FIJI NATIONAL UNIVERSITY

Supplementary Examination

College	Engineering, Science & Technollogy
School	Electrical & Electronics Engineering
Programme	Trade Diploma in Electrical Engineering
Trimester	3
Year	2015
Unit Code	EEE554/EEE505
Unit Title	Computer Systems
Date of Examination	December 3
Time	2.00 pm - 4.10 pm
Venue	TBA
Duration	2 Hours *(extra 10 mins allowed to read the paper)*
Maximum Marks	100

Instructions

1. There are four (4) sections (A - D). Attempt all sections in the answer booklet.
2. Write your answers legibly in the answer booklet.
3. Write your student identification number on each page used.

Section A: Short Answers *(25 Marks)*

1. In your own words explain the three general types of programming languages with examples? (6)
2. State and explain the steps of a typical C++ development environment. (6)
3. What is the difference between a stream insertion and a stream extraction operator? (2)
4. What is a syntax error? Give an example. (2)
5. Write an example of a preprocessor directive. (1)
6. What is an algorithm? (2)
7. Compare and contrast pass-by-reference and pass-by-value. (2)
8. Give an example of a function prototype. (1)
9. Describe how a linear search works. On average, how many comparisons must a linear search perform? (2)
10. What happens when the programmer tries to modify the contents of an array that is passed to a function that receives the array as a `const` parameter? (1)

Section B: Programming Output *(25 Marks)*

For each of the given complete programs or program segments, read the code and write the output.

1. What is the output of the following program? (1)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x;
7     int y;
8
9     x = 30;
10    y = 2;
11    cout << x * y + 27 / 3 << endl;
12 }
```

2. What is output by the following program? (2)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x = 5;
7     int y = 2;
8     if ( x > 4 )
9     {
10        cout << "Hi" << endl;
11        if ( y > 3 )
12        {
13            cout << "Bye" << endl;
14        }
15    }
16 }
```

3. What is output by the following program? (2)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x = 5;
7
8     switch (x)
9     {
10        case 1:
11            cout << "one ";
12            break;
13        case 2:
14            cout << "two ";
15            break;
16        default:
17            cout << "none ";
18    }
19 }
```

4. What is the output of the following program? (2)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x = 1;
7     for ( ; x < 10; x++ );
8         cout << "The value of x is: " << x << endl;
```

```
9 }
```

5. What is output by the following lines of code? (2)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x = 2;
7     while ( x < 10 )
8     {
9         if ( x % 2 == 1 )
10            cout << x << " ";
11        x++;
12    }
13 }
```

6. What is output by the following program segment? (4)

```
1 int x;
2 for ( x = 1; x <= 10; x++ )
3 {
4     if ( x == 7 )
5     {
6         break;
7     }
8     if ( x == 3 )
9     {
10        continue;
11    }
12    cout << x << " ";
13 }
14 cout << endl << "The final value of x is: " << x << endl;
```

7. What is output by the following program segment when function `f1` is invoked? (2)

```
1 void f1()
2 {
3     int x = 10;
4     f2( x );
5     cout << x << endl;
6 } // end function f1
7
8 void f2( int x )
9 {
10    x += 5;
11    cout << x << endl;
12 } // end function f2
```

8. What is output by the following program segment when function `f1` is invoked? (2)

```
1 void f1()
2 {
3     int x = 10;
4     f2( x );
5     cout << x << endl;
6 } // end function f1
7
8 void f2( int &x )
9 {
10    x += 5;
11    cout << x << endl;
12 } // end function f2
```

9. What is output by the following program segment when function `f3` is called twice? (2)

```
1 void f3()
2 {
3     static int x = 0;
4     ++x;
5     cout << x << endl;
6 } // end function f3
```

10. What is output by the following program? (6)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int array[ 3 ][ 4 ] = {{1, 2, 3, 4},{2, 3, 4, 5},{3, 4, 5, 6}};
7
8     for ( int i = 0; i < 3; i++ )
9     {
10        for ( int j = 0; j < 4; j++ )
11        {
12            cout << array[ i ][ j ] << " ";
13        }
14        cout << endl;
15    }
16 } // end main
```

Section C: Correct the Code *(25 Marks)*

For each of the given complete programs or program segments, determine if there is one or more error in the code. Write down the line number and describe the error or write the corrected form. For program segments only, assume the code appears in `main` and that `using` directives are provided.

