NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
DEPARTMENT OF COMPUTER SCIENCE

SUBJECT: STRUCTERED PROGRAMMING

CODE: SCS 2107

Instructions to candidate:

1. Answer any four questions. Paper contains five questions.
2. All programming questions to be answered in structured C/C++.

3 HOURS

QUESTION ONE.

Write a program, which computes the area and circumference of a circle. You should have the user input the diameter of the circle as an integer. The area of a circle is given by πr^2, where r is half the diameter. The circumference is π times the diameter. You should compute the area and circumference as a floating-point value. Use the correct data types in intermediate calculations. Format the output of the calculations to four decimal places. Declare the value of π using C/C++ constant declaration with the value of 22/7. Use proper input validation. [25]

QUESTION TWO.

Write a program, which views text files. First your program should read in the name of the file. The user may give an invalid file name hence facilitate the choices of trying again or exiting the program. If the file name is valid read the first twenty lines of the file and display them on the screen. Then request for a user instruction as follows:

      c – Continue, display next twenty or message if end of the file
      b – Back. Display previous or message if at the beginning
      n – New, prompt new file name
      q – Quit   [25]

QUESTION THREE.

i). What are the advantages of structured programming? [5]

(ii) What are the disadvantages of structured programming? [5]

(iii) Compare and contrast structured programming and an object oriented approach.

[10]

(iv) Describe in brief each of the following terms:

    a) object
    b) Inheritance
    c) void pointer
    d) polymorphism
    e) passing by reference

[5]

QUESTION FOUR

The factorial of an integer is defined as follows:

- $0! = 1$
- $n! = n(n-1)(n-2)(n-3)!$ for all $n>0$;

a)   Write a recursive function, which calculates the factorial of an integer

[10]

b)   Write an iterative (non – Recursive) function which calculates the factorial of an integer n

[10]

c)   What the difference is between passed by value, and passed by reference give examples.

[3]

ii) What is the difference between an array and a structure?

[2]

QUESTION FIVE.

a). What is the difference between the following?

i)   void f (int &r) {{r = r/2;}
ii)   void g (int *r) {*r = * r/2;}

[5]

b) Suppose we execute the following code:

```
int a [10], *p
for (int  i  = 0; i < 10, ++ i )
a [i] = i * i ;
p = & a [3];
```

Which of the following expressions is not valid and which is valid

i)   a[1] = p [-2];
ii)   &a[0] = p-3
iii)   *a = *(p-3)
iv)   &a[10] = & p[7]
v)   a = (p-3)

[10]

c)   Given the following program what is the output:

```
# include < iostream.h>

 int main ( ) {

char * p = {'T','r','i','s','h','\0'};
int name [ ] = {1,2,3};
double db[ ] = {20.8,30.8,10.8};
cout << p;
cout<< name;
cout<<&name[0];
cout <<&db[2];
cout<<db[2];
cout<<*p;
cout<<&p;
cout<<&name[3];
cout <<db;
cout <<&p;

[10]

}
```