THE HONG KONG POLYTECHNIC UNIVERSITY
Faculty of Engineering

Computer Programming Closed-book Written Test 3
Date: 5 April 2008 Time: 2:30 – 3:30 pm

Name: _____ Student No. _____
Programme: _____

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 one of 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: *Choose only ONE answer for each question* ***unless stated otherwise****. Choose the answer(s) by circling it/them. Each question carries 2 marks. The total marks are 60.*

Consider the following C++ program and answer **Questions Q1-Q4**:

```
#include <iostream>
using namespace std;
int main()
{
      int var = 5;
      int *p1 = &var;
      int *p2 = new int[2];
      int *p3 = new int(3);
      int *p4 = &var;

      *p2 = 7;
      *(p2+1)=*p4;

      cout << "*p1: " << *p1 << "\n"; //line 14
      cout << "*p2: " << *p2 << "\n"; //line 15
      cout << "*p3: " << *p3 << "\n"; //line 16
      cout << "*p4: " << *p4 << "\n"; //line 17

      delete [] p2;
      delete p3;
      return 0;
}
```

Q.1 Which of the following could be the output of `line 14`?

a) `*p1: 0012FF60` b) `*p1: 0` c) `*p1: 5` d) `*p1: 7`

e) None of the above.

2K

Q2 Which of the following could be the output of `line 15`?

a) `*p2: 0012FF60` b) `*p2: 2` c) `*p2: 5` d) `*p2: 7`

e) None of the above.

2K

Q3 What should be the value of `*p3` after executing `line 16`?

a) 3 b) Some uninitialized integer value c) An address value d) 2

e) Unknown, a run-time error will occur.

2K

Q4 Which of the following could be the output of `line 17`?

a) `*p4: 0012FF60` b) `*p4: 2` c) `*p4: 5` d) `*p4: 7`

e) None of the above.

2A

Q5 Which of the following about the library function `srand()` is true?

a) It must be called before calling the library function `rand()`.

b) It must be used in place of `rand()` in order to generate a truly random number.

c) By executing `srand(1)` before `rand()`, the random sequence generated will be different on each run of the application.

d) We can use the library function `time()` to provide the input parameter for `srand()`.

e) None of the above.

2K

Q6 What is the value of the integer returned by the function `mystery()` below if it is provided with an input parameter of 4?

```
int mystery (int number){
     if (number <=1)
          return 1;
     else
          return number * mystery(number-1);
}
```

a) 0 b) 1 c) 4 d) 8 e) 24

2E

Q7 Which of the following statement(s) about I/O buffer is(are) NOT correct?

(i) I/O buffer is a part of the memory of the computer.
(ii) I/O buffer will only be released after the application has ended.
(iii) I/O buffer is provided in some cases to the I/O stream.
(iv) The stream of data will not be sent out if the I/O buffer is not full or no flush request is received.

a) (i) b) (i) and (ii) c) (i) ,(ii) and (iii) d) (i) and (iv)

e) None of the above.

2A

Q8 Consider the following program:

```
#include <fstream>
#include <iostream>
using namespace std;
int main()
{
      ofstream text1("test");
      char A[256];
      char B[256];
      cout << "Enter string one: ";
      cin.getline(A,256);
      int a = strlen(A);
      cout << "Enter string two: ";
      cin >> B;
      strcat(B,A);
      text1.write(B,a); // line 16
      text1.close();
}
```

If the user inputs to the program are "`aa bb cc`" and "`dd ee ff`", both are entered by pressing the `Enter` key on the keyboard; which of the following is the content of the file `test`?

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

e) None of the above.

2E

Consider the following C++ code and answer **Questions 9-11**.

```
class CAT //Use a number CatNum to represent a cat
{
public:
   CAT() {pNext=0;}
   ~CAT(){;}
   int GetNum() const {return CatNum;}
   void SetNum(int num) {CatNum = num;}
   CAT * GetNext() {return pNext;}
   void SetNext(CAT *pN) {pNext = pN;}
private:
   int CatNum;
   CAT *pNext;
};
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;
}
```

Q9 What is the type of the return value of the function `create()`?

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

2K

Q10 What is the meaning of the statement in `Line 5`? (*You may choose more than one answer.*)

a) `pL` and `pH` store the same address of an object. b) `pL` becomes a null pointer.

c) A new object copied from that pointed by `pH` has been created and pointed by `pL`.

d) `pL` is the name of the object pointed by `pH`. e) None of the above.

2A

Q11 According to `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()`.

