PART A (10 MARKS)

1. ____________ translates the source code into machine code.
   - A. Linker
   - B. Compiler
   - C. Operating System
   - D. Editor

2. ____________ will produce undesired output
   - A. Logic error
   - B. Syntax error ~ cannot produce any output because of syntax errors made
   - C. Run-time error ~ no output produced
   - D. Hardware error

3. Which of the following is the **CORRECT** preprocessor directive to support console input and output?
   - A. `#include<conio.h> ~ getch()`
   - B. `#include<iostream.h>`
   - C. `#include<string.h> ~ strcmp(), strcpy()`
   - D. `#include<math.h> ~ pow(), sqrt()`

4. Which statement demonstrates the appropriate way to declare and initialize a variable named **population** to 0?
   - A. `double population;`
   - B. `double population = 0;`
   - C. `int population;`
   - D. `int population = 0;`

5. Which of the following statements are **TRUE**?
   - i. The modulus operator can be used only with integer operands.
   - ii. All variables must be declared before they are used.
   - iii. During program execution, the content of a named constant can be changed.
   - iv. C++ considers the variables `num` and `Num` to be identical.
   - A. i, ii, iii
   - B. ii, iii, iv
   - C. i and ii
   - D. i, iii, and iv
6. What is the result of the following expression?

```cpp
int a = 6, b = 5, c = 4;
cout << (b % a + b * c * c % 6);
```

A. 0  
B. 8  
C. 7  
D. 2

7. Which statements will return TRUE if a = 1, b = 2, c = 3 and d = 4?

i. !(a / b) && a % b == 1  
ii. (b > c && b < d || a == 2)  
iii. (d || !a)  
iv. (a < b || c < b && b > d)

A. iii  
B. i, ii  
C. i, iii  
D. i, iii, iv

8. What is displayed by the following program?

```cpp
int b = 7;
if (b < 7 || b > 7)
   cout << "Please " << endl;
   cout << "Come ";
   cout << "Again";
```

A. Come Again  
B. Please  
   Come Again  
C. Please  
   Come  
   Again  
D. Again

Without curly braces {}, if statement will take one statement only
9. Determine the output of the following code fragment:

```c++
int x = 8, y = 10;
y = 5;
if(x == 8 && y <= 8)
cout << "Rabbit" << endl;
if(x == 3 || y < 10)
cout << "Cat" << endl;
if(x != 5 && y != 112)
cout << "Ant" << endl;
```

Variable y will take the last value assigned to it.

A. Rabbit
   Cat
   Ant
B. Rabbit
   Cat
C. Cat
   Ant
D. Ant

10. What is the output of the following program?

```c++
int k = 8;
if (k < 10)
    k = k * k;
if (k <= 64)
    k = k + 10;
cout << k;
```

A. 18
B. 64
C. 74
D. 8
PART B (25 MARKS)

QUESTION 1

a) Based on the given problem, identify the required input, process and output.

Lionel Messi wants to give out “duit raya” to his muslim fans. He needs a program that can read in an amount of money and determine the number of purple envelopes to put RM50, the number of red envelopes to put RM10, the number of green envelopes to put RM5, and how much money is left without envelope.

Answer

INPUT:

    amtMoney

PROCESS:

    noPurpleEnv = amtMoney / 50
    noRedEnv = amtMoney % 50 / 10
    noGreenEnv = amtMoney % 50 % 10 / 5
    moneyLeft = amtMoney % 50 % 10 % 5

    OR

    noPurpleEnv = amtMoney / 50
    remainder = amtMoney % 50
    noRedEnv = remainder / 10
    remainder = remainder % 10
    noGreenEnv = remainder / 5
    moneyLeft = remainder % 5

    OR

    noPurpleEnv = amtMoney / 50
    remainder = amtMoney - (50 * noPurpleEnv)
    noRedEnv = remainder / 10
    remainder = amtMoney - (50 * noPurpleEnv) - (10 * noRedEnv)
    noGreenEnv = remainder / 5
    moneyLeft = amtMoney - (50 * noPurpleEnv) - (10 * noRedEnv) - (5 * noGreenEnv)

OUTPUT:

    noPurpleEnv, noRedEnv, noGreenEnv, moneyLeft
b) Write C++ statement(s) to perform the following tasks:

i) Prompt and allow user to **input** CSC128 or CSC118 as the value for **courseCode**.

   **Answer:**
   ```cpp
cout << "Enter your course code (CSC128/CSC118): " ; // prompt
   cin >> ws; // optional
   cin.getline(courseCode, 10); // input statement for string
   ```

ii) **Assign value Bandar Jengka to variable town.**

   **Answer:** `strcpy(town,"Bandar Jengka"); // assignment stmt for string value

   Or `char town[50] = "Bandar Jengka";`

iii) If **grade** is equal to A, B or C, set the variable **gradeStatus** equal to P, otherwise set **gradeStatus** equal to F.

