# The Open University of Sri Lanka
# Faculty of Engineering Technology

| | | |
|---|---|---|
| Study Programme | : | Diploma in Technology/Bachelor of Technology (Engineering) |
| Name of the Examination | : | Final Examination |
| **Course Code and Title** | : | **MEK3170 – C Programming** |
| Academic Year | : | 2016/17 |
| Date | : | 2nd December 2017 |
| Time | : | 1400hrs – 1700hrs |
| Duration | : | 3 hours |

**General instructions**

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 6 questions.
3. **Question 01 is compulsory.**
4. Answer 5 questions including the compulsory question.

**Question 1. (Compulsory) [40 Marks]**

a. Briefly explain the following. (4 x 5 marks)
[Note: Do not write lengthy answers with unnecessary information. ]

I. Compare and Contrast Natural Languages and Programming Languages
II. Syntax and Semantics
III. High Level and Low Level Languages
IV. Documentation methods of Algorithms

b. Write the output of the following C ++ programs. (10 marks)

```
#include <iostream.h>
#include <conio.h>

void main()
{
    int rows,i,j,space;
    cout<<"Enter number of rows: ";
    cin>>rows;
    for(i=rows;i>=1;--i)
    {
        for(space=0;space<rows-i;++space)
           cout<<"  ";
        for(j=i;j<=2*i-1;++j)
           cout<<"* ";
        for(j=0;j<i-1;++j)
           cout<<"* ";
        cout<<endl;
    }

}
```

c. Imagine it is required to input three numbers in to the computer and find the greatest value of the three inputs. (2 x 5 marks)

I. Draw a flow chart to depict the solution to the problem given.
II. Write a C++ program to solve the problem given.

**Question 2 [15 Marks]**

a. Briefly explain the advantages of functions in programming.
b. The Fibonacci series [0,1,1,2,3,5,8,13,21...] begins with 0 and 1 and has the property that each subsequent Fibonacci number is the sum of the previous two Fibonacci numbers.

Write a C ++ program to calculate the $n^{th}$ Fibonacci number recursively using function **fibonacci**.

Hint : that Fibonacci numbers tend to become large quickly. Therefore, choose the datatype ***unsigned int*** for the parameter type and the data type ***unsigned long int*** or the return type in function fibonacci.

**Question 3 [15 Marks]**

a. Explain the term Multidimensional array in programming with necessary sketches & examples.
b. Write a C ++ program to enter the average temperature data for a week of first city and then second city. After entering data, it should be displayed in the screen. The data to be entered is given bellow.

| City 01 | City 02 |
|---|---|
| Day 1 : 32 | Day 1 : 23 |
| Day 2 : 33 | Day 2 : 24 |
| Day 3 : 32 | Day 3 : 26 |
| Day 4 : 34 | Day 4 : 22 |
| Day 5 : 35 | Day 5 : 29 |
| Day 6 : 36 | Day 6 : 27 |
| Day 7 : 38 | Day 7 : 23 |

Hint: Use a two dimensional array to use the data.

**Question 4 [15 Marks]**

Write a C ++ program to sort given array of numbers to ascending order, and prints the resulting array. Use pointers to swap the values in the array.

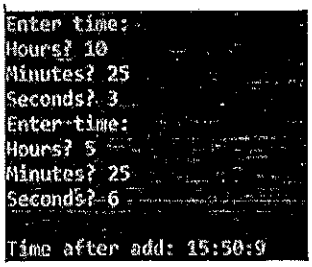
Hint: Use bubble sort algorithm to sort the values.

Array = [2, 6, 4, 8, 10, 12, 89, 68, 45, 37]

**Question 5 [15 Marks]**

a. Briefly explain the advantages of Classes in C ++ programming.
b. Write a C ++ program to add two times using a Class and then display the results in the format of HH:MM: SS.

Hint: Following should be result in your display when you run the program.




**Question 6 [15 Marks]**

a. Briefly Explain the following terms in C ++ programing using necessary sketches & example programs.

I. Inheritance & Derived Classes.
II. Polymorphism in C++ programing.
III. Data Structures & Algorithms.
IV. Pointers & Arrays

b. Write the output of the following program.

```
#include <iostream>
using namespace std;
class p
{
    protected:
    int width, height;
    public:
    void set_values (int a, int b)
    {
        width = a; height = b;
    }
    virtual int area (void) = 0;
};
class r: public p
{
    public:
    int area (void)
    {
        return (width * height);
    }
};

class t: public p
{
    public:
    int area (void)
    {
        return (width * height / 2);
    }
};
int main ()
{
    r rect;
    t trgl;
    p * ppoly1 = &rect;
    p * ppoly2 = &trgl;
    ppoly1->set_values (4, 5);
    ppoly2->set_values (4, 5);
    cout << ppoly1 -> area() ;
    cout << ppoly2 -> area();
    return 0;
}
```

ALL RIGHTS RESERVED

**END**