



**UNIVERSITI TEKNOLOGI MARA
FINAL EXAMINATION**

COURSE	: FUNDAMENTALS OF COMPUTER PROBLEM SOLVING
COURSE CODE	: CSC125/128/ITC120
EXAMINATION	: MARCH 2012
TIME	: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. This question paper consists of three (3) parts: PART A (10 Questions)
PART B (5 Questions)
PART C (2 Questions)
2. Answer ALL questions from all three (3) parts :
 - i) Answer PART A in the Objective Answer Sheet.
 - ii) Answer PART B and PART C in the Answer Booklet. Start each answer on a new page.
3. Do not bring any material into the examination room unless permission is given by the invigilator.
4. Please check to make sure that this examination pack consists of:
 - i) the Question Paper
 - ii) an Answer Booklet – provided by the Faculty
 - iii) an Objective Answer Sheet – provided by the Faculty

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

This examination paper consists of 11 printed pages

PART A (20 MARKS)

1. Consider the following C++ program segment:

```
cout >> "Thank You" >> endl;
```

What type of error occurs for the above program segment?

- A. Logic error.
 - B. Output error.
 - C. Run-time error.
 - D. Syntax error.
2. Variable names actually correspond to the
- A. data types.
 - B. integers.
 - C. locations in the computer's memory.
 - D. operators.
3. The compile stage is when
- A. the object code is linked with code for functions in other files.
 - B. the C++ program is translated into machine language code.
 - C. the program is executed one instruction at a time.
 - D. the program is placed in memory.
4. What is the output of the following program segment?

```
if (108 <= 12 * 12)
cout << "TRUE ";
cout << "FALSE";
```

- A. TRUE
- B. TRUE FALSE
- C. FALSE
- D. TRUE
FALSE

5. Which of the following statements is **FALSE**?
- A. A compound statement is treated as a single statement.
 - B. Every else has a related if.
 - C. Including a space between the relational operators ==, <=, >= and != creates a syntax error.
 - D. Logical expressions evaluate to 1 or nonzero value is treated as false.
6. A(n) _____ loop is a loop that contains another loop within its body.
- A. compound
 - B. for
 - C. nested
 - D. while
7. Which of the following for loop headers would result in an infinite loop?
- A. for (int k = 0; k > 10; k++)
 - B. for (int k = 0; k < 10; k--)
 - C. for (int k = 0; k < 10; k++)
 - D. for (int k = 0; k > 0; k++)
8. What is the output for the following program?

```
void func(int &, int);
void main()
{
    int a = 10, b = 20;
    func(a, b);
    cout << a << ' ' << b;
}

void func(int &x, int y)
{
    x = x / 3;
    y = x;
    cout << x << ' ' << y << endl;
}
```

- A. 3 3
3 20
- B. 3 3
10 20
- C. 10 20 3 3
- D. 3 20 3 3

9. Given the following function definitions.

```
int product(int a, int b)
{
    int x;
    x = a * b;
    return x;
}

void display(int dis)
{
    cout << "End result: " << dis;
}
```

Which of the following is **VALID** function calls for function `product` and function `display`?

- A. `c = product(a, b);`
`display(c);`
 - B. `c = product(a, b);`
`d = display(c);`
 - C. `cout << product(5, 6);`
`d = display(5);`
 - D. `product(a);`
`display(5);`
10. Analyze the following program segment and determine the output.

```
int list[10] = {10, 9, 8, 7, 6, 5, 4, 3, 2, 1};
int arr[10];

for (int i = 0; i < 10; i++)
    arr[i] = list[9 - i];

cout << arr[9];
```

- A. 1
- B. 2
- C. 9
- D. 10

PART B (50 MARKS)**QUESTION 1**

- a) Briefly explain the difference between compiler and interpreter. (2 marks)
- b) Briefly explain the difference between syntax error and logic error. (2 marks)

- c) Given the following variables declaration:

```
int x = 7, y = 10, k = 2;
```

Evaluate the following expressions.

