**National University of Computer and Emerging Sciences**

School of Computing        Fall 2022        Islamabad Campus

# CS-1002 Programming Fundamentals BS(DS/AI)

Thursday, November 10, 2022

## Course Instructor

Mr. Adil Majeed, Ms. Ayesha Kamran, Dr. Hasan Mujtaba

Serial No:

# Sessional II

**Total Time: 1 Hour**
**Total Marks: 60**

_____
Signature of Invigilator

_____    _____   _____   _____
Student Name                                Roll No      Section     Signature

## DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

**Instructions:**

1. Attempt on the question paper. Attempt all of them. Read the question carefully, understand the question, and then attempt it.

2. No additional sheet will be provided for rough work. Use the back of the last page for rough work.

3. If you need more space, write on the back side of the paper ( only for questions number II, III and IV ) and mark the question and part number etc.

4. After being asked to commence the exam, please verify that you have (**11**) different printed pages, including this title page. There is a total of (**4**) questions.

5. Use of a calculator is strictly prohibited.

6. Use permanent ink pens only. Any part done using a soft pencil will not be marked and cannot be claimed for rechecking.

7. Use **proper indentation** while writing code and ensure that your code is legible. You will lose your marks If your code is not clear.

8. Please read the question thoroughly and use your time **properly**; an uneven time distribution can lead to incomplete answers.

|                   | I  | II | III | IV | **Total** |
|-------------------|----|----|-----|----|-----------|
| **Total Marks**   | 36 | 8  | 8   | 8  | 60        |
| **Marks Obtained** |    |    |     |    |           |

**Question I** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **(36 Marks)**

Only the code of main function is written without return 0 statement. So please don't identify those errors.

(a) **(2 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1   int a, b, c;
2   a=6,b=4,c=2;
3   int max = (a>b>c)*(a+b+c);
4   cout<<max;
```

**Solution:** 0

(b) **(3 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1   char alphabet= 'A';
2   for(int i = ('F'-'A'+1); i >= 1; --i)
3   {
4       for(int j = 1; j <= i; ++j)
5       {
6           cout << alphabet << " ";
7       }
8       ++alphabet;
9       cout << endl;
10  }
```

**Solution:**

```
1   A A A A A A
2   B B B B B
3   C C C C
4   D D D
5   E E
6   F
```

(c) **(3 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1   int i, j, m, answer;
2   m = 0;
3   j = 4;
4   while (m < 5) {
5   for (i = 0; i < j; i++){
6       answer = i * m;
7       cout << answer;
8   }
9   m = m + 1;
10  cout << endl;}
```

**Solution:**

```
1       0000
2       0123
3       0246
4       0369
5       04812
```

(d) **(1 Mark)** What is the output of the following program segment? Identify errors (if any).

```
1  int x = 5, y = 10;
2  int z = ++x * y--;
3  cout<<(z+y);
```

**Solution:** 69

(e) **(2 Marks)** What is the output of the following program segment? Identify errors (if any).

```
1  int x=10;
2  {
3      cout<<x<<"\t";
4      int x=20;
5      cout<<(x++)<<"\t";
6  }
7  cout<<(--x);
```

**Solution:** 10 20 9

(f) **(1 Mark)** What is the output of the following program segment? Identify errors (if any).

```
1  int z = 5, j = 7, k = 6, n = 3;
2  cout << (z + j % k + k * n - 15) << "\t" ;
3  cout << (z % n + 5) << endl;
```

**Solution:** 9 7

(g) **(2 Marks)** What is the output of the following program segment? Identify errors (if any).

```
1  int i = 12, counter = 5;
2  while (i - 1)
3  {
4      ++counter;
5      i--;
6  }
7  cout<<counter;
```

**Solution:** 16

(h) **(1 Mark)** What is the output of the following program segment? Identify errors (if any).

```
1  int a=5;
2  int b=a++++;
3  cout<<b;
```

**Solution:** Error

(i) **(2 Marks)** What is the output of the following program segment? Identify errors (if any). Assume uninitialized variable has value zero in beginning.

```cpp
int x=10;
    {
        int x=x;
        cout<<x<<"\t";
    }
cout<<(--x);
```

---

**Solution:** 0 9

(j) **(2 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```cpp
int suite = 5 ;
switch ( suite ) ;
{
case 0+5 ;
cout<< "\nClub" ;
case 1+5 ;
cout<< "\nDiamond" ;
}
```

---

---

**Solution:** Error

(k) **(1 Mark)** What is the output of the following program segment? Identify errors (if any). Assume uninitialized variable has value zero in beginning.

```
1  int i=0, n = 0;
2  if ((i < 1) && (++i < n))
3  {
4      cout << "Condition True!";
5  }
6  else
7      cout<<"Not True";
```

**Solution:** Not True

(l) **(2 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1  int x = 8, y = 0, z ;
2  while ( x >= 0 && y <=5 )
3  {
4      if ( x == y )
5      break ;
6      else
7      cout<<x<<y ;
8      x-- ;
9      y+=2 ;
10 }
```

**Solution:** 807264

(m) **(2 Marks)** What is the output of the following program segment? Identify errors (if any).

