CONFIDENTIAL

Infrastructure University Kuala Lumpur

FINAL EXAMINATION
SEPTEMBER/OCTOBER SEMESTER 2016

BACHELOR OF COMPUTER SCIENCE (HONS)
BACHELOR OF SOFTWARE ENGINEERING (HONS)
BACHELOR OF INFORMATION TECHNOLOGY (HONS) IN NETWORK TECHNOLOGY
BACHELOR OF INFORMATION TECHNOLOGY (HONS) IN SOFTWARE ENGINEERING

ADVANCED PROGRAMMING
(BTT112)

(TIME : 3 HOURS)

MATRIC NO. : | | | | | | | | | |

IC. / PASSPORT NO. : | | | | | | | | | | | | | | |

LECTURER : **DR. MARWAN ALSHAR'E**

GENERAL INSTRUCTIONS

1. This question booklet consists of **11** printed pages including this page.
2. Answer **any FOUR (4)** questions from section **A** in the **ANSWER BOOKLET.**
3. Answer all questions from sections **B** in the **ANSWER BOOKLET.**
4. Answer all questions from sections **C** in the **ANSWER BOOKLET.**

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INSTRUCTIONS: **TIME: *3 HOURS***

SECTION A **(40 MARKS)**

There are FIVE (5) questions in this section. Answer ANY FOUR (4) Questions in the Answer Booklet.

1. Answer the following questions:

   a) Differentiate between Constructor and Destructor function in context of Classes and Objects using C++.

   (5 marks)

   b) What is the difference between call by value and call by reference? Give an example in C++ to illustrate both.

   (5 marks)

2. a) Answer the questions (i) to (iii) after going through the following class:

```
class Seminar
{
 int time;
    public:
    Seminar()                                          //Function 1
    {
        time = 30;
        cout << "Seminar starts now" << endl;
    }

    void lecture()                                     //Function 2
    {
        cout << "Lectures in the seminar on" << endl;
    }

    Seminar(int duration)                              //Function 3
    {
        time = duration;
        cout << "Seminar starts now" << endl;
    }

    ~Seminar()                                        //Function 4
    {
        cout << "Thanks" << endl;
    }
};
```

   i. Write an object that would execute Function 1 and Function 3 of class Seminar.

   (2 marks)

ii. In Object Oriented Programming, what is Function 4 referred as and when does it get invoked/called?

(2 marks)

iii. In Object Oriented Programming, which concept is illustrated by Function 1 and Function 3 together?

(1 mark)

b) Write the names of the header files to which the following belong:

i. strlen()
ii. clrscr()
iii. pow()
iv. setw()
v. abs()

(5 marks)

3. Answer the following questions:

a) consider the code below:

```
int N = 5;
int* M = new int(3);
int** J = &M;
int A[5] = {1,2,3,4,5};
```

Based on the code given above, what will be the output of the following:

i. `cout << *M;`
ii. `cout << **J;`
iii. `cout << *&N;`
iv. `cout << A[4];`
v. `cout << *(A+2);`

(5 marks)

b) consider the code below:

```
include<iostream>

using namespace std;
bool even(int m)
{
    if (m%2==0)
        return 1;
    else
        return 0;
}
```

```
int F(int m, int n)
{
      int sum = 0;
      if (even(m)) // even(m) is true if and only if m
      is an even number
      sum = n;
      while (m > 1)
      {
          m = m/2;
          n = 2*n;
          if (even(m))
          sum += n;
      }                    // while
      return sum;
}

int main()
{
      cout << _______;
}
```

Based on the code given above, what will be the output of the following:

i. `cout << F(4,7);`
ii. `cout << F(7,4);`
iii. `cout << F(8,2);`
iv. `cout << F(3,8);`
v. `cout << F(8,3);`

(5 marks)

4. Answer the following questions:

a) Consider the definition of the following class:

```
class testClass
{
   public:
        int sum();
        // returns the sum of the private member variables.
        void print() const;
        //prints the values of the private member variables.
        testClass();
        //default constructor
        //initializes the private member variables to 0
        testClass(int a, int b);
        //constructors with parameters
        //initializes the private member variables to the values
        //specified by the parameters
        //postcondition: x=a; y=b;
```

```
    private:
          int x;
          int y;
};
```

i. Write the definition of the member functions as described in the definition of the `class testClass`.

(2 marks)

ii. Write a test program to test the various operations of the `class testClass`.

(3 marks)

b) consider the code below, then provide the expected output:

```
int x,  *p, *q;
p = new int[10];
q = p;
*p = 4;
for (int j=0; j<0; j++)
{
   x = *p;
   p++;
   *p = x + j;
}
for (int k = 0; k < 10; k++)
{
   cout << *q << "  ";
   q++;
}
cout << endl;
```

(4 marks)

c) Given the declaration:

```
int num = 6;
int *p = &num;
```

Using unary operator, write a statement that would increment(s) the value of num.

