
Higher Diploma in Information Technology



Introduction to Programming (C++)

Year 1 Semester 1 – 2023

Revision – Mid Term Examination

1. Provide reasons indicating why the following identifiers are invalid.

- | | |
|-------------|-----------------|
| a) const | b) 123go |
| c) float | d) char% |
| e) #include | f) &no |
| g) break | h) basic salary |
| i) \$sum | j) while |

2. Evaluate each of the following expressions and list the final value of variable x.

- a) $x = (8 + 2) \% 3 - (8 - 5) + 3 / 8 + 6 \% 3$
- b) $x = 15 \% (4 + 2) * 8 / (5 + 2) \% 3$
- c) $x = ((8 - 4) + 2) * 7 / (2 + 3) / 2$
- d) $x = 4 - (8 \% 5) * 3 / (8 - 6) \% 3$
- e) $x = 3 / 6 + 13 \% 3 + 2$

3. The loop given below has been written by a C++ programmer.

```
int n = value; //A
while (condition) { //B
    if(condition) { //C
        //D
    }
    n++;
}
```

Write the value of n (//A), condition statements (//B and //C), and condition body (//D) to select and print only even numbers between 100 and 120.

4. Determine the output of the following code segments:

```
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int a = 1, b = 2 , m ,n;
6
7      m = a++ + --b ;
8      n = ++a + b++;
9
10     cout<<m + n;
11
12     return 0;
13 }
```

```
1  #include <iostream>
2  using namespace std;
3  int main()
4  {
5      int p;
6      bool a = true;
7      bool b = false;
8      int x = 10 , y = 5;
9      p = ((x | y) + (a + b));
10     cout << p;
11     return 0;
12 }
```

```
#include <iostream>
using namespace std;
int main()
{
    int x=5, y=5,z=0;
    x= x--; y= --y;
    z= x++ + y--;
    cout<<"x:"<<x<<endl;
    cout<<"y:"<<y<<endl;
    cout<<"z:"<<z<<endl;

    return 0;
}
```

```
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5
6      cout<<sizeof(int);
7      cout<<sizeof(4);
8      cout<<sizeof(8.0);
9      cout<<sizeof(4.0f);
10     cout<<sizeof('a');
11     return 0;
12 }
```

```
1  #include<iostream>
2  using namespace std;
3  int main()
4  {
5      int i = 0, x = 1;
6
7      do
8      {
9          if(i % 5 == 0)
10         {
11             cout<<x;
12             x++;
13         }
14
15         ++i;
16     }while(i<3);
17     cout<<x;
18     return 0;
19
20
21 }
```

```
1  #include <iostream>
2  using namespace std;
3  int main()
4  {
5      int a = 5;
6      double b = 3.14;
7      cout << sizeof(++a + b);
8      cout << a;
9      return 0;
10 }
```

5. Determine the output of code segment 01 and 02 when.

x = 2 and y = 11

x =10 and y = 6

```
1  #include <iostream>
2  using namespace std;
3  int main()
4  {
5      int n=1;
6      while(n<=15)
7      {
8          if(n%3==0)
9              cout<<(n*n)<<endl;
10             cout<<n%3<<endl;
11             n+=3;
12         }
13     return 0;
14 }
```

```
//Code Segment01

if(x<10)
cout<<"AAA"<<endl;
cout<<"BBB"<<endl;

if(y>10)
cout<<"CCC"<<endl;
cout<<"DDD"<<endl;
```

```
//Code Segment02

if(x<10){
if(y>10)
cout<<"PPP"<<endl;
cout<<"QQQ"<<endl;
}
else
{
cout<<"RRR"<<endl;
}
```

6. Write a C++ program to calculate and print the kinetic energy of the object depending on the mass of the object and velocity of the object. The user enters the mass and velocity of the object to the program as user input.

The kinetic energy of the object is calculated as follows:

$$E = \frac{1}{2}mv^2$$

E= kinetic energy

m = mass of the object

v = velocity of the object

The program is required to find the category based on the kinetic energy.

The categories are given below.

kinetic energy	category
0-110	Mechanical Energy
111-170	Thermal Energy
171-250	Electrical Energy
251-340	Electromagnetic Radiation
Above 340	Invalid

Sample Output:

```
Enter mass of the object: 18
Enter velocity of the object: 5
The kinetic energy of the object: 225
The category is: Electrical Energy
```

7. Write the main method of a C++ program to read until user enters a 3-digit integer. The program outputs the number of digits in the user input.

Example 1:

Enter a 3-digit number:14

Output:14 has 2 digits. Please enter a 3-digit number.

Example 2:

Enter a 3-digit number:1456

Output:1456 has 4 digits. Please enter a 3-digit number.

Example 3:

Enter a 3-digit number:145

Output: You have entered a 3 digits number.

8. Write a C++ program to read a number from the user and print the number of even and odd numbers in the given number.

Sample Output:

```
Enter number: 12345
```

```
The number of even digits: 2
```

```
The number of odd digits: 3
```