1. The following code should declare an integer variable and assign it the value 6. (2)

```
1 int 1stPlace
2 1stPlace = 6;
```

2. The following code should determine whether q is equal to 10. (1)

```
1 int q = 10;
2
3 cout << "q is: " << q << endl;
4
5 if ( q = 10 )
6 {
7     cout << "q is equal to 10";
8 }
```

3. The following program segment should calculate if a student has a passing grade. If so, the code should print "Passed.". Otherwise, the code should print both "Failed." and "You must take this course again.". (2)

```
1 if ( grade >= 60 )
2     cout << "Passed.\n"
3 else
4     cout << "Failed.\n"
5     cout << "You must take this course again.\n"
```

4. The following program segment should input and sum integers from the user until the sentinel value, -1, is entered. (2)

```
1 int total = 0;
2 int input;
3 while ( input != -1 )
4 {
5     cin >> input;
6     total += input;
7 }
```

5. The following program segment should input 15 integers from the user and calculate their total. (2)

```
1 int total = 0;
2 int counter = 1;
3 int input;
4
5 while ( total <= 15 )
6 {
7     cin >> input;
8     total += input;
9     counter++;
10 }
```

6. The following while loop should compute the product of all integers between 1 and 5, inclusive. (3)

```
1 int i = 1;
2 int product = 1;
3
4 while ( i <= 5 );
5     product *= i;
```

7. The following program should display three lines of text: (2)

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     cout << "Before call to f1.\n";
7     f1();
8     cout << "After call to f1.\n";
9 } // end main
10
11 // f1 definition
12 void f1()
13 {
14     cout << "During call to f1.\n";
15 } // end function f1
```

8. The following program segment defines function maximum, which returns the largest of three integers: (3)

```
1 int maximum( int x, int y, int z );
2 {
3     int max = x;
```

```
4
5       if ( y > max )
6           y = max;
7
8       if ( z > max )
9           max = x;
10
11      return max;
12  } // end function maximum
```

9. The following program should display a character input by the user: (5)

```
1  #include <iostream>
2
3  void f4( int c );
4
5  int main()
6  {
7      char myChar;
8
9      cout << "Enter a character: ";
10     cin >> myChar;
11
12     f4( myChar )
13 } // end main
14
15 // f4 definition
16 void f4( char c )
17 {
18     cout << "You just entered the character: " << myChar << endl;
19     return myChar;
20 } // end function f4
```

10. The following code should assign 8 to the fifth element in array: (1)

```
1  array[ 5 ] = [ 8 ];
```

11. The for loop should initialize all array values to -1. (1)

```
1  int array[ 10 ];
2  for ( int i = 0; i < 9; i++ )
3      array[ i ] = -1;
```

12. Array array should contain all the integers from 0 through 10, inclusive. (1)

```
1  int array[ 10 ] = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 };
```

Section D: Programming *(25 Marks)*

Write a program that prompts the user to enter an 8-bit unsigned decimal number (0 - 255) and converts it into its binary form. The program should test the validity of the user input and give the user three chances to enter the decimal number within the range 0 - 255. If the user fails to enter a valid number in all the three chances, the program should exit. If the user enters a valid number then the program should compute and display the 8-bit binary from MSB to LSB. To do this your program should have a function with the prototype `void Dec2Bin(int *binary, int decimal)`. This function has two inputs; a pointer to the first element of the binary array and the decimal number input. This function should compute the binary form of the decimal number and store it in the 8 element binary array. Your program should also have another function with the prototype `void Display(int *binary)`. This function should print the binary array from MSB to LSB on the screen. A sample output of your program should be as follows:

```
Enter Unsigned Decimal Number (8-Bit): 7
The binary equivalent is: 0 0 0 0 0 1 1 1
```

The End