- i) $y / k - x \% y$
- ii) $(6 * k) - y + \text{sqrt}(\text{pow}(x, 2) - y \% k)$
- iii) $\text{pow}((y - 3), 2) + (k / x - y)$ (3 marks)
- d) Write a C++ assignment statement for each of the following algebraic equations:

i) $G = 4\pi^2 \frac{a^3}{p^2(x+y)}$

ii) $A = \frac{4t^2}{t+2} - 20$

(3 marks)

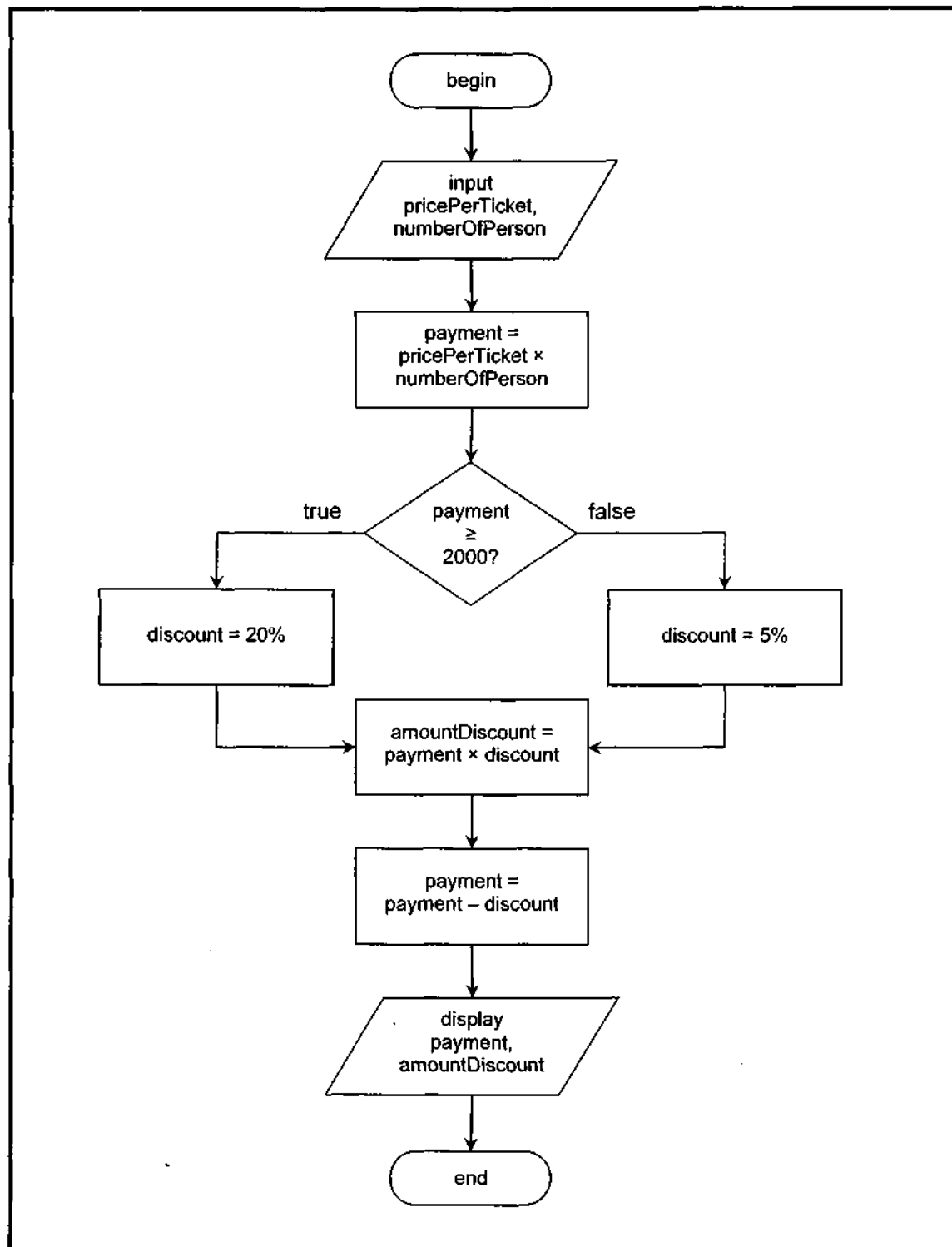
QUESTION 2

- a) Trace the following program segment and give the output:

```
int x = 8, y = 10;
if (x < 9)
if (y > 9)
    cout << "####";
else
    cout << "####" << endl;
cout << "----";
```

(2 marks)

b) Write a complete C++ program based on the following flowchart.



(8 marks)

QUESTION 3

a) Given the following C++ program:

```
void main()
{
    int a, b, c;
    cin >> a;
    b = a;
    c = a;
    while (a != -99)
    {
        if (a > b)
            b = a;
        if (a < c)
            c = a;
        cin >> a;
    }
    cout << "Message1: " << b << endl;
    cout << "Message2: " << c << endl;
}
```

i) Trace the above program and give the output for the following input data:

127 88 139 75 -99

(4 marks)

ii) Replace Message1 and Message2 with more suitable messages.

