THE HONG KONG POLYTECHNIC UNIVERSITY
Faculty of Engineering

Computer Programming Closed-book Written Test 3
Date: 30 April 2007 Time: 2:30 – 4:00 p.m.

Name: _____ Student No. _____
Programme code:_____

This test aims at assessing students on the following learning outcomes:

1. Be familiarized with the Visual C++ 2005 programming environment.
2. Be proficient in using the basic constructs of C/C++, such as variables and expressions, looping, arrays and pointers, to develop computer programs.
3. Be able to develop a structured and documented computer program.
4. Understanding the fundamentals of object-oriented programming and be able to apply it in computer program development.
5. Solve problems by using systematic approaches.

Every question belongs to either one the three levels of difficulties:

- Knowledge reflected in the learning outcomes
- Application of knowledge that exceeds the learning outcomes in the majority of regards
- Extrapolation of knowledge that exceeds the learning outcomes in all regards

Grading:

0 - 11 marks	F	12 - 22 marks	D, D+	23 - 34 marks	C, C+
35 - 48 marks	B, B+	49 - 60 marks	A, A+		

Instruction: *When specified, you **may** choose more than one answer; otherwise, choose ONE answer for each question. Choose the answer(s) by circling it/them. Questions 1 - 26 contain 1 mark each; questions 27-43 contain 2 marks each. The total marks are 60.*

Consider the following program and answer Questions 1 - 2:

```
#include <iostream>
#include <fstream>
using namespace std;
int main()
{
     ofstream fout1("myfile.txt");
     fout1 << "This line is written to file.";
     fout1.close();
     ofstream fout2("myfile.txt");  //Line 9
     fout2.seekp(10);
     fout2 << "*******";
     fout2.close();
     ifstream fin("myfile.txt");
     fin.seekg(8);
     char ch;
     while (fin.get(ch))
     cout << ch;
     fin.close();
     return 0;
}
```

Q1 After executing the above program, what will be the content of the file `myfile.txt`?

a) `This line *******ten to file.`

b) `This line is written to file.*******`

c) _____`*******`

d) `*******`

e) None of the above

1

Q2 If we change Line 9 to "`ofstream fout2("myfile.txt", ios::app);`", what will be the console output?

a) `e *******ten to file.`

b) `e is written to file.*******`

c) `*******`

d) `This line is written to file.*******`

e) None of the above

1

Q3 Which of the following is(are) C++ file I/O stream class(es)?
(i) ifstream (ii) istream (iii) iostream (iv) ofstream

a) (i) b) (i), (iv) c) (ii), (iii) d) (i), (ii) and (iv) (e) None of the above

1

Q4 Which of the following is(are) NOT correct? (*You may choose more than one answer.*)

a) MFC and ATL libraries are supported by C++/CLI.

b) Unmanaged code can run directly in Windows without Common Language Runtime.

c) Managed code can run directly in Windows without Common Language Runtime.

d) Managed Windows applications can use unmanaged C++ libraries.

e) All of the above are NOT correct. [It is correct if answer e) is also selected.]

1

Q5 Which of the following is(are) managed class(es)?
(i) `string` (ii) `String` (iii) `cstring` (iv) `Convert`

a) (i) b) (ii), (iii) and (iv) c) (i), (iii) and (iv) d) (ii) , (iv) e) None of the above

1

Q6 In C++/CLI applications compiled under the Visual C++ 2005 environment, `MessageBox::Show()` is:

a) a function of the `MessageBox` class b) an object of the `MessageBox` class

c) a property of the `MessageBox` class d) a reference of the `MessageBox` class

e) None of the above

1

Q7 Which of the following object(s) is(are) NOT created on executing "`#include <iostream>`"?

a) `std::cin` b) `std::cout` c) `std::cerror`

d) `std::clog` e) All the above will be created.

