



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FSB 23003
SUBJECT TITLE : PROGRAMMING FUNDAMENTAL
LEVEL : BACHELOR
TIME / DURATION : 12.30pm – 3.30pm
(3 HOURS)
DATE : 28 APRIL 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
 2. This question paper is printed on both sides of the paper.
 3. Please write your answers on the answer booklet provided.
 4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
 5. This questions paper consists of **TWO (2)** sections. Section A and B. Answer **ALL** questions in section A. For Section B, answer **THREE (3)** questions only.
 6. Answer **ALL** questions in English.
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THERE ARE 11 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

(a) Briefly explain the following term.

- i. Source Code
- ii. Object Program
- iii. Compilation
- iv. Compile-Time Error
- v. Execution Error

(5 marks)

(b) Name and draw the three symbols used in flow chart.

(3 marks)

(c) By using illustrated examples, explain the difference between *pre-test* and *post-test*.

(4 marks)

(d) Write a single C++ statement corresponding to each of the following tasks:

- i. Declare the variables `b` and `c` of type integer.
- ii. Assign `150.13` to the variable `z`.
- iii. Compute an area of a square as `s` using height as `h` and length as `l`. Given the formula of square is $h \times l$.
- iv. Add 5 to the variable `total` by using the `+=` operator
- v. Set `time` to 10.
- vi. Read two integers value, `v1`, `v2`.
- vii. Print message "1Malaysia"
- viii. Print output, `result` on the screen (Assume, the variable `result` has been declared as double)

(8 marks)

Question 2

(a) Write the following statements into C++ statement.

i. If `time` is greater than 15.0, increment `time` by 1.0

(2 marks)

ii. If the difference between `volt_1` and `volt_2` is larger than 10.0, print the values of `volt_1` and `volt_2`

(2 marks)

(b) By using `for` statement, write a C++ program that make 50 times loops displaying the message "BEST OF LUCK!!!".

(3 marks)

(c) Write a C++ program that reads a monetary value in American Dollar (USD) and then convert and display it in it's Ringgit Malaysia (RM) equivalent. The conversion formula is shown below:

$$1 \text{ USD} = 3.32 \text{ RM}$$

(3 marks)

(d) Given the following segment of code:

```
int sum=0, count;
...
for (count=0; count <=10; count+=5)
    sum += count;
cout << "sum = " << sum << endl;
```

i. What is the output displayed on the screen?

(1 mark)

ii. What is the value of `count` after execution of the `for` loop?

(1 mark)

iii. How many times are the statements inside the loop executed?

(1 mark)

- (e) Assume that the variable `k` and the array `s` have been defined with the following statement:

```
int k, s[] = {3,8,15,21,30,41}
```

Determine the output for each of the following sets of statements

```
for (k=0;k <= 5;k++)  
    if (s[k]%2 ==0)  
        cout << s[k] <<endl;
```

(2 marks)

(f) Given the following program:

```
Line 1 : #include <iostream>
Line 2 : using namespace std;
Line 3 :
Line 4 : double display();
Line 5 :
Line 6 :
Line 7 :
Line 8 : int main()
Line 9 : {
Line 10 :     char color;
Line 11 :
Line 12 :     cout << "Enter Character [G,R,E]";
Line 13 :     cin >> color;
Line 14 :
Line 15 :     display(color)
Line 16 :
Line 17 :     return 0;
Line 18 : }
Line 19 :
Line 20 :
Line 21 : void display(char ch)
Line 22 : {
Line 23 :     if (ch == 'G')
Line 24 :         cout << "MOVE";
Line 25 :     else if (ch == 'R')
Line 26 :         cout << "STOP";
Line 27 :     else
Line 28 :         cout << endl;
Line 29 : }
```

- i. Detect which line will indicate syntax error? How to correct it? (1 mark)
- ii. Identify which variable is called as actual parameter and formal parameter. (1 mark)
- iii. Replace if statement from line 23 until line 28 with switch statement. (3 marks)

SECTION B (Total: 60 marks)**INSTRUCTION: Answer THREE (3) questions only.****Please use the answer booklet provided.****Question 3**

Given a case study of a car rental company, **Rent-N-Car**. The company charges a fixed rate of RM0.25 per kilometer (km) traveled by the client if the client's total mileage does not exceed 100 km. However, if the total mileage is more than 100 km, the company will charge RM0.25 for the first 100 km, and then it will charge RM0.15 for any additional km.