   **Answer:**
   ```cpp
   if (grade == 'A' || grade == 'B' || grade == 'C')
       gradeStatus = 'P';
   else
       gradeStatus = 'F';
   ```

**QUESTION 2**

a) **Given the declarations:**

   ```cpp
   int x = 2, y = 3, z = 5;
   float a = 17.5;
   ```

   **Evaluate the following C++ expressions:**

   i) `a + sqrt( pow( x, y % z ) * x )`

   **Answer:** 
   
   ii) `x * y / z % y`

   **Answer:**
   
   iii) `a + 1 / x`

   **Answer:**
   
   (3 marks)
b) Write the equivalent C++ statement for the following mathematical equations:

i) \[ P = \frac{2(x^7 y + 12)}{(z-2)(z-2)} - \frac{1}{x+4} \]

Answer:
\[ P = 2 * (\text{pow}(x, 7) * y + 12) / ((z - 2) * (z - 2)) - 1 / (x + 4); \]

ii) \[ S = \sqrt{R + \sqrt{Q^3 + R^2}} \]

Answer:
\[ S = \text{sqrt}(R + \text{sqrt}(\text{pow}(Q, 3) + \text{pow}(R, 2))) \text{ or } S = \text{sqrt}(R + \text{sqrt}(\text{pow}(Q, 3) + (R * R))) \]

(3 marks)
QUESTION 3

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

```cpp
#include <iostream>
#include <string>

int main() {
    double total_liter, daily_consuming, weekly_cost, type_petrol;
    std::cout << "Enter type_petrol (RON97, RON95, ron97, ron95): " << std::endl;
    std::cin >> type_petrol;
    std::cout << "Enter total_liter: " << std::endl;
    std::cin >> total_liter;
    daily_consuming = total_liter + 7;

    if (type_petrol == RON97 || type_petrol == ron97) {
        weekly_cost = daily_consuming * 2.85 * 7;
    } else if (type_petrol == RON95 || type_petrol == ron95) {
        weekly_cost = daily_consuming * 2.10 * 7;
    } else {
        weekly_cost = daily_consuming * 2.00 * 7;
    }

    std::cout << "Weekly cost: " << weekly_cost << std::endl;
    return 0;
}
```
```cpp
#include<iostream.h>
#include<conio.h>
#include<string.h>

int main()
{
    char type_petrol[10];
    float total_liter, daily_consuming, weekly_cost;

    cout << "Enter the petrol type: RON97 or RON95 or DIESEL:";
    cin.getline(type_petrol,10);

    cout << "Input the total of petrol for a week (Liter):";
    cin >> total_liter;

    daily_consuming = total_liter / 7;

    if ((strcmp(type_petrol,"RON97") == 0) ||
        (strcmp(type_petrol,"ron97") == 0))
        weekly_cost = daily_consuming * 2.85 * 7;

    else if ((strcmp(type_petrol,"RON95") == 0) ||
        (strcmp(type_petrol,"ron95") == 0))
        weekly_cost = daily_consuming * 2.10 * 7;

    else
        weekly_cost = daily_consuming * 2.00 * 7;

    cout <<" The weekly cost of petrol consumed is :" << weekly_cost;
}
```
QUESTION 4

a)

```cpp
float CGPA = 2.33;

if(CGPA >= 3.50 && CGPA <= 4.00)
    cout << "Dean's List";
else if(CGPA >= 2.00 && CGPA < 3.50)
    cout << "Try Harder";
else
    cout << "Under Probation";
```

**ANSWER:** Try Harder (1 mark)

b)

```cpp
int y = 2, z = 0;
if (y > 5)
    z = 14;
cout << z;
```

**ANSWER:** 0 (1 mark)

c)

```cpp
int speed, limit;
speed = 80;
limit = 110;
if (speed < limit)
    cout << "Slow";
else
    cout << "Drive faster";
```

**Answer:** No output (1 mark)

More than one stmts (i.e. a block stmt) after an if stmt must be put inside curly braces {} or else it will become a syntax error (misplaced else)
d)  

```cpp
int no = 8;
if(no == 3)
    cout << "The number is three";
else if(no == 8)
    cout << "The number is eight";

if(no >= 1 && no <= 5)
    cout << " and it's between 1 and 5";
else if(no >= 6 && no <= 10)
    cout << " and it's between 6 and 10";

ANSWER: The number is eight and it's between 6 and 10 (1 mark)
```

e)  

```cpp
int a = 2, b = 6, c = 3, d = 8;
int x = d;
if(b < a)
{
    if(c < d)
        x = a;
}
else if(a < d)
{
    if(d < b)
        x = c;
}
else if(b < d)
    x = b;

cout << x;
ANSWER: 8 (1 mark)
```
PART C (15 MARKS)