1

Q8 Which of the following is(are) NOT a member function(s) of `std::cin`? (*You may choose more than one answer.*)

a) `get()` b) `put()` c) `seekp()` d) `getline()` e) `write()`

1

Q9 When a linked list item is first created and initialized, what should be the value of the pointer for the next item?

a) Address of the next item b) Null character c) Null pointer

d) Address of the previous item e) None of the above

1

Q10 Which of the following about linked lists is/are true? (*You may choose more than one answer.*)

a) We do not need to define the size of the list beforehand.

b) Every item in the list can be accessed randomly.

c) When some items are inserted to or removed from the list, we do not need to move other items.

d) The size of the space we need to allocate for the list is proportional to the number of items in the list.

e) None of the above is true.

1

Q11 On executing the following C++ code, if the user enters "hello" and then press the <enter> key, what will be the content of the strings `abc` and `xyz`?

```
char abc[10], xyz[10];
cin >> abc; cout << "abc: " << abc << endl;
cin.getline(xyz,10);
cout << "xyz: " << xyz << endl;
```

a) `abc` = "`hello\0`", `xyz` = "`\0`" b) `abc` = "`hello`", `xyz` = "`\0`"

c) `abc` = "`hello`", `xyz`: Undetermined, waiting for the further input from the user

d) `abc` = "`hello\0`", `xyz`: Undetermined, waiting for the further input from the user

e) None of the above.

1

Q12 Which of the following statement(s) is/are wrong? (*You may choose more than one answer.*)

a) Objects of a managed class are stored in the CLR heap.

b) Storage space for objects of a managed class should be freed explicitly by the programmer.

c) Objects of a managed class can only be used with the presence of the .NET Framework.

d) Storage space for objects of a managed class cannot be allocated by the operator `new`.

e) Storage space for objects of a managed class can be allocated by the programmer.

1

Q13 For C++ applications, the memory is divided into 4 areas: Code Space, Stack, Global Name Space, and

Free Store. Which of the following about these 4 areas is/are correct?
(i) Code Space: For the storage of program code
(ii) Stack: For the storage of local variables inside functions only
(iii) Free store: For the storage of global variables, local variables and dynamically allocated data

a) Only (i) is correct. b) Only (ii) is correct. c) Only (iii) is correct.

d) Both (i) and (ii) are correct. e) All are correct.

1

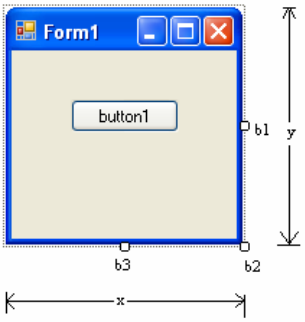
Q14 Which of the following about the open mode for file I/O is/are correct?
(i) `ios::ate` – Place you at the end of the file; the original file (if it exists) will not be truncated.
(ii) `ios::app` – File will be opened for appending data to the end of the existing file.
(iii) `ios::ate|ios::in` – Similar to `ios::app`, allow appending at end of the existing file.

a) Both (i) and (ii) are correct. b) Both (i) and (iii) are correct.

c) Both (ii) and (iii) are correct. d) All of them are correct. e) None of the above.

1

Q15 Consider the Windows form below. If the property of `button1->Anchor` is set to `Bottom`, when we click "`b3`" and drag down so as to increase the height `y`, which of the following will happen?
(i) The size of `button1` will change.
(ii) The position of `button1` will change.



a) Only (i) is correct. b) Only (ii) is correct. c) Both (i) and (ii) are correct.

d) Both (i) and (ii) are wrong e) Information is insufficient to determine.

1

Q16 Which of the following about GDI+ is/are correct?
(i) To programmers, GDI+ is just a set of namespaces that provides library functions for the rendering of 2D graphics.
(ii) GDI+ provides advanced animation and 3D rendering features.
(iii) For compatibility reason, GDI+ for Windows Forms applications is not included in Visual C++ 2005 by default. The programmer has to add "`using namespace System::Drawing;`" to enable GDI+.

a) Both (i) and (ii) are correct. b) Both (i) and (iii) are correct

c) Both (ii) and (iii) are correct d) All of the above are correct. e) None of the above.