(1 mark)

b) The factorial of non-negative integer n is written as $n!$ and is defined as follows.

$$n! = \begin{cases} 1 & \text{if } n = 0 \text{ or } n = 1, \\ n \times (n-1) \times (n-2) \times \dots \times 1 & \text{if } n > 1 \end{cases}$$

for example,

$$4! = 4 \times 3 \times 2 \times 1, \text{ which is } 24.$$

Write a C++ program that reads a non-negative integer value, computes the factorial and prints the result.

(5 marks)

QUESTION 4

a) Write the definition for each of the following functions:

- i) Function `fahrenheitToCelsius` receives a temperature in degrees Fahrenheit. This function calculates and returns the temperature in degrees Celsius using the following formula:

$$celsius = 5/9 (fahrenheit - 32)$$

(3 marks)

- ii) Function `cylinderVolume` receives the radius (r) and the height (h) of a cylinder. This function calculates and returns the volume of the cylinder using the following formula:

$$volume = \pi r^2 h$$

(3 marks)

b) Given the following C++ program:

```
int funct1(int, int);
void funct2(int, int, int &);
void main()
{
    int x = 3, y = 10, z = 6;
    x = funct1(y, z);
    funct2(x, y, z);
    cout << x << " " << y << " " << z << endl;
}
int funct1(int a, int b)
{
    int result;
    if (a > b)
        result = a - b;
    else
        result = a + b;
    return result;
}
void funct2(int j, int k, int &m)
{
    m = (j * k) - 10;
}
```

- i) Trace the program and give the output.

(3 marks)

- ii) How many parameters does function `funct2` have?

(1 mark)

QUESTION 5

- a) Trace the following program segment and give the output.

```
int array[6] = {26, 59, 80, 13, 37, 5};
int temp, size = 6;

for (int j = 1; j < size; j++)
{
    for (int k = 0; k < (size-j); k++)
    {
        if (array[k + 1] < array[k])
        {
            temp = array[k + 1];
            array[k + 1] = array[k];
            array[k] = temp;
        }
    }
}

for (int m = 0; m < size; m++)
    cout << array[m] << "  ";
```

(3 marks)

- b) Write a program that reads **TEN (10)** integers and store them into an array. Determine whether there are any duplicates in the array's elements. Display the message "Duplicate found" if there is at least one duplicate integer and "Duplicate not found" if all the integers are unique.

(7 marks)

PART C (30 MARKS)**QUESTION 1**

NHAT Hospital needs a program to compute and print a bill statement for each patient. The charges for each day are as follows:

Type of Charges	Charges per Day (RM)
Room charges:	
Deluxe Room (D)	365.00
Single Room (S)	330.00
2-Bedded Room (B)	180.00
Telephone charges	2.00
Television charges	3.50

Write a program that requires the user to enter the number of days spent in the hospital, the room type (D, S or B), the telephone option (Y or N) and the television option (Y or N).

The program will calculate the patient's bill and print the patient's billing statement as example below:

Input: 2 D Y N

where 2 indicates the number of days, D represents the room type, Y represents the telephone option and N represents the television option.

Output:

NHAT HOSPITAL Patient Billing Statement	
Number of days in hospital: 2	
Type of room: Deluxe	
Room charge	RM 730.00
Telephone charge	RM 4.00
Television charge	RM 0.00
TOTAL DUE	RM 734.00

(15 marks)

QUESTION 2

Compass is currently holding a charity car wash for a week. You are asked to write a program that calculates and displays the total collection, the average collection, and the minimum and maximum collection for the week.

Thus, create an array of floating point of size **SEVEN (7)** to store the total collection per day from Monday through Sunday. Your program should contain the following functions and main program:

- a) Function `inputCollection` to prompt the user to input the total collection for each day and stores it in the array.
(2 ½ marks)
- b) Function `totalCollection` to determine the total collection received by Compass and returns the result to the main function.
(2 ½ marks)
- c) Function `minCollection` to determine the minimum collection received by Compass and returns the result to the main function.
(2 ½ marks)
- d) Function `maxCollection` to determine the maximum collection received by Compass and returns the result to the main function.
(2 ½ marks)
- e) A main program that uses the above functions and displays the appropriate result.
(5 marks)

The following is a sample input and output:

```
Enter total collection for day 1: 220.50
Enter total collection for day 2: 198.60
Enter total collection for day 3: 88.50
Enter total collection for day 4: 122.40
Enter total collection for day 5: 180.60
Enter total collection for day 6: 200.50
Enter total collection for day 7: 175.80

The total collection : 1186.90
The average collection: 169.56
The lowest collection : 88.50
The largest collection: 220.50
```

END OF QUESTION PAPER