The program should request the distance traveled in km, and will display the total price to be paid by the client.

- (a) By using an engineering problem-solving methodology, write an algorithm that use flowchart to solve the above problem.
(8 marks)
- (b) Translate your algorithm in Question 3(a) in C++ programming language.
(10 marks)
- (c) Based on the above problem, what will your expected output if the user enters 80 km.
(2 marks)

Question 4

- (a) Given the following segment of code:

```
double celcius = 10.0;
while (celcius < 50.0)
{
    fahrenheit = (9.0/5.0) * celcius + 32;
    cout << celcius << "\t" << Fahrenheit << endl;
    celcius += 10.0;
}
```

- i. What is the output displayed on the screen?
(2 marks)
- ii. Replace while loop statement with for loop statement
(4 marks)
- (b) Discuss the difference between pretest loop and posttest loop.
(2 marks)
- (c) Apply. Industry Sdn Bhd system development team is developing an automated system in order to detect, compute and display the total of green, 'g' and red, 'r' apples in its plant production lines. As a member of this team, you are required to develop a C++ program that should perform the following tasks:
- The program should continuously request user to enter the colour character of an apple such as 'g' for green or 'r' for red apples.
 - If the character entered is different than 'g' or 'r', then the program should display an appropriate message informing the user that an invalid apple colour has been entered.
 - If the character 'x' is entered, then the program will display the total number of green and red apples entered by user and exit.

The examples of the program's outputs are shown in **Figure 1** and **Figure 2**.

(12 marks)

```
G:\FEJan2010\FEJAN2010_OOP_C++_UPDATE\FSB23003\Set A Updated\Q4c_finale.exe
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Total of Green Apple : 4
Total of Red Apple : 0
Press any key to continue
```

Figure 1: Program's Output 1

```
G:\FEJan2010\FEJAN2010_OOP_C++_UPDATE\FSB23003\Set A Updated\Q4c_finale.exe
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Entering Invalid Detector Apple!!
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Enter Detector Apple 10000
Entering Invalid Detector Apple!!
Enter Detector Apple 10000
Total of Green Apple : 0
Total of Red Apple : 7
Press any key to continue
```

Figure 2: Program's Output 2

Question 5

- (a) Given the following program:

```
//Program to calculate total grade
#include <iostream>
using namespace std;

int main()
{
    float grade1,grade2,grade3,grade4,grade5,grade6,grade7,grade8,grade9,grade10;
    float sum = 0;

    grade1= 20.5;grade2= 80.5;grade3= 30.5;grade4= 20.5;grade5= 43.4;
    grade6= 20.5;grade7= 20.5;grade8= 55.5;grade9= 20.5;grade10= 76.5;

    sum = grade1+ grade2+ grade3+ grade4 + grade5+ grade6+ grade7+grade8+
        grade9+grade10;

    cout << "Sum = " << sum ;

    system("PAUSE");
    return 0;
}
```

Rewrite the above program using one-dimensional array that use array declaration for grade that has 10 elements (array size is 10). The program should prompt the user for ten grades, calculate the total of grade and display all grades and total.

(10 marks)

- (b) Write a declaration to store the string "This is a Final Examination" into an array named strexam. Include the declaration in a program to display the message using the following loop:

```
for (int i=0; i < NUMDISPLAY; i++)
    cout << strexam[i];
```

where NUMDISPLAY is named constant for the number 30.