1

Q17 Which of the following about the run-time debugger of Visual Studio 2005 is/are correct? (*You may choose more than one answer.*)

a) It supports line by line tracing for checking the sequence of program execution.

b) It supports the setting of break points triggered by a particular change of value of a variable.

c) It supports the examination of the values of variables at different stages of the program execution.

d) It supports the generation of the log file that records the history of some chosen variables' values.

e) None of the above.

1

Consider the following program and answer Questions 18 - 19.

```
#include <iostream>
using namespace std;
int main()
{
      char show[] = "ENG236 C++ programming";
      cout.write(show,4);
      return 0;
}
```

Q18 After compiling the above program, what would be shown on the screen?

a) `ENG236 C++ programming` b) `ENG2` c) `ming`

d) The program contains error(s) and cannot run. e) None of above.

1

Q19 How many elements does the array `show[]` have after the program execution?

a) 4 b) 22 c) 23 d) It cannot be determined though the program can run.

e) The program contains error(s) and cannot run.

1

Q20 In the C++ statement below, what is the range of the values of `num`?

```
int num = rand() % 4;
```

a) 0 to 0x7FFF b) 0 to 0x1FFF c) 0 to 0x0003 d) 1 to 4

e) None of the above.

1

Consider the following C++ function and answer Questions 21 - 23.

```
CAT* create(int n)
{
      CAT *pH, *pT, *pL; //Line 2
      int i;
      pH = new CAT;
      pL = pH;          //Line 5
      pL -> SetNum(0);
      for(i=1;i<n;i++)
      {
            pT = new CAT;
            pL -> SetNext(pT);
            pL = pT;
            pL -> SetNum(i);
      }
      return pH;
}
```

Q21 In Line 2, where will the three pointers `pH`, `pT` and `pL` be located?

a) Free store b) Code space c) Stack d) Global name space

e) Undetermined; it depends on the function calling `create()`.

1

Q22 What is the return type of the function `create()`?

a) `CAT` b) pointer of `CAT` object c) `int` d) `pH` e) None of the above.

1

Q23 What is the meaning of the statement in Line 5 ?

a) `pL` and `pH` contain the same address of an object.

b) A new object the same as the object pointed by `pH` is created, and pointed by `pL`.

c) `pL` becomes a null pointer.

d) `pL` is the name of the object pointed by `pH`.

e) None of above.

1

Consider the following program and the description follows, then answer Questions 24 - 25.

```
#include <iostream>
using namespace std;
int main(int argc, char *argv[])
{
      cout << argc << endl;  // Line 5
      cout << argv[argc-1];
      return 0;
}
```

The above program has been built successfully into the executable file `test3.exe`. In the folder containing the executable file, the user types the following in the Command Prompt window and then press the <enter> key:

```
test3 summer is coming
```

Q24 What will be the console output on executing Line 5?

a) `4` b) `3` c) `2` d) `1` e) Undetermined; a run-time error occurs.

1

Q25 What will be shown on the screen after line 6 has been executed?

a) `test3` b) `summer` c) `is` d) `coming` e) Undetermined; a run-time error occurs.

1

Q26 What is the return type of the library function `time(NULL)`?

a) `int` b) `unsigned int` c) `long` d) `time_t` e) None of the above.

1

Instruction: *Each of the following questions below contains TWO marks. When specified, you **may** choose more than one answer; otherwise, choose ONE answer for each question.*

Q27 Which of the following about linked list is(are) NOT correct? (*You may choose more than one answer.*)

a) A linked list is a data structure of many items, with each item having a pointer points to the location of the next item.

b) A linked list is a class in C++.

c) If a linked list is stored in the heap, the location of each item is managed by the system.

d) On building linked lists, the managed C++ libraries will be used.

e) All of the above are NOT correct.

