



## Final Examination

<b>College</b>	Engineering, Science & Technology
<b>School</b>	Electrical & Electronics Engineering
<b>Programme</b>	Trade Diploma in Electrical Engineering
<b>Trimester</b>	I
<b>Year</b>	2016
<b>Unit Code</b>	EEE554
<b>Unit Title</b>	Computer System
<b>Date of Examination</b>	April 25
<b>Time</b>	2 - 5 pm
<b>Venue</b>	B314
<b>Duration</b>	3 Hours ( <i>extra 10 mins allowed to read the paper</i> )
<b>Maximum Marks</b>	100

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

## 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 = 12;
10    y = 2;
11    cout << (x * y + 3) / 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
8     switch (x)
9     {
10        case 1:
11            cout << "one ";
12            break;
13        case 2:
14            cout << "two ";
15            break;
16        default:
17            cout << "three ";
18    }
19 }
```

---

3. 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 < 11; x++ );
8     cout << "The number is " << x << endl;
9 }
```

---

4. 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 < 15 )
8     {
9         if ( x % 3 == 0 )
10            cout << x << " ";
11        x++;
12    }
13 }
```

---

5. What is output by the following program segment when function f1 is invoked?

(2)

---

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

---

6. What is output by the following program segment when function f1 is invoked?

(2)

---

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

---

7. 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
```

---

8. What is output by the following program?

(4)

---

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int x = 5;
```

---

```

7   int y = 4;
8   if ( x > 4 )
9   {
10      cout << "x" << endl;
11      if ( y > 3 )
12      {
13          cout << "y" << endl;
14      }
15  }
16 }

```

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

```

1 int x;
2 for ( x = 1; x <= 10; x++ )
3 {
4     if ( x == 9 )
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;

```

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

```

1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     int array[ 2 ][ 4 ] = {{4, 5, 6, 7},{5, 6, 7, 8}};
7
8     for ( int i = 0; i < 4; i++ )
9     {
10        for ( int j = 0; j < 2; j++ )
11        {
12            cout << array[ j ][ i ] << " ";
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 determine whether q is equal to 10. (1)

---

```

1 int q = 10;
2
3 cout <<          << q << endl;
4
5 if ( q = 10 )
6 {
7     cout <<          ;
8 }

```

---

2. 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.". (1)

---

```

1 if ( grade >= 60 )
2     cout <<
3 else
4     cout <<
5     cout <<

```

---

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

---

```

1 array[ 5 ] = [ 8 ];

```

---

4. 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;

```

---

5. 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 };

```

---

6. The for loop that follows should print array's values: (1)

---

```
1 int array[ 10 ] = { 0 };
2 for ( int i = 0; i <= 10; i++ )
3     cout << array[ i ];
```

---

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

---

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

---

8. 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 }
```

---

9. 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 }
```

---

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

---

```
1 #include <iostream>
2 using namespace std;
3
4 int main()
5 {
6     cout << "Line 1\nLine 2\nLine 3\n";
7     f1();
```

---

```

8     cout << "Enter a number: ";
9 } // end main
10
11 // f1 definition
12 void f1()
13 {
14     cout << "Enter a number: ";
15 } // end function f1

```

---

11. 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;

```

---

12. 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 = z;
10
11     return max;
12 } // end function maximum

```

---

13. 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 << "Enter a character: ";
19     return myChar;
20 } // end function f4
```

---

## Section D: Programming (25 Marks)

Write a C++ program to find the square root of perfect squares. The program should ask the user to enter a positive integer which is a perfect square number and then the program should compute the square root and display the solution. You are required to create your own algorithm for computing square root. The following requirements must be met:

1. Create your own square root algorithm. Do **not** use the `sqrt` function from the `math` library to compute the square root.
2. Your program should cater for all non-perfect square numbers as well as negative integers that the user inputs. In these cases the program should prompt the user that a perfect square has not been entered.
3. The program should allow the user three chances to enter a perfect square. If the user is not able to enter a perfect square within the three chances then the program should exit.
4. You **should** use functions in your C++ program. Create a user defined function with the prototype `int sqroot(int);`. This should be the function where you implement your own square root algorithm. This function should return the square root if the input integer is a perfect square and 0 otherwise.

The End

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