(1 mark)

5. Answer the following questions:

a) Find the syntax error(s), if any, in the following code :

```
#include [iostream.h]
#include [stdio.h]

class Employee
{
  int EmpId = 901;
  char EName [20];
  public
  Employee ( ) { }
  void Joining () {cin>>EmpId; gets (EName);}
  Void List ( ) {cout<<EmpId<<":"<<EName<<endl ;}
} ;
void main ( )
{
  Employee E ;
  Joining.E ( ) ;
  E. List ( )
}
```

(2 marks)

b) Consider the following two classes then discuss the expected output:

```
class Super
{
   public:
   virtual void foo() {
   cout << "Super::foo()" << endl;
   }
   virtual void foo(int i) {
   cout << "Super::foo(" << i << ")" << endl;
   }
};
class Sub : public Super
{
   public:
   virtual void foo() {
   cout << "Sub::foo()" << endl;
 }
};

int main()
{
  Sub mySub;
  mySub.foo(3);
}
```

(3 marks)

c) Go through the following code then highlight and discuss any error you might find :

```
#include<iostream.h>
 class A { int a1;
 public: int a2;
 protected : int a3; };
 class B :public A
 { public:
      void func( )
      {
           int b1, b2, b3;
           b1 = a1;
           b2 = a2;
           b3 = a3;
      }
   };
   class C : A
   {
   public:
        void f( )
        {
             int c1, c2, c3;
             c1 = a1;
             c2 = a2;
             c3 = a3;
        }
   };
   int main( )
   {
        int p, q, r, i, j, k;
        B O1;
        C O2;
        p = O1.a1;
        q = O1.a2;
        r = O1.a3;
        i = O2.a1;
        j = O2.a2;
        k = O2.a3;
   }
```

(5 marks)

SECTION B **(30 MARKS)**

There are THREE (3) questions in this section. Answer ALL questions in the Answer Booklet.

1.

a) Given the following class definitions answer what follows:

```
class livingbeing
{
      char specification[20];
      int averageager;
      public:
      void read();
      void show();
};
class mammal : private livingbeing
{
      int no_of_organs, no_of_bones;
      protected :
      int iq_level();
      public:
      void readmammal();
      void showmammal();
};
class human : public mammal
{
      char race[20];
      char habitation[30];
      public:
      void readhuman();
      void showhuman();
};
```

i. Name the members, which can be accessed from the member functions of class human.

(2 marks)

ii. Name the members, which can be accessed by an object of class mammal.

(1 marks)

iii. Name the members, which can be accessed by an object of class human.

(2 marks)

b) Write a user defined function in C++ to read the content from a text file NOTES.TXT,
Then you need to count and display the number of blank spaces present in it.

(5 marks)

2. What will this program output when the program is executed?

```
#include <iostream>
      class Rational {
        public:
            Rational (int=0, int=1);
            Rational (const Rational&);
            void print();
            Rational& operator= (const Rational&);
        private:
           int num, den;
           int gcd (int j, int k)
             {
               if (k==0) return j;
               return gcd(k, j%k);
             }
            void reduce () {int g = gcd(num, den); num /= g; den
           /= g;}
      };

      int main(){
       Rational x(100,360);
       Rational y(x);
       Rational z, w;
       cout << "x= "; x.print();
       cout << "\ny= "; y.print();
       cout << "\nz= "; z.print();
       w = z = y;
       cout << "\nz= "; z.print();
       cout << "\nw= "; w.print();
       cout << "\n\n\nPress any key to close console window: ";
       char c; cin >> c;
       return 0;
      }

      Rational::Rational (int n, int d) : num (n), den (d){
      reduce();
      }
      Rational::Rational (const Rational& r) : num(r.num),
      den(r.den){
      }
      void Rational::print(){
      cout << num << '/' << den;
      }

      Rational& Rational::operator= (const Rational& r){
        num = r.num;
        den = r.den;
        return *this;
      }
```

(10 marks)

3. Consider the definition of the following class:

```
class Sample
   {
     private:
          int x;
          double y;
          public :
               Sample();              //Constructor 1
               Sample(int);           //Constructor 2
               Sample(int, int);      //Constructor 3
               Sample(int, double); //Constructor 4
   };
```

a) Write the definition of the constructor 1 so that the private member variables are initialized to 0.

(2.5 marks)

b) Write the definition of the constructor 2 so that the private member variable x is initialized according to the value of the parameter, and the private member variable y is initialized to 0.

(2.5 marks)

c) Write the definition of the constructors 3 and 4 so that the private member variables are initialized according to the values of the parameters.

(5 marks)

SECTION C **(30 MARKS)**

There are THREE (3) questions in this section. Answer ALL questions in the Answer Booklet.

1. Write a program code which throws an exception of type `char*` and another of type `int`. Write a `try ---- catch` block which can catch both the exception.

(10 marks)

2. Write a template function that swaps the values of two arguments passed to it. In main( ), use the function with integers and characters.

(10 marks)

3. Write a complete C++ program to do the following :

   a) `Student` is a base class, having two data members: `entryno` and `name`; `entryno` is `integer` and `name` of 20 `characters` long.
   The value of `entryno` is `1` for `Science` student and `2` for `Arts` student, otherwise it is an `error`.
   The class have two functions `getdata()` to read the students name, and `display()` to print the student name on the screen.

(4 marks)

   b) `Science` and `Arts` are two `classes` derived from the `class student`, having respectively data items marks for Physics, Chemistry, Mathematics and marks for English, History, Economics.
   Each class have two functions `getdata()` to read the students marks, and `display()` to print the student marks.

(6 marks)

***** END OF QUESTIONS *****