SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

Higher National Diploma in Information Technology
First Year, First Semester Examination – 2020
HNDIT 1103 - Structured Programming

Instructions for Candidates:
Answer five (05) questions only

No. of questions : 06
No. of pages : 05
Time : 03 Hours

Question 1

I. State a difference between semantic and syntax component in computer programming. (2 marks)

II. State two differences between compiler and interpreter. (4 marks)

III. Mention three constructs in structured programming. (3 marks)

IV. Draw a flow chart to display the square numbers between 1 to 1000.
NOTE: Square numbers: 1,4,9,16,25..... (7 marks)

V. State whether the following statements are correct or incorrect

a) Structure chart is a chart which shows the breakdown of a system to its lowest manageable parts.

b) In bottom-up problem-solving approach, it is writing a main body first which calls to several major routines and then develop the routines.

c) Linker combines all object code files into a single executable program.

d) In implicit casting, a lower type variable is converted to the higher type variable (4 marks)

Question 2

I. State a usage of header files in C++. (2 marks)

II. Derive the answer for the following C++ expressions.

a) 5+2*3-1

b) 10+5%3/2

c) (14+1)/int(double(2))

d) 5/double(2) (4 marks)

III. What would be the output of the program shown below?

a)

```
int x, y;
x = 2;
y = ++x * ++x;
cout << x << y;
x = 3;
y = x++ * ++x;
cout << x << y;
```

(4 marks)

b)

```
int a = 10, b = 3, c;
c = (a > b) ? a : b;
cout << c;
```

(2 marks)

IV. Write C++ program to find and display the total surface area of the cylinder for the input radius(r) and height(h). Clearly define constants and variables in your program.
Hint : Total surface area of the cylinder $=2\Pi r(r+h)$, $\Pi=3.14$

(8 marks)

Question 3

I. Write the syntax of nested if statement. (3 marks)

II. Write C++ program to obtain the length and breadth of the rectangle from the user and check if it is a square or not.
Note: Square is a figure with equal length and breadth.

(6 marks)

III. What would be the output of the program given below?

```
int a,b,c;
a=2;b=4;c=6;
if(a!=b && ++a==b){
        a+=b;
        cout<<a;
        }
        a*=b;
        cout<<a;
```

(3 marks)

IV. Write C++ program to output the day of a week using switch-case for the input day number as follows.

Day Number	*Day*
1	Sunday
2	Monday
3	Tuesday
4	Wednesday
5	Thursday
6	Friday
7	Saturday

(8 marks)

Question 4

I. Write the C++ syntax of do-while loop. (3 marks)

II. What do you mean by infinite loop? (3 marks)

III. Write C++ code segment to display the odd numbers from 1 to 1000 using a **for loop**. (6 marks)

IV. What would be the output of the C++ code segments given below?

a)

```
int dec, bin[16], i = 0, j = 0;
dec=16;
while (dec > 0)
{
        bin[i] = dec % 2;
        dec = dec / 2;
        ++i;
}
cout << "Output :";
for (j = i - 1; j >= 0; --j)
{
        cout << bin[j];
}
```

(4 marks)

b)

```
int rows, i, j, space;
rows=5;
for(i=rows; i>=1; --i)
{
  for(space=0; space<rows-i; ++space)
    cout<<" ";
  for(j=i; j<=2*i-1; ++j)
    cout<<"* ";
  for(j=0; j<i-1; ++j)
    cout<<"* ";
        cout<<endl;
}
```

(4 marks)

Question 5

I. State a difference between an ordinary variable and an array variable? (2 marks)

II. Write C++ code segment to create the matrix shown below using multidimensional array concept.

100	1
200	2
300	3
400	4

(5 marks)

III. Derive the answer for the following C++ built in functions shown below.

a) sqrt(25)
b) pow(2, 3)
c) abs(5.14)
d) fabs(5.14)
e) isdigit(9)

(5 marks)

IV. Define a C++ struct called Rectangle with the fields of length and height. (2 marks)

V. What would be the output of the C++ program shown below?

```
#include<iostream>
using namespace std;
void method(int value[], int n)
{
   bool result = true;
   for (int i=0; i<=n-2; i++)
   {
      if (result)
      {
         if (value[i] > value[i+1])
            swap(value[i], value[i+1]); // swap(a,b) will interchange the values of a and b.
      }
      else
      {
         if (value[i] < value[i+1])
            swap(value[i], value[i+1]);
      }
      result = !result;
   }
}
int main()
{
   int value[] = {10,20,30,40,50,60};
   int n = sizeof(value)/sizeof(value[0]);
   cout << "Initial value ";
   for (int i=0; i < n; i++)
   cout << value[i] <<" ";
   method(value, n);
   cout << "\nUpdated values ";
   for (int i=0; i < n; i++)
   cout << value[i] <<" ";
   return 0;
}
```

(6 marks)

Question 6

I. Define a pointer in C++. (2 marks)

II. Write C++ code segment to print the address of the variable which is used to input an integer by the user. (3 marks)

III. Write a C++ program to calculate and display the area and circumference of the circle. Area is calculated from the function called cal_Area and circumference is calculated from the function called cal_Circum. cal_Area and cal_Circum takes radius as floating-point argument from main method which is given by the user. cal_Area and cal_Circum methods return calculated area and calculated circumference to main method.
(Note : Area of the circle=Πr^2, Circumference of the circle =2 Πr, Π=3.14) (8 marks)

IV. What is meant by "pass by reference" in C++ functions. (3 marks)

V. What would be the output of the C++ program shown below.

```
#include<iostream>
using namespace std;

 void swap(int & x, int b)
{
 int t = x;
 x = b;
 b = t;
}


int main()
{
 int x = 40;
 int b = 20;
 int c = 50;
 swap(x,b);
 swap(b,c);
 cout << x << "\n"<< b << "\n" << c;
}
```

(4 marks)