2

Q28 Which of the following about GUI is(are) NOT correct? (*You may choose more than one answer.*)

a) The support from .NET class libraries is needed to realize GUI.

b) GUI must be realized inside a Windows Forms application.

c) Before the introduction of the .NET Framework, GUI can not be achieved by using C++ in Windows.

d) The .NET Framework must be installed before a Windows Forms application with GUI can be executed in Windows environment.

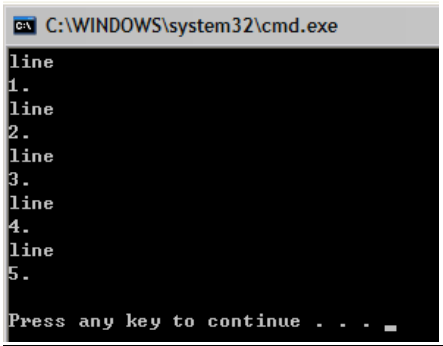
e) All of the above are NOT correct. [It is correct if answer e) is also selected.]

2

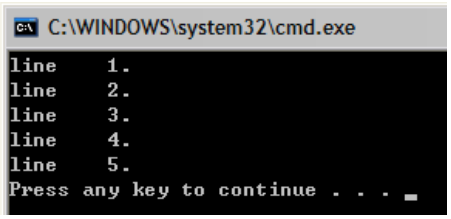
Q29 What should be the console output on executing the program below?

```
#include <iostream>
#include <fstream>
using namespace std;
int main()
{
      ofstream write("test.txt");
      for(int i=1; i<=5; i++)
            write << "line\t"<< i<<".\n";
      write.close();
      ifstream read("test.txt");
      char a[256];
      while(read.getline(a,256,'\t'))
            {cout<<a<<endl;}
      read.close();
}
```

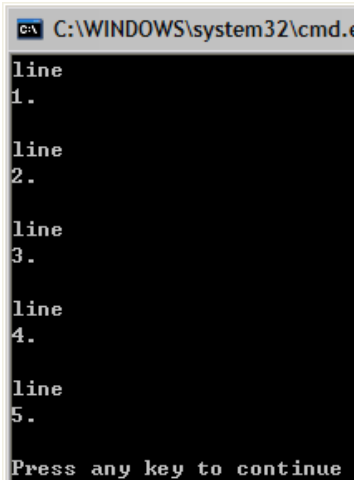
a)



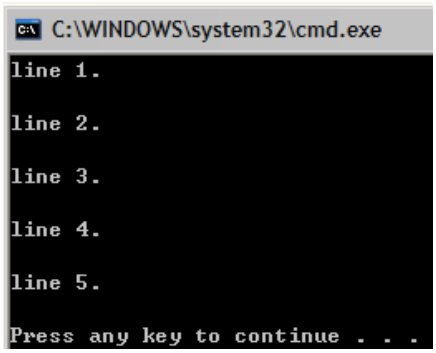
b)



c)



d)



e) None of the above.

2

Q30 After executing the following C++ program, what should be the content of the file `write1.dat`?

```
# include <iostream>
# include <stdlib.h>
# include <fstream>
using namespace std;
int main ( )
{
      ofstream  file1("write1.dat");
      int flag=0;
      for (int k=3 ; k<=10 ; k++ )
      {
            flag=1;
            for( int j=2; j<=k-1;j++)
            {
                  if(k%j==0)
                  {
                        flag=0;
                        break;
                  }
            }
            if (flag==1)
            file1<<k<<' ';
      }
      file1.close ( );
}
```

(a) `3` (b) `4 6 8 10` c) `3 5 7` d) `3 5 7 9` e) None of the above.

