Answer ALL of Part I and TWO questions from Part II

The use of Electronic Calculators is NOT permitted

PART I

1.

a) Design and show the implementation in C++ of a string set class called StringList. The class should allow the following operations:

i) add string to set
ii) delete string from set.
iii} find longest string in set
iv) find shortest string in set

The class should not allow the same string to appear twice in the set.

Make sure all design decisions are properly commented

[30 marks]

b) Provide a test plan - including test programs - for the class. Make sure the plan tests all operations.

[10 marks]

c) Discuss in detail the performance implications of handling very large string sets and outline any changes you would make to the class to operate on such sets.

[10 marks]

[Total 50 marks]

PART II

2.

Describe the following C++ features:

Pointer Arithmetic
Templates
Dynamic variables
Inline functions
Initialisation

[5 marks each]

[Total 25 marks]

3.

a) Explain the use of inheritance in C++

[5 marks]

b) What are the different kinds of inheritance used for?

[6 marks]

c) How are abstract classes used? Provide an example.

[8 marks]

d) Explain the concepts of Scope and Lifetime in C++

[6 marks]

[Total 25 marks]

4.

a) Explain the use of “break” and “continue” in C++

[6 marks]

b) Explain the relationship between pointers and arrays.

[6 marks]

c) How is array indexing done using pointer arithmetic?

[7 marks]

d) Why is the following function incorrect?

```
int f( int *a, int n )
{
      for( int i=0; i<n; i++ ) {
            if( a[i] == 0 ) break;
      }
      if( i < n/2 ) return( 0 );
      else return( 1 );
}
```

[6 marks]

[Total 25 marks]

END OF PAPER