CONFIDENTIAL

UNIVERSITI TEKNOLOGI MALAYSIA

TEST 1 - PRACTICAL

SEMESTER I 2017/2018

SUBJECT CODE	**:**	**SCSJ1013**
SUBJECT NAME	**:**	**PROGRAMMING TECHNIQUE I**
YEAR/COURSE	**:**	**1 (SCSJ / SCSV / SCSB / SCSR / SCSP)**
TIME	**:**	**1 HOUR 30 MINUTES**
DATE	**:**	**17 NOVEMBER 2017**
VENUE	**:**	**N28, MPK1-MPK10**

INSTRUCTIONS TO THE STUDENTS:

- Read the instructions carefully.
- References to any resources by any means are strictly prohibited.
- Use the tool Dev C++ for writing your program.
- You are given 1 HOUR 30 MINUTES to complete the test, including the submission of your program.
- Your program must follow the input and output as required in the text and shown in the examples. You must test the programs with (but not limited to) all the input given in the examples.

SUBMISSION PROCEDURE:

- Only the source code (i.e. the file with the extension .cpp) is required for the submission.
- Submit the source code via the UTM's e-learning system.

This question booklet consists of 6 pages inclusive of the cover page.

Problem **40 marks**

A hospital supply company wants to market a program to assist with the calculation of intravenous rates. Design and implement a program that interacts with the user as follows.

Write a complete C++ program that helps the company to calculate intravenous rates. The program should perform the following steps. (*Note:* that the values in *italics* are input by the user while the values in **bold** are the final result for each problem.)

1. Provide a menu driven screen for user to select the problem choice.
2. If the user enters ***1***, the program should ask the user
    a) to enter the rate of intravenous drop in ml/hr
    b) to enter the intravenous tubing drop factor (drops/ml)

    From the given information calculate and display the intravenous drop rate per minute. The screen display for problem 1 is as in **Figure 1**.

```
INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 1
Enter rate in ml/hr => 150
Enter tubing's drop factor(drops/ml) => 15
The drop rate per minute is 38.
```

Figure 1: Screen Display for Problem 1

3. If the user enters ***2***, the program should ask the user
    a) to enter input rate in mg/hr
    b) to enter the patient weight in kg
    c) to enter the concentration rate of the drug in mg/hr

From the given information calculate and display rate in millilitres per hour. The screen display for problem 2 is as in **Figure 2**.

```
INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 2
Enter rate in mg/hr => 0.6
Enter patient weight in kg => 70
Enter concentration in mg/ml => 1
The rate in millilitres per hour is 42.
```

Figure 2: Screen Display for Problem 2

4. If the user enters ***3***, the program will display the screen as in Figure 3.

```
INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 3
You have chosen to quit the program.
Thank you for using our system.
```

Figure 3: Screen Display for Problem 3

5. If the user enters any other problem number besides 1, 2 or 3, the program will display

the screen as in **Figure 4**.

```
INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 6
Please run the system again and choose a problem number
between 1 and 3.
```

Figure 4: Screen Display for Invalid Problem Choice

To assist the company in developing the program, you should implement the following functions:

`getProblem` – A function with no input parameters. It will display the user menu, then inputs and returns from the function the value of the problem number selected.

`getRateDropFactor` – This is a non-returning function which prompts the user to enter the data required for problem 1, and sends this data back to the calling module through the use of reference parameters.

`getKgRateConc` – This is also a non-returning function which prompts the user to enter the data required for problem 2, and sends this data back to the calling module through the use of reference parameters.

`figDropsMin` – This function takes rate and drop factor as input parameters and it returns the value of drops/min (rounded to the **nearest** whole drop, for example 23.2 to 24 and 23.7 to 24).

`byWeight`– This function takes as input parameters rate in mg/hr, patient weight in kg, and concentration of drug in mg/ml and it returns the value ml/hr (rounded, for example 26.2 to

26 and 26.6 to 27). *Note:* Formula to calculate rate in ml/hr = rate in mg/hr × weight in kg × concentration of drug in mg/ml.

Your program should also be written to show the implementation of a loop(s).

You will be assessed according to the assessment criteria shown in **Table 1.**

Table 1: Assessment Criteria

Item	Criteria	Marks
A	The program is able to run Applying proper styles, *e.g*. indentation and comments Using an appropriate structure for the program (*e.g*. all required header files are included, the function main is properly written, *etc*.)	2 2 2
B	Providing a menu driven screen for user to make choice of problem Reading the input value for problem number Reading the input values for each problem from the user with proper prompts	2 1 5
C	Validating range of values for problem numbers Proper handling of returning functions (headers & returns) Proper handling of non-returning functions (headers & reference parameters) Obtaining correct calculation of results for returning functions Activating function to get problem number Activating function(s) to call & calculate results of Problem 1 Activating function(s) to call & calculate results of Problem 2 Implementing valid cases of problem numbers in a loop	2 4 4 3 1 3 3 2
D	Printing the output for all cases including default case	4
Total		**40**

On the whole, the program execution for all problem choices