have a member function print() that prints the day in the month–day format. The class should have an integer member variable to represent the day and should have static member variables holding string objects that can be used to assist in the translation from the integer format to the month-day format. Test your class by inputting various integers

Question 02: (Marks 10)

Note: Every topic which you want to use write its basic syntax Definition (Short) in comment and then Implement.

Write a program of your own choice having the following basic concepts: Composition, Polymorphism and Inhertinace.

OR

Write a program of your own choice having the following basic concepts: Structure, Friend and Virtual Function and pointers.

- **Use comments in each concept for better understanding and for bonus marks as well.**

Good luck with your lab paper!

National University

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Student Name: _____ Roll No: _____

Program: BCS (CS1004)
Semester: Summer-2023
Time Allowed: 2:00 hour
Course: Object Oriented Programming

Examination: Mid-term
Total Marks: 45 Weightage: 20
Date: Monday 10th July, 2023
Instructor: Mr. Usman Wajid

NOTE: Attempt all questions in a sequence as specified.

[CLO-1] (Marks 5+5+5 = 15)

Q1. Differentiate between the following in the context of Object Oriented Programming with Syntax examples:

a. Parameterized default constructor vs default constructor. Can we use both at the same time? Explain.
b. Setter methods vs Getter methods. Which one is suitable in combination with the keyword const and why?
c. Scope resolution (::) operator vs dot (.) operator. State at least two cases where the scope resolution (::) operator is mandatory.

Q2. Draw the memory structure diagram of the following code snippet: **[CLO-4] (Marks = 5)**

```
struct Point{
    int x, y;
};
```

```
struct Line{
    Point p[2];
};
```

```
struct Square{
    Line l[4];
};
```

[CLO-3] (Marks = 10)

Q3. Write the main() function by considering the following code snippet and an output:

```
class Contact {
private:
  string name_;
  Address* address_;
public:
  Contact(const string name,
  Address* address){
     setName(name);   }

  string getName() const {
     return name_; }
  Address* getAddress() const {
     return address_; }
  void setName(string name) {
     name_ = name; }
  void setAddress(Address* address)
{
     address_ = address;   }
};
```

```
class Person {
private:
  Contact* contact_;
  string email_;
public:
  Person(Contact* contact, string
email){
     setEmail(email);   }

  Contact* getContact() const {
     return contact_; }
  string getEmail() const {
     return email_; }
  void setContact(Contact* contact){
     contact_ = contact; }
  void setEmail(string email) {
     email_ = email; }
};
```

```
class Address {
  private:
    string city_;
  public:
    Address(const string city){
      setCity(city);}
    string getCity() const {
      return city_;  }
    void setCity(const string& city) {
      city_ = city; }
  };
```

OUTPUT:

```
Name: Ali Imran
Address: Peshawar
Email: ali.imran@abc.com
```

[CLO-3] (Marks 15)

Q4. Use composition and design a class hierarchy that represents a Department. A Department class is composed of one or more Sections. Each Section in the Department is composed of one or more Students. Consider the following code snippet as a starting point and complete the implementation of the three classes by writing member functions only (do not add more data members to any class).

```
class Student {
        private:
                string name;
};

class Section {
        private:
                string name;
                Student* Students;
};

class Department {
        private:
                string name;
                Section* Sections;
};

int main() {
        int Section_count = 2;
        int Student_count = 15;

        Department department("Computer Science", Section_count);
        string name;

        for (int i = 0; i < Section_count; i++) {
                cout << "Enter Name for Section " << i + 1 << endl;
                cin >> name;
                Section sec(name, Student_count);

                        for (int j = 0; j < Student_count; j++) {
                                cout << "Enter Name for Student " << j + 1 << endl;
                                cin >> name;
                                Student st(name);
                                sec.add_Student(st, j);
                        }

                department.add_Section(sec, i);
        }

        cout << "Department Name: " << department.get_name() << endl;

        Section* Sections = department.get_Sections();
                for (int i = 0; i < Section_count; i++) {
                        cout << "Section Name: " << Sections[i].get_Section_name() << endl;

                        Student* Students = Sections[i].get_Students();
                        for (int j = 0; j < Student_count; j++) {
                                cout << "Student Name: " << Students[j].get_Student_name() << endl;
                        }
                }
        return 0;
}
```

National University

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Student Name: Shahid Roll No: 20P-0087

Program: BCS (CS1004)
Semester: Summer-2023
Time Allowed: 3:00 hour
Course: Object Oriented Programming

Examination: **Final**
Total Marks: 65 Weightage: 45
Date: Wednesday 9th Aug, 2023
Instructor: Mr. Usman Wajid

NOTE: Attempt all questions in the respected sequence. Else will result in -5 penalty.