2

Q31 Consider the following C++ code, which is a part of a Windows Forms application:

```
public: Form1(void)  // Form1 constructor
{ X = 0;             // Initialize the counter to 0
  InitializeComponent();
}

private: int X; // Serve as a counter

private: System::Void timer1_Tick(System::Object ^ sender, System::EventArgs ^e)
{ if (X%10 == 0)          // If X is a multiple of 10,
  {
    label1->Text =""+X;// show its value on label1
```

```
  }
  this->Invalidate(); // Generate a Paint message to Form1
}
```

In the above code, which of the following about the line "`this->Invalidate();`" is/are true?

(i) The line can certainly be replaced by "`Invalidate()`".
(ii) The line can certainly be replaced by "`Form1-> Invalidate()`"
(iii) On executing the line, the `Paint` event handler of `Form1` will be called.

a) Only (i) is correct. b) Only (ii) is correct. c) Only (iii) is correct.

d) All of them are correct. e) Only (i) and (iii) are correct

2

Q32 Consider the following C++ codes inside a Windows Forms application:

```
char *name = (char*) Marshal::StringToHGlobalAnsi(tbstr).ToPointer();
      :
      :
Marshal::FreeHGlobal((IntPtr)name);
```

(i) The first line is to convert a managed string to an unmanaged string.
(ii) The function `ToPointer()` of the `Intptr` object is to convert the object to a pointer.
(iii) The last line is not necessary because the CLR heap for storing any managed objects will automatically be freed by the CLR.

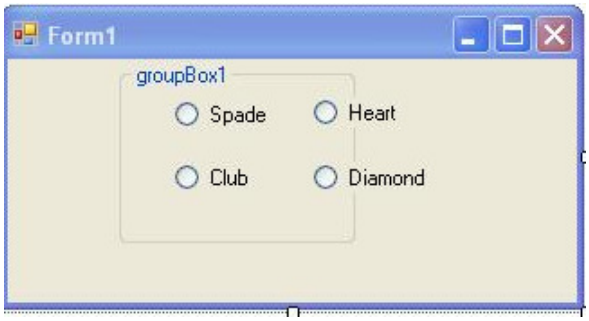
Which of the above is(are) correct?

a) Only (i) is correct. b) Only (ii) is correct. c) Both (i) and (ii) are correct.

d) All of them are correct. e) None of the above.

2

Q33 Referring to the Windows Form application below, the radiobuttons `Spade` and `Club` belong to `groupBox1`, whereas the radiobuttons `Heart` and `Diamond` do not.



Which of the following is/are true?

(i) We cannot simultaneously choose `Spade` and `Heart`.
(ii) We can simultaneously choose `Heart` and `Diamond`.
(iii) We can simultaneously choose `Heart` and `Club`.

a) Only (i) is correct. b) Only (ii) is correct. c) Only (iii) is correct.

d) Ony (ii) and (iii) are correct. e) Ony (i) and (ii) are correct.

2

Consider the following program when answering Questions 34 - 35.

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

```
int main()
{
      char A[256];
      char B[256];
      char C[256];
      cout << "Enter string one: ";
      cin.getline(A,256);
      int a = strlen(A);
      cout << "Enter string two: ";
      cin >> B;
      cout << "Enter string three: ";
      cin.getline(C,256);
      strcat(B,A);
      cout.write(B,a);  // Line 16
}
```

Assume that the user enters "`aa bb cc`" and "`dd ee ff`" as the first two lines of input through the keyboard.