2K

Consider the following C++ code and answer **Questions 12-13**.

```
private: int Mul = 1;
private: System::Void Form1_Paint(System::Object^ sender,
System::Windows::Forms::PaintEventArgs^  e)
{
     Graphics ^g = e->Graphics;
     if(X*Mul < this->Size.Width)
          X += 1;
     else
          X = 0;
     Bitmap ^bp = gcnew Bitmap("h1.gif");  // line 10
     g->DrawImage(bp, X*Mul, 25);
}

private: System::Void button1_Click(System::Object^ sender, System::EventArgs^ e)
{
     if (timer1->Interval>20)
          timer1->Interval=timer1->Interval/2;
     else
          Mul += 1;
}
```

Q12 When the above code is executed, which of the following statement(s) is(are) NOT correct?

(i) The moving speed of the picture will be changed through changing the timer interval or the positional step size.
(ii) The picture box can only get the picture file if it is stored under project's current folder.
(iii) The keyword `gcnew` cannot be replaced by `new`.
(iv) The object pointed by `bp` will be automatically released when the application ends.

a) (i) b) (iii) c) (ii) and (iii) d) (i) and (iv) e) None of the above.
(All are correct) 2A

Q13 Assume that `timer1->Interval` is initialized with a value of `10`, i.e. 10 ms. What is the moving speed of the picture if `button1` is clicked 5 times?

a) 80 pixel/s b) 167 pixel/s c) 333 pixel/s d) 500 pixel/s e) None of the above.

2E

Q14 Consider the following C++ code and assume that the file `text.txt` contains only the line of string `"Hello!!"`.

```
ofstream fout("text.txt", ios::ate|ios::in);
```

```
fout << "Hi" << endl;
fout.close();
```

After executing the code, which of the following will be the new content of the file `text.txt`?

a) `Hello!!` b) `Hi` c) `Hillo!!` d) `Hello!!Hi` e) `HelloHi`

2K

Q15 On executing the following C++ code, what will be the output shown on the screen?

```
char One[] = "One Word";
int fullLength = strlen(One);
int short1 = fullLength - 5;
int short2 = fullLength - 6;
cout.write(One,short1) << " ";
cout.write(One,short2) << " ";
cout.write(One,fullLength) << endl;
```

a) `One W One Wo One Word` b) `One On` c) `On One` d) `One On One Word`

e) `On One One Word`

2K

Q16 Which of the following can return a number between 1 and 52 inclusively?

a) `rand()/52` b) `rand()/52 + 1` c) `rand()%52` d) `rand()%52 + 1`

e) `rand(52)`

2K

Q17 Which of the following statement(s) is/are correct? (*You may choose more than one answer.*)

a) `char abc[] = textBox1->Text;`
b) `String^ str = "1 + 2 = " + 3;`
c) `int num = atoi(textBox1->Text);`
d) `char *abc = textBox1->Text;`
e) `label1->Text = 100;`

2A

Q18 Assume that the file `text.txt` contains the line of string "`It's a wonderful world!!`". On executing the following C++ code, what will be the output shown on the screen?

```
ifstream tin("text.txt");
tin.seekg(10);
char ch;
while (tin.get(ch))
     cout << ch;
tin.close();
```

a) `nderful world!!` b) `derful world!!` c) `erful world!!` d) `ul world!!`

e) `it's wonde`

2K

Q19 What is the output shown on the screen if the following program is executed under the `Command Prompt` by entering "`SomeProgram a1 b1 c1 d1`"?

```
#include <iostream>
using namespace std;
int main(int argc, char *argv[])
{
     cout << argc << " ";
```

```
      for (int i = 0; i<argc; i++)
            cout << argv[i] << " ";
      return 0;
}
```

a) `4 a1 b1 c1 d1` b) `5 a1 b1 c1 d1` c) `5 SomeProgram a1 b1 c1 d1`

d) `8 a1 b1 c1 d1` e) `19 SomeProgram a1 b1 c1 d1`

2K

Q20 On executing the following C++ code, what will be the output shown on the screen?

```
char abc[] = "One Two";
char def[] = "One Two";

if (abc == def)
      cout << "same ";
else
      cout << "different ";

for(int i=0; i<strlen(def); i++)
      abc[i] = def[i];

if(abc == def)
      cout << "same ";
else
      cout << "different ";
```

a) `same same` b) `same different` c) `different same`

d) `different different` e) Undetermined because the code contains error(s).