[CLO-1] (Marks = 15)

Q1. Write the short answers of the following:

a. Name two situations in which a copy constructor executes.
b. Specify the number of techniques the shallow copy problem can be resolved by utilizing deep copy. According to you which technique is more suitable to resolve shallow copy problem. Justify your answer.
c. What happens when a class inherits from an abstract class and doesn't override a pure virtual function of the abstract class?
d. Why does the destructor of the base class need to be defined as virtual?

[CLO-2] (Marks = 15)

Q2. The equation of a line in standard form is $ax + by = c$, wherein both a and b cannot be zero, and a, b, and c are real numbers. If $b \neq 0$, then $-a/b$ is the slope of the line. If $a = 0$, then it is a horizontal line, and if $b = 0$, then it is a vertical line. The slope of a vertical line is undefined. Two lines are parallel if they have the same slope or both are vertical lines. Two lines are perpendicular if either one of the lines is horizontal and the other is vertical or the product of their slopes is -1. Design the class **`LineType`** to store a line. To store a line, you need to store the values of **a** *(coefficient of x)*, **b** *(coefficient of y)*, and **c**. Your class must contain the following operations:

a. To determine if two lines are equal, **overload operator ==** as a member function so that it returns **true if lines are equal; false otherwise.**
b. To determine if two lines are parallel, **overload operator ||** as a member function so that it returns **true if lines are parallel; false** otherwise.
c. To determine if a line is perpendicular, **overload operator +** as a member function so that it returns **true if line is vertical; false** otherwise
d. To determine if two lines are perpendicular, **overload operator &&** as a member function so that it returns **true if lines are perpendicular** to each other, **false** otherwise.
e. To determine if a line is horizontal, **overload operator -** as a member function so that it returns **true if line is horizontal; false** otherwise

[CLO-2] (Marks = 10)

Q3. Considering the Object Oriented Programming (OOP) **project** you have constructed during your OOP lecture classes, specify the following:

a. The **OOP concepts** you have used **in your project** and the **rationale** behind it.
b. Draw the **class diagram** of your OOP project.

[CLO-3] (Marks 15)

Q4. When implementing a real world into a software program, we translate nouns to classes. And the relationships are translated to inheritance or associations of different types. In the below mentioned scenario analyze the situation and provide proper classes and relationships among them. In a school there are chairs and classrooms. Classrooms cannot exist without the existence of the school. **School** has attributes **name (string), address (string)** and **Id (integer)**. There are 5 classrooms in the school. Each **Classroom** has its own attributes including **roomNo (integer), capacity of chairs (integer)** and **list of chairs**. Each class has a fixed capacity of 20 chairs per class. This attribute cannot be updated in the program later on. The school has 100 chairs. Any chair can be assigned to a room. **Chair** has **attributes price (float), legs (int)** and **tag (string)**. You are required to answer the following questions keeping in view the above mentioned description:

a. Write down the classes **Chair, Classroom** and **School** showing all the appropriate data members.

b. What is the **relationship** between Chair-Classroom and School-Classroom.

c. Now write another function that will **not be a member function of the class Chair** but will be able to **access** and **print** the **private attributes** of the **class Chair**. Write the function and its protype in the class.
Note: *Do not use any getter function*

d. Demonstrate a scenario in the code, how a chair can be assigned to a Classroom and upon deletion of the object of the class Classroom the chairs still exist.

e. Keep track of the number of chairs

[CLO-4] (Marks 10)

Q5. Do as directed,

a. Use **good programming practices** for the **code in your answer to Q4.**

NOTE: *if the code is already written using good programming practices while attempting Q4, then mention in your answer to Q5 as "Q4 answer code already written using good programming practices". Else you can re-write the code to clearify answer.*

Good luck ☺