
UNIVERSITI SAINS MALAYSIA

Second Semester Examination
2010/2011 Academic Session

April/May 2011

CPT111/CPM111 – Principles of Programming
[Prinsip Pengaturcaraan]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:
[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **THREE** questions in **FIFTEEN** printed pages before you begin the examination.

*[Sila pastikan bahawa kertas peperiksaan ini mengandungi **TIGA** soalan di dalam **LIMA BELAS** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

*[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

[Anda dibenarkan menjawab soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.]

- In the event of any discrepancies, the English version shall be used.

[Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi bahasa Inggeris hendaklah diguna pakai.]

1. (a) State whether each of the following is **TRUE** or **FALSE**:
- (i) Multiple comments are enclosed between `//` and `//` symbols.
 - (ii) The pre-processor command `#include <iostream>` instructs the pre-processor to include the header file `iostream` in the program.
 - (iii) If `a = 4; b = 3;`, then after the statement `a = b;` the value of `b` is still 3.
 - (iv) To close a file as indicated by the `ifstream` variable `inFile`, you can use the statement `inFile.close();`. To close a file as indicated by the `ofstream` variable `outFile`, you can use the statement `outFile.close();`.
 - (v) The statement `cin >> x >> y;` requires the input values for `x` and `y` to appear on the same line.
 - (vi) Every `if` statement must have a corresponding `else`.
 - (vii) The `break` statement can be used to terminate a loop.
 - (viii) The `return` statement allows the function to return more than one value at a time.
 - (ix) The `do while` loop will be executed at least once.
 - (x) The `while` loop:

```
j = 0;  
while (j >= 10)  
    j--;
```

terminates if `j < 10`.

(10/100)

- (b) What are the final values of variables x, y, and z when the following C++ program executes?

```
#include <iostream>
using namespace std;
int main()
{
    int x = 3, y = 7, z = 2;
    int *ptr1, *ptr2;
    cout << x << " " << y << " " << z << endl;
    ptr1 = &y;
    *ptr1 = 10;
    ptr1 = &y;
    *ptr1 *= 5;
    ptr2 = &z;
    *ptr1 = 2 + *ptr2;
    cout << x << " " << y << " " << z << endl;
    system ("pause");
    return 0;
}
```

(6/100)

- (c) Given the following C++ program:

```
#include <iostream>
.....
using namespace std;
main()
{
    for (int i=5; i>0; i--)
    {
        for (int j=i; j<5; j++)
            cout << setw(3) << j;
        cout << endl;
    }
    system("pause");
}
```

While compiling the program above, Dev C++ compiler generates the following error:

```
In function int main()
    setw undeclared (first use in this function)
```

- (i) Correct the error of the program.
(ii) Give the output of the program.

(6/100)

(d) Given the following C++ program:

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

int main()
{
    int x=5; int y=100;
    do {
        x = x + 10;
        while (x < y);
        cout << x << " " << y << endl;
        system("pause");
    }
    return 0;
}
```

- (i) How many times does the do loop execute?
- (ii) Rewrite the above program using while loop.
- (iii) Explain the difference between while loop and do while loop.

(8/100)

(e) Explain what the following program does. Give the output of the program.

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

int main()
{
    int a[]={1, 2, 2, 4, 4, 7, 7, 8, 9, 9, 14, 20};
    for (int i = 0; i < 12; i++)
    {
        if (a[i] == a[i+1])
        {
            a[i]= a[i] + a[i+1];
            cout << a[i] << " ";
        }
    }
    system("pause");
    return 0;
}
```

(7/100)

(f) Given the following functions:

<pre>int mystery1(int x) { int i, j; i = 2 * x; if (i < 5) j = x * 2; else j = x - 5; return (j + 2); }</pre>	<pre>int mystery2(int a, int b) { int i, j; j = 0; for (i = a; i < b+a; i++) j = j + 1; return (j); }</pre>
--	--

What is the output of each of the following program statements? Assume that x, y and k are int variable.

