INTI
INTERNATIONAL COLLEGE PENANG (507232-U)
LAUREATE INTERNATIONAL UNIVERSITIES

FINAL
Examination Paper

(COVER PAGE)

Session	:	August 2016
Programme	:	DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING
Course	:	**ICT1103: STRUCTURED PROGRAMMING**
Date of Examination	:	8 December 2016 (Thursday)
Time	:	5:00pm – 7:00pm Reading Time : Nil
Duration	:	2 Hours
Special Instructions	:	

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Materials permitted : Nil

Materials provided : Nil

Examiner(s) : **Chern Huey Rong**

Moderator : **Dr. Vincent Khoo**

This paper consists of _8_ printed pages, including the cover page.

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DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING (DEEI)
ICT1103: STRUCTURED PROGRAMMING
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Instruction: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

QUESTION 1

(a) Convert the following **switch-case** code to an **if-else** code.

```
switch ( i )
{
      case 0:
      case 1:
            n = 10;
            break;
      case 2:
            n = 500;
            break;
      default:
            n = 0;
            break;
}
```

(8 marks)

(b) Rewrite the following while loop as a **for** loop that performs the same task.

```
int Max = 1900;
int Sum = 0;
while(Max<1950)
{
      Sum = Sum + (Max -1900);
      cout<<Sum<<endl;
      Max = Max + 5;
}
```

(6 marks)

(c) Identify THREE errors with the following variable definition?

```
int ounces per liter = 28.35
```

(6 marks)

(d) Write a program that reads an amount in US Dollar and convert it to Ringgit Malaysia. The exchange rate is 1 US Dollar is equal to 3.91 Malaysia Ringgit.

(5 marks)

QUESTION 2

(a) A ball is thrown up in the air. Its height above the ground is given by the formula $h = 3 + 10t - t^2$ where t is the time in seconds after it is thrown. For example, at

Time $t = 0$, $h = 3 + 0 - 0 = 3$

Time $t = 2$, $h = 3 + 20 - 4 = 19$

When the ball hits the ground, h becomes negative. Write a fragment of C++ code to print out the height, h, once every second, starting a $t = 0$, and continuing until h becomes negative (meaning the ball has hit the ground). (Do not print the negative value.) Include all necessary data declarations and initializations.

(6 marks)

(b) Write a function **integerPower(base, exponent)** that returns the value of

$base^{exponent}$

For example, **integerPower(3,4)** = 3*3*3*3. Assume that *exponent* is a positive, non zero integer and that *base* is an integer. The function **integerPower** should use **for** to control the calculation. Do not use any math library functions.

(6 marks)

(c) Write a program that will randomly generate a number between 1 and 100. The user will then guess the number via several attempts until he gets it right. Each time the number is wrong, the program will let the user know if it is too high or too low, and the user will guess again. If the number guessed is correct, it will print "Correct", then quit the program.

(7 marks)

(d) Write a program that asks the user to type 10 integers of an array and an integer V. The program must search if V is in the array of 10 integers. The program writes "V is in the array" or "V is not in the array".

(6 marks)

QUESTION 3

(a) Write a function named "sum_from_to" that takes two integer arguments, call them "first" and "last", and returns as its value the sum of all the integers between first and last inclusive. Thus, for example,

```
cout << sum_from_to(4,7) << endl; // will print 22 because 4+5+6+7 = 22
cout << sum_from_to(-3,1) << endl; // will print -5 because (-3)+(-2)+(-
1)+0+1 = -5
cout << sum_from_to(7,4) << endl; // will print 22 because 7+6+5+4 = 22
cout << sum_from_to(9,9) << endl; // will print 9
```

(11 marks)

(b) Trace the output of the following program:

```
#include <iostream>
using namespace std;
int b = 3;
void change1();
void change2(int *);
void main()
{
      int a = 1, b = 2;
      cout << "b = " << b << endl;
      change1();
      cout << "b = " << b << endl;
      change2(&a);
      cout << "a = " << a << endl;
      cout << "b = " << b << endl;
      system("pause");
}
void change1()
{
      b = b + 10;
      cout << "b = " << b << endl;
}
void change2(int *a)
{
      *a = *a - 5;
      b = b + 2;
      cout << "a = " << *a << endl;
      cout << "b = " << b << endl;
}
```

(7 marks)

(c) Write a function named "**subtotal**" takes as its arguments the following:

(i) an array of floating point values; and

(ii) an integer that tells the number of cells in the array.