QUESTION 1

CS110 Hospital needs a program to compute and print a bill statement for each patient. The charges for each day are as follows:

<table>
<thead>
<tr>
<th>Ward Code</th>
<th>Ward Name</th>
<th>Room ID</th>
<th>Room Types</th>
<th>Days Spent</th>
<th>Charges Per Day (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K</td>
<td>Kiambang</td>
<td>KA</td>
<td>Single Room</td>
<td>First 2 days</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Next 3 days</td>
<td>200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KB</td>
<td>Deluxe Room</td>
<td>Over 5 days</td>
<td>170</td>
</tr>
<tr>
<td>C</td>
<td>Cempaka</td>
<td>CA</td>
<td>Single Room</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CB</td>
<td>Standard Room</td>
<td></td>
<td>50</td>
</tr>
</tbody>
</table>

Write a complete C++ program that can perform the following tasks:

- Read the patient name, ward code, room id, and the no of days the patient spent in the hospital.
- Accept the telephone option (Y or N). The telephone charge is RM3.00 per day.
- Generate a bill for each patient using the following format – for example, if the input are AARON AZIZUL, K, KA, 5, and Y, then the output screen is as shown below:

```
CS110 HOSPITAL
BILL STATEMENT FOR AARON AZIZUL

Ward Name : K - Kiambang
Room Type : KA - Single Room
No of Days in Hospital : 5 days
Room Charge : RM 1100.00
Telephone Charge : RM 15.00
Payment Due : RM 1115.00
```
#include <iostream.h>
#include <conio.h>
#include <ctype.h>
#include <iomanip.h>  // not required

void main ()
{
    char name[50], wardCode, wardName[20];
    char roomID[5], roomType[50], telephone;
    double charge, telCharge, totalAmount;
    int days;
    bool valid = true;  // not required

    cout << "\n\n
tCS110 HOSPITAL";
    cout << "\n\nEnter your name: ";
    cin >> ws;
    cin.getline(name,50);
    cout << "\n\nEnter the ward code (K->Kiambang/C->Cempaka): ";
    cin >> wardCode;
    cout << "\n\nEnter the room ID(Kiambang->KA/KB,Cempaka->CA/CB): ";
    cin >> ws;
    cin.getline(roomID, 5);
    cout << "\n\nEnter number of days in hospital: ";
    cin >> days;
    cout << "\n\nEnter telephone option (Y/N): ";
    cin >> telephone;

    if (toupper(wardCode) == 'K')
    {
        strcpy (wardName, "K - Kiambang");

        if(strcmp(roomID, "KA") == 0)
        {
            strcpy (roomType, "KA - Single Room");

            if (days <= 2)
                charge = 250.00 * days;
            else if (days <= 5)
                charge = 250.00 * 2 + (days - 2) * 200.00;
            else if (days > 5)
                charge = 250.00 * 2 + 200.00 * 3 + (days - 5) * 170.00;
        }

        else if(strcmp(roomID, "KB") == 0)
        {
            strcpy (roomType, "KB - Deluxe Room");
            charge = 300.00 * days;
        }
        else
        {
            valid = false;  // not required
            cout << "\n\nINVALID ROOM ID ENTERED..."
;
        }
    }
else if (toupper(wardCode) == 'C')
{
    strcpy (wardName, "C - Cempaka");

    if(strcmp(roomID, "CA") == 0)
    {
        strcpy (roomType, "CA - Single Room");
        charge = 150.00 * days;
    }
    else if(strcmp(roomID, "CB") == 0)
    {
        strcpy (roomType, "CB - Standard Room");
        charge = 50.00 * days;
    }
    else
    {
        valid = false;  // not required
        cout << "\n\nInvalid ROOM ID ENTERED...";
    }
}
else
{
    valid = false;  // not required
    cout << "\n\nInvalid WARD CODE ENTERED...";
}

if (toupper(telephone) == 'Y')
telCharge = 3.00 * days;
else if (toupper(telephone) == 'N')
telCharge = 0.00;
else
{
    valid = false;  // not required
    cout << "\n\nInvalid TELEPHONE CODE ENTERED...";
}
totalAmount = charge + telCharge;

if(valid)
{
    clrscr();  // not required
    cout << setiosflags(ios::fixed) << setprecision(2);
    cout << \n\n\tCS110 HOSPITAL;
    cout << \n\tBILL STATEMENT FOR " << name;
    cout << \n\tWard Name : " << wardName;
    cout << \n\tRoom Type : " << roomType;
    cout << \n\tNo of Days in Hospital: " << days << " days";
    cout << \n\tRoom Charge : RM " << charge;
    cout << \n\tTelephone Charge : RM " << telCharge;
    cout << \n\tPayment Due : RM " << totalAmount;
}  // not required