- (i) `x = 10;`
`cout << mystery1(x+2) << endl;`
- (ii) `x = 5; y = 8;`
`cout << mystery2(x,y) << endl;`
- (iii) `x = 10; k = mytery2(x,2);`
`cout << x " " << k << mystery2 (x,k) << endl;`
- (iv) `x = 5; y=8;`
`cout <<mystery2(y,x) << endl;`

(8/100)

2. Given the following 2-D array (10 rows x 19 columns):

1																		1
	1																	1
		1							1								1	
			1					1		1							1	
				1				1			1					1		
					1			1		1				1				
						1			1				1					
							1				1							
								1		1								
									1									

- (a) Write a C++ program to store integer 1 in the above 2-D array using **for** loop.

(15/100)

- (b) Suppose `list` is an array of five components of type `int`. What is stored in `list` after the following C++ code executes?

```
int list[5];
for (int i=0; i<5; i++){
    list[i]=2*i+3;
    if (i%2 != 0)
        list[i] = list[i] - 2;
}
```

(10/100)

3. You are working as a application engineer at a car dealer company, Autoworld.com. You are required to develop an application for car loan payment calculator to assist car salesman to calculate loan payment for customers. Your program should accept the following parameters as input:
- Car purchase price (in RM)
 - Down payment (in RM)
 - Interest rate (e.g. 2.60 %)
 - Repayment period in years (e.g. 3 years, 5 years, 9 years)

For example if the car purchase price is RM150,000.00, down payment is RM20,000.00, interest rate is 2.6% and repayment period is 5 years, then the monthly instalment that a customer has to pay is RM2,448.33. The loan repayment calculation is based on the following formula:

$$\begin{aligned}
 \text{Total loan} &= \text{RM}150,000.00 - \text{RM}20,000.00 = \text{RM}130,000.00 \\
 \text{Total Interest charged} &= \text{total loan} \times \text{interest rate} \times \text{repayment period} \\
 &= \text{RM}130,000.00 \times 0.026 \times 5 \\
 &= \text{RM}16,900.00 \\
 \text{Monthly instalment} &= (\text{total loan} + \text{total interest charge}) / \\
 &\quad (\text{repayment period in years} \times 12 \text{ months}) \\
 &= \text{RM}146,900.00 / 60 \\
 &= \text{RM}2,448.33
 \end{aligned}$$

Given the following `main()` program segment:

```

...
(1) // Write function prototypes
    main() {
(2) // Declare appropriate variables
(3) // C++ statements to accept inputs from a user
(4) // Function call that calculates the loan payment
(5) // Function call that displays the car purchase price, down
    payment, interest rate, repayment period in years, total
    interest charge and monthly instalment.
    system("pause");
    }

```

- (a) Write the C++ statements in `main()` for (1), (2), (3), (4) and (5) above.

(10/100)

- (b) Write a complete function to compute the loan payment. This function should return a value to the calling function.

(12/100)

- (c) Write a complete function to display the car purchase price, down payment, interest rate, repayment period in years, total interest charged and monthly instalment.

(8/100)

KERTAS SOALAN DALAM VERSI BAHASA MALAYSIA

[CPT111/CPM111]