```
1  int z, x=5, y=-10, a=4, b=2;
2  z = x++ - --y * b / a;
3  cout<<z;
```

**Solution:** 10

(n) **(3 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1  int x = 1, y =2, n=50 ;
2  while (y <=n )
3  {
4      if ( n%y == 0 )
5      {
6          n=n/y;
7          x=x+1;
8      }
9      else
10     y=y+1;
11     cout<<x<<y<<" ";
12 }
```

---

**Solution:** 22 23 24 25 35 45

(o) **(2 Marks)** What will the following program display on screen. Explain the error or bug if there is any.

```
1   int a = 0, b=26;
2   float f=2.6;
3   b+= (a = 50)*f/2*10-b\%5;
4   cout << a << "#" << b;
```

---

**Solution:** 50#675

(p) **(2 Marks)** What is the output of the following program segment? Identify errors (if any).

```
1  float Mystery(int y, int x){
2          return (y + x + 7.0 / 2);   }
3  int main(){
4          float i = 9.5;
5          int j = 4;
6          cout << Mystery(i, j) << endl;   }
```

---

**Solution:** 16.5

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(q) **(2 Marks)** What is the output of the following program segment? Identify errors (if any).

```
1  int fun(int x){
2          return x % 3 + 1; }
3  int main() {
4          int b = 5;
5          int y = 2 + fun(3 * b + 1);
6          int z = fun(fun(y));
7          cout << y << "-" << z;   }
```

---

**Solution:** 4-3

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(r) **(3 Marks)** Convert the following code (of switch) in if-else decision structures.

```
1  cin >> sport;
2  switch (sport) {
3  case 'c':
4  cout << "You like Cricket";
5  case 'f':
6  cout << "You like Football";
7  break;
8  case 't':
9  case 'H':
10 cout << "You like Tennis";
11 cout << "You like Hockey";
12 case 'B':
13 cout << "You like BasketBall";
14 break; }
```

**Solution:**

```
1  cin>>sport;
2          if(sport=='c')
3          {
4          cout<<"You like Cricket";
5          cout<<"You like Football";
6          }
7          else if(sport=='f')
8          {
9          cout<<"You like Football";
10         }
```

```
11          else if(sport=='t'|| sport =='H')
12          {
13          cout<<"You like Tennis";
14          cout<<"You like Hockey";
15          cout<<"You like BasketBall";
16          }
17          else if(sport=='B')
18          {
19          cout<<"You like BasketBall";
20          }
```

**Question II** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **(8 Marks)**

(a) **(8 Marks)** Write a function in c++ which takes a number as input and prints the pattern of alphabets as given below. You are required to validate the input that the number should be in-between 1 and 26.

For example, for *n=5*, print pattern as below

```
A B C D E D C B A
  B C D E D C B
    C D E D C
      D E D
        E
```

for *n=4*, print pattern as below

```
A B C D C B A
  B C D C B
    C D C
      D
```

**Solution:**

```cpp
void pyramid(int n)
{
        if(n>=1 && n <=26)
        {
                char alphabet='A';
                for(int i = 0; i <n; i++)
                {
                        cout<<setw(i+1);
                        alphabet = alphabet + i;
                    for(int j = i; j<n; j++)
                    {
                        cout<<alphabet++;
                    }
                    --alphabet;
                    for(int j = i; j<n-1; j++)
                    {
                        cout<<--alphabet;
                    }
                    alphabet= 'A';
                    cout << endl;
                        }
        }
}
```

**Question III** . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . **(8 Marks)**

(a) **(8 Marks)** Write a function in c++ which takes a number **_n_** as input (parameter) and return *sum of all digits except unit digit* (rightmost digit), **is equal** to the *unit digit*(rightmost). If the function returns the sum of digits, then print *YES* in main otherwise print *NO*.
For Example, if the user enters 1124 it will print YES because *1+1+2 is equal to 4*
While if the user enters 2348 it will print No because *2+3+4 is not equal to 8*.

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**Solution:**

```cpp
int sum(int n)
{
        int number = 0, remainder;
          while(n != 0)
           {
              remainder = n % 10;
              number += remainder;
              n /= 10;
           }
        return number;
}
int main() {
        int n, c, number;
        cout << "Enter an integer: ";
        cin >> n;
        c = n % 10;
        n /= 10;
          if(sum(n)==c)
                  cout << "Yes";
          else
                  cout<<"No";
    return 0;
}
```

**Question IV** ................................................................................................ **(8 Marks)**

   (a) **(8 Marks)** The value of a function F is defined by the following infinite series:

$$F = \frac{1}{3} + \frac{x^2}{9} + \frac{x^4}{27} + \frac{x^6}{81} + \frac{x^8}{243} + \cdots$$

Write a C++ code that takes **n** (number of terms) and the value of **x** as input from the user and calculates the function's value. In other words, calculate the sum of the series for the first N terms. For example, if n=5 and x=2, then it should display 0.744856.

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**Solution:**

```cpp
int main()
{
        float mul,sum;
        int x,n,c=2,a=3;
        cout<<"Enter the value of n ";
        cin>>n;
        cout<<"Enter the value of x ";
        cin>>x;
        sum= 1/3.0;
        for(int i=1;i<n;i++)
        {
                mul=1;
                a=a*3;
                for(int j=1;j<=c;j++)
                {
                        mul *=x;
                }
                sum += mul/a;
                c+=2;
        }
        cout<<"Sum :  "<<sum<<endl;
        return 0;
}
```

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