Q34 What will be the output on executing Line 16?

a) `dd aa bb cc` b) `dd ee ffaa bb cc` c) `dd aa bb`

d) `ddaa bb` e) None of the above

2

Q35 If we replace Line 16 by "`cout << C;`", what will be the output of Line 16?

a) `gg hh ii` b) `ee ff` c) ` ee ff`

d) `ee ffgg hh ii` e) None of the above

2

Consider the following event handler and answer Questions 36 - 37.

```
private: System::Void button1_Click(System::Object^  sender, System::EventArgs^
e) {
      srand(time(NULL));
      int i = rand()%5;
      System::Drawing::Color c;
      switch (i)
      {
            case 1: c=System::Drawing::Color::Blue;break;
            case 2: c=System::Drawing::Color::Red;break;
            case 3: c=System::Drawing::Color::Green;break;
            case 4: c=System::Drawing::Color::White;break;
            case 5: c=System::Drawing::Color::Yellow;break;
            default:c=System::Drawing::Color::Gold;break;
      }
      this->label1->BackColor=c;
}
```

Q36 What will be done by the above event handler?

a) Change the back colour of a label. b) Change the text of a label.

c) Change text of a button. d) Change the back colour of a button

e) This event handler contains error(s) and cannot be executed.

2

Q37 According to the above event handler, which case will never happen?

a) `case 1` b) `case 5` c) `default` d) All the cases will possibly happen.

e) All the cases will never happen.

2

Consider the following program and answer Questions 38 -39.

```
#include <iostream>
#include <fstream>
using namespace std;
int main()
{
      ofstream createfile("closeBookTest");
      createfile<<"ENG236";
      createfile.close();
      ofstream createfile2("closeBookTest", ios::in);
      createfile2<<"ENG236\n";
      createfile2.close();
      ifstream openfile("closeBookTest");
      openfile.seekg(1);
      //cout<<"Current position: "<< openfile.tellp() <<endl;
      char ch;
      while (openfile.get(ch))
            cout<<ch;
      openfile.close();
      return 0;
}
```

Q38 On executing the above program, what will be shown on the screen?

a) `ENG236ENG236` b) `ENG236` c) `NG236` d) `NG236ENG236`

e) The program contains error(s) and cannot run.

2

Q39 Which of the following about `tellp()` is/are true? (*You may choose more than one answer.*)

a) It is a member function of `ofstream`, and it tells the current position of an opened file.

b) It is a member function of `ifstream`, and it tells the current position of an opened file.

c) It is a member function of `ofstream`, and it sets the current position of an opened file.

d) It is a member function of `ifstream`, and it sets the current position of an opened file.

e) None of the above.

2

Consider the following program and answer Questions 40 - 41.

```
1.  #include <iostream>
2.  #include <fstream>
3.  #include <string>
4.  using namespace std;
5.  int main()
6.  {
7.    ofstream file("test.txt");
8.    string line;
9.    char studentID[] ={"06901033","06901022"};
10.   char studentNM[] ={"Lily","Tom"};
11.   for(int i=0; i<2; i++)
12.         file<<studentID[i]<<" "<<studentNM[i]<<"\n";
13.   file.close();
```

```
14.   ifstream file1("test.txt");
15.   if(file1)
16.   {
17.         while(getline(file1,line))
18.         cout<<line<<endl;
19.   }
20.   file1.close();
21. }
```

Q40 On compiling the program above, the compiler reports errors. Indicate the lines that have compilation errors.

a) Lines 9, 10, 12 b) Lines 12, 17 c) Lines 9, 10 d) Lines 9, 10, 12, 17

e) None of the above.

2

Q41 If the errors are corrected, what will be the output shown on the screen?

a) `06901033 Lily` b) `06901033` c) Many outputs in an infinite loop will be shown.

d) `06901033 Lily`
`06901022 Tom` e) None of the above

2

Q42 When using the library function `int atoi(char *)`, which of the following header file(s) can be included in order to make the linking successful? (*You may choose more than one answer.*)

a) `fstream` b) `iostream` c) `math.h` d) `time.h` e) None of the above.

2

Q43 What should be the console output on executing the following program?

```
#include<iostream>
using namespace std;
void main()
{
  int a=3, b=0;
  int *p=&a;
  b=+a++;
  cout<<*p<<','<<b<<endl;
}
```

(a) `3,4` b) `4,3` c) `3,3` d) `4,4` e) The program contains error(s).

2