(3 marks)

- (c) Modify the for statements in 5 (b) to display only the array characters E, x and m.

(3 marks)

- (d) Rewrite answer at 5 (c) using a while loop. Given the expression while (strexam[i] != '\0') can be used to stop the loop when the '\0' escape sequence is detected.

(4 marks)

Question 6

- (a) Write a function called `add()` that accepts two floating-point numbers as arguments, addition these two numbers, and returns the result

(4 marks)

- (b) Write a function called `CalcAvg()` that accepts two integer numbers as arguments, calculate the average of these two numbers, and displays the result.

(5 marks)

- (c) Given the area, A of a sphere;

$$AV = 4\pi r^2$$

$\pi = 3.1452$

Where r is the sphere's radius. Using this formula, write a C++ function named `sphere_A()` that accepts the radius of a sphere and returns its area. Then, include this function into a working program, where you have called this function from `main()` and correctly returns a value to `main()`. Have `main()` use a `cout` statement to display the value returned. (Hints : The answer should consists of an appropriate preprocessor directive, naming constant, function prototype and defining a function)

(11 marks)

Question 7

- (a) You are required to write a complete C++ program for the Pelabuhan Pulau Pinang (PPP) Malaysia. The functionalities of the program are as follows :
- The program will ask user to enter the number of ships docking at PPP port per month for 12 months (Jan-Dec) consecutively.
 - The monthly values are to be stored in an **array** (or table).
 - After the 12th value (12th month), the program will calculate the **average** number of docked ships and display it to the user.
 - The program will display the **lowest** and **highest** number of docked ships along with their respective months.
 - The program will also display the **total** number of docked ships in PPP per year.

(14 marks)

The expected output of the program is shown as below:

```

Please enter the number of ships docked at PPP for month 1 : 505
Please enter the number of ships docked at PPP for month 2 : 650
Please enter the number of ships docked at PPP for month 3 : 300
Please enter the number of ships docked at PPP for month 4 : 200
Please enter the number of ships docked at PPP for month 5 : 790
Please enter the number of ships docked at PPP for month 6 : 990
Please enter the number of ships docked at PPP for month 7 : 1200
Please enter the number of ships docked at PPP for month 8 : 1278
Please enter the number of ships docked at PPP for month 9 : 888
Please enter the number of ships docked at PPP for month 10 : 300
Please enter the number of ships docked at PPP for month 11 : 400
Please enter the number of ships docked at PPP for month 12 : 270
The average number of ships docked at PPP is 649.25
The lowest month is 4 and the sum is : 200
The highest month is 7 and the sum is : 1200
The total ships docked at PPP is 7893
Press any key to continue

```


- (b) **Figure 3** shows a C++ program that will calculate and return the result of integer *a* to the power of integer *b* using a function named `my_power(int, int)`. Both integers *a* and *b* are entered by the user. The prototype of this function has been declared in **Figure 3** below.

Example usage of function: `temp = my_power(3, 4)`. The value of `temp` is 81.

```
#include <iostream>

using namespace std;

/* Function prototype definition */
int my_power(int value1, int value2);

/* Main function begin*/
main()
{
    int input_value1, input_value2;
    int result = 0;

    cout<<"\nProgram that calculate a to the power of b !!"<<endl;
    cout<<"\nPlease enter the value of a: ";
    cin>>input_value1;
    cout<<"\nPlease enter the value of b: ";
    cin>>input_value2;

    result= my_power(input_value1, input_value2);

    cout<<"\n"<<input_value1<<"to the power of "<<input_value2<<"
is :"<<result;

    cout<<endl;
    cout<<endl;

    return 0;
    system("PAUSE");
}
```

Figure 3: C++ program without function body (defining a function).

Based on the program in **Figure 3**, write a body of function `my_power(int, int)` using C++ language.

(6 marks)

END OF QUESTION