The function should replace the contents of each cell with the sum of the contents of all the cells in the original array from the left end to the cell in question. Thus, for example, if the array passed to the function looks like this:

0	1	2	3	4
5.8	2.6	9.1	3.4	7.0

then when the function returns, the array will have been changed so that it looks like this:

0	1	2	3	4
5.8	8.4	17.5	20.9	27.9

because 5.8 + 2.6 = 8.4 and 5.8 + 2.6 + 9.1 = 17.5 and so on. Note that the contents of cell 0 are not changed. The function should not return a value

(7 marks)

QUESTION 4

(a) The following program finds the common elements in two different integer arrays (fibArray and primeArray) and stores them in another array called commonArray. At the end of the program, it prints out how many common elements in the common array. There are five bugs in the code. Identify the bugs and then fix them.

```
1  int main()
2  {
3  int fibArray[] = { 1, 2, 3, 5, 8, 13, 21, 34, 55, 89 };
4  int primeArray[] = { 2, 3, 5, 7, 11, 13, 17, 19, 23, 29 };
5  int commonArray[];
6  int i, j;
7
8  for ( i = 0; i < 10; ++i )
9  {
10 for ( j = 0; j < 10; ++j )
11 {
12 if (fibArray[i] = primeArray[j])
13 {
14 commonArray[j] = primeArray[j];
15 ++n;
16 }
17 }
18 }
19
20 printf("The total number of common elements is %n\n", n);
21 return 0;
22 }
```

(10 marks)

(b) Write a function that copies all characters from **s** to **t** in reverse order. Define your function prototype as shown below. Assume that the arguments to **myfunction** have the same array size.
void myfunction(char *s, char *t)

(7 marks)

(c) Write a recursive function to produce the following hailstone sequence.
Starting with any positive whole number n to form a sequence in the following way:

If n is even, divide it by 2 to give $n' = n/2$.

If n is odd, multiply it by 3 and add 1 to give $n' = 3n + 1$.

Then take n' as the new starting number and repeat the process. For example, $n = 5$ gives the sequence

$$5, 16, 8, 4, 2, 1, 4, 2, 1, \ldots$$

and $n = 11$ gives the sequence

$$11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1, 4, 2, 1, \ldots.$$

(8 marks)

QUESTION 5

(a) Describe the process of compiling a C++ program from the source code to the final executable file. You may draw a diagram to describe it.

(7 marks)

(b) What is the output of the program below?

```
#include <iostream.h>
main() {
        int n;
        cout << (n = 4) << endl;
        cout << (n == 4) << endl;
        cout << (n > 3) << endl;
        cout << (n < 4) << endl;
        cout << (n = 0) << endl;
        cout << (n == 0) << endl;
        cout << (n > 0) << endl;
        cout << (n && 4) << endl;
        cout << (n || 4) << endl;
        cout << (!n) << endl;
        return 0;
}
```

(10 marks)

(c) Write a C++ function that takes a 2-dimensional integer array with 10 rows and 5 columns as an input and returns the max value of that array and its location within the array as reference parameters.

(8 marks)

QUESTION 6

(a) Consider the following variable declarations:

```
int catHeight = 6;
int dogHeight = 7;
string dogName = "Rover";
string catName = "Sylvester";
float catWeight = 15.0;
float dogWeight = 20.0;
bool dogRabies = true;
bool catRabies = false;
```

Write Boolean expressions equivalent to the statements below:

(i) The cat has rabies and does not weigh 20 pounds or less

(ii) The dog does not weigh less than the cat and neither the cat nor the dog has rabies

(8 marks)

(b) Describe **THREE (3)** C++ math functions with an example each.

(9 marks)

(c) Write a function minmax so that the call minmax(x, y, a, b) sets **a** to the smaller of **x** and **y**, and **b** to the larger of **x** and **y**.

(8 marks)

~ The End ~