2E

Consider the following defined class and answer **Questions 22-23**:

```
class node
{
public:
      node(int num) {myNum = num; pNext = 0;}
      void setNum(int num) {myNum = num;}
      int  getNum() {return myNum;}
      void setNext(node *pN) {pNext = pN;}
      node *getNext() {return pNext;}
private:
      int myNum;
      node *pNext;
};
```

Q21 What will be the output shown on the screen on executing the following C++ code?

```
node * n1 = new node(0);
n1->setNext(new node(2));
n1->getNext()->setNext(new node(1));
cout << n1->getNum() << " " << n1->getNext()->getNum() << " " <<
      n1->getNext()->getNext()->getNum() << endl;
```

a) `0 1 2` b) `0 2 1` c) `2 1 0` d) `1 2 0` e) `1 2 3`

2A

Q22 Which of the following will be a possible output shown on the screen if the `cout` statement in the code of Q21 is replaced by "`cout << *(n1->getNext()) << endl;`"?

a) `0` b) `1` c) `2` d) `00355C20`

e) Undetermined, because the code contains error(s)

2E

Q23 Which of the following statements can convert a managed string (e.g. `String^ s`) into an unmanaged string (e.g. `char a[]`)?

a) `String^ s = gcnew String(a);` b) `String^ s = gcnew String();`

c) `char *a = (char *) Marshal::StringToHGlobalAnsi(s);`

d) `char *a = (char *) Marshal::StringToHGlobalAnsi(s).ToPointer();`

e) `char *a = (char *) Marshal::StringToHGlobalAnsi(s).ToPointer(a);`

2K

Q24 Consider the following C++ program:

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

int main()
{
      int x = 3;
      int *Ptr1;
      int *Ptr2;

      cout << "&x = " << &x << endl;
      cout << "&Ptr1 = " << &Ptr1 << endl;
      cout << "&Ptr2 = " << &Ptr2 << endl;
      Ptr1 = &x;
      Ptr2 = Ptr1;
      x++;
      *Ptr2 = *Ptr1;
      cout << "Ptr2 = " << Ptr2 << " and ";
      cout << "*Ptr2 = " << *Ptr2 << endl;
      return 0;
}
```

The first three lines shown on the output screen are listed below:

```
&x = 0012FF60
&Ptr1 = 0012FF54
&Ptr2 = 0012FF48
```

Which of the following is the last line shown on the screen?

a) `Ptr2 = 0012FF60 and *Ptr2 = 3` b) `Ptr2 = 0012FF54 and *Ptr2 = 3`

c) `Ptr2 = 0012FF48 and *Ptr2 = 3` d) `Ptr2 = 0012FF54and *Ptr2 = 4`

e) `Ptr2 = 0012FF60 and *Ptr2 = 4`

2E

Q25 Which of the following statement(s) is/are NOT correct? (*You may choose more than one answer.*)

a) When developing a C++ application using Visual Studio 2005, both the native C++ code and C++/CLI code are supported.

b) An unmanaged application runs directly under Windows.

c) The Common Language Runtime is needed to run an unmanaged application.

d) Your computer needs to have Microsoft .NET Framework installed before running a managed

application.

e) A managed application needs the support of the CLR.

2A

Q26 Which of the following functions sets the current position in the file output stream?

a) `seekp(long);` b) `tellp();` c) `seekg(long);` d) `tellg();`

e) None of the above.

2K

Q27 If the statement "`char catname[15];`" is declared, which of the following is a valid C++ statement?

a) `catname[15] = " Daisy ";` b) `catname = " Daisy ";`

c) `catname[ ] = " Daisy ";` d) `catname[0] = " Daisy ";`

e) None of the above.

2K

Q28 Which of the following about showing `Form2` on the screen is true?

a) If the function `ShowDialog()` is called, `Form2` will be a modal form, i.e. we cannot access other forms unless we close `Form2`.

b) If the function `ShowDialog()` is called, `Form2` will be a modeless form, i.e. we can access other forms without closing `Form2`.

c) If the function `Show()` is called, `Form2` will be a modeless form, i.e. we cannot access other forms unless we close `Form2`.

d) If the function `Show()` is called, `Form2` will be a modal form, i.e. we cannot access other forms unless we close `Form2`.

e) If the function `Show()` is called, `Form2` will be a modal form, i.e. we can access other forms without close `Form2`.

2K

Q.29 In C++, a `continue` statement in a loop will cause the execution to skip to:

a) The next `return` statement b) The first statement following the loop

c) The next iteration of the loop (and detect whether the test condition is true)

d) The statement following the `continue` statement e) None of the above.

2K

Q30 In a group of nested loops, which loop is executed most in terms of number of times?

a) The outermost loop b) All loops are executed the same number of times

c) The innermost loop d) Undetermined, without knowing the size of the loops

e) None of the above.

2K

- End -