- 9 -

1. (a) Nyatakan sama ada kenyataan berikut **BENAR** atau **PALSU**:
- (i) Komen yang berbilang terkandung antara simbol-simbol `//` and `/**`.
 - (ii) Arahan pra-pemproses `#include <iostream>` mengarah pra-pemproses untuk memasukkan fail pengepala `iostream` dalam atur cara.
 - (iii) Jika `a = 4; b = 3;`, kemudian selepas kenyataan `a = b;` nilai `b` masih 3.
 - (iv) Untuk menutup sebuah fail seperti yang ditunjukkan oleh `inFile`, suatu pemboleh ubah `ifstream`, anda boleh menggunakan kenyataan `inFile.close();`. Untuk menutup sebuah fail yang ditunjukkan oleh `outFile`, suatu pemboleh ubah `ofstream`, anda boleh menggunakan kenyataan `outFile.close();`.
 - (v) Kenyataan `cin >> x >> y;` memerlukan nilai input untuk `x` and `y` wujud pada baris yang sama.
 - (vi) Setiap kenyataan `if` mesti dipasangkan dengan `else`.
 - (vii) Kenyataan `break` boleh digunakan untuk menamatkan gelung.
 - (viii) Kenyataan `return` membenarkan fungsi mengembalikan lebih daripada satu nilai pada satu masa.
 - (ix) Gelung `do while` akan dilaksanakan sekurang-kurangnya sekali.
 - (x) Gelung `while`:

```
j = 0;  
while (j >= 10)  
    j--;
```

tamat jika `j < 10`.

(10/100)

- (b) Apakah nilai akhir bagi pemboleh ubah x , y , and z apabila atur cara C++ berikut dilaksanakan?

```
#include <iostream>
using namespace std;
int main()
{
    int x = 3, y = 7, z = 2;
    int *ptr1, *ptr2;
    cout << x << " " << y << " " << z << endl;
    ptr1 = &y;
    *ptr1 = 10;
    ptr1 = &y;
    *ptr1 *= 5;
    ptr2 = &z;
    *ptr1 = 2 + *ptr2;
    cout << x << " " << y << " " << z << endl;
    system ("pause");
    return 0;
}
```

(6/100)

- (c) Diberi atur cara C++ berikut:

```
#include <iostream>
.....
using namespace std;
main()
{
    for (int i=5; i>0; i--)
    {
        for (int j=i; j<5; j++)
            cout << setw(3) << j;
        cout << endl;
    }
    system("pause");
}
```

Semasa mengompil atur cara di atas, pengkompil Dev C++ akan menghasilkan ralat berikut:

```
In function int main()
    setw undeclared (first use in this function)
```

- (i) Betulkan ralat atur cara.
(ii) Beri output atur cara tersebut.

(6/100)

(d) Diberi atur cara C++ berikut:

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

int main()
{
    int x=5; int y=100;
    do {
        x = x + 10;
        while (x < y);
        cout << x << " " << y << endl;
        system("pause");
    }
    return 0;
}
```

- (i) Berapa kalikah gelung do dilaksanakan?
- (ii) Tulis semula atur cara di atas dengan menggunakan gelung while.
- (iii) Terangkan perbezaan antara gelung while dan gelung do while.

(8/100)

(e) Terangkan apa yang dilakukan oleh atur cara berikut. Beri output atur cara tersebut.

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

int main()
{
    int a[]={1, 2, 2, 4, 4, 7, 7, 8, 9, 9, 14, 20};
    for (int i = 0; i < 12; i++)
    {
        if (a[i] == a[i+1])
        {
            a[i]= a[i] + a[i+1];
            cout << a[i] << " ";
        }
    }
    system("pause");
    return 0;
}
```

(7/100)

(f) Diberi fungsi-fungsi berikut:

<pre>int mystery1(int x) { int i, j; i = 2 * x; if (i < 5) j = x * 2; else j = x - 5; return (j + 2); }</pre>	<pre>int mystery2(int a, int b) { int i, j; j = 0; for (i = a; i < b+a; i++) j = j + 1; return (j); }</pre>
--	--

Apakah output untuk setiap kenyataan-kenyataan atur cara berikut? Anggapkan x , y dan k adalah pemboleh ubah `int`.

- (i) `x = 10;`
`cout << mystery1(x+2) << endl;`
- (ii) `x = 5; y = 8;`
`cout << mystery2(x,y) << endl;`
- (iii) `x = 10; k = mytery2(x,2);`
`cout << x " " << k << mystery2 (x,k) << endl;`
- (iv) `x = 5; y=8;`
`cout <<mystery2(y,x) << endl;`

(8/100)

2. Diberi tatasusunan 2-D berikut (10 baris x 19 lajur):

1																		1
	1																	1
		1						1									1	
			1				1		1							1		
				1			1			1					1			
					1			1		1				1				
						1			1				1					
							1				1							
								1		1								
									1									

- (a) Tulis atur cara C++ untuk menyimpan integer 1 dalam tatasusunan 2-D di atas dengan menggunakan gelung **for**.
(15/100)
- (b) Anggapkan `list` adalah suatu tatasusunan lima komponen jenis integer. Apakah yang disimpan dalam `list` selepas kod C++ berikut dilaksanakan?

```
int list[5];
for (int i=0; i<5; i++){
    list[i]=2*i+3;
    if (i%2 != 0)
        list[i] = list[i] - 2;
}
```

(10/100)

3. Anda bekerja sebagai jurutera aplikasi di sebuah syarikat agen kereta, Autoworld.com. Anda dikehendaki membangun sebuah aplikasi kalkulator pembayaran pinjaman kereta untuk membantu juru jual kereta mengira pembayaran pinjaman untuk pelanggan. Atur cara anda perlu menerima parameter-parameter berikut sebagai input:
- Harga belian kereta (dalam RM)
 - Bayaran pendahuluan (dalam RM)
 - Kadar faedah (contoh 2.60 %)
 - Tempoh bayaran semula dalam tahun (contoh 3 tahun, 5 tahun, 9 tahun)

Sebagai contoh jika harga belian kereta ialah RM150,000.00, bayaran pendahuluan ialah RM20,000.00, kadar faedah ialah 2.6% dan tempoh bayaran semula ialah 5 tahun, maka ansuran bulanan yang pelanggan perlu bayar ialah RM2448.33. Pengiraan bayaran semula pinjaman adalah berdasarkan formula seperti berikut:

$$\begin{aligned}
 \text{Jumlah pinjaman} &= \text{RM}150,000.00 - \text{RM}20,000.00 = \text{RM}130,000.00 \\
 \text{Jumlah faedah dikenakan} &= \text{jumlah pinjaman} \times \text{kadar faedah} \times \text{tempoh bayaran semula} \\
 &= \text{RM}130,000.00 \times 0.026 \times 5 \\
 &= \text{RM}16,900.00 \\
 \text{Ansuran bulanan} &= (\text{jumlah pinjaman} + \text{jumlah faedah dikenakan}) / \\
 &\quad (\text{tempoh bayaran semula dalam tahun} \times 12 \text{ bulan}) \\
 &= \text{RM}146,900.00 / 60 \\
 &= \text{RM}2,448.33
 \end{aligned}$$

Diberi keratan atur cara `main()` berikut:

```

...
(1) // Tulis protaip fungsi-fungsi bersesuaian
    main() {
(2) // Istiharkan pemboleh ubah-pemboleh ubah bersesuaian
(3) // Kenyataan-kenyataan C++ untuk menerima input
(4) // Panggilan fungsi untuk mengira pembayaran pinjaman
(5) // Panggilan fungsi untuk memaparkan harga belian kereta,
    bayaran pendahuluan, kadar faedah, tempoh bayaran semula
    dalam tahun, jumlah faedah dikenakan, dan ansuran bulanan
    system("pause");
    }

```

- (a) Tulis kenyataan-kenyataan dalam `main ()` untuk (1), (2), (3), (4) dan (5) di atas. (10/100)
- (b) Tulis fungsi lengkap untuk mengira bayaran pinjaman. Fungsi ini perlu memulangkan satu nilai ke fungsi yang memanggilnya. (12/100)

- (c) Tulis fungsi lengkap untuk memaparkan harga belian kereta, bayaran pendahuluan, kadar faedah, tempoh bayaran semula dalam tahun, jumlah faedah dikenakan, dan ansuran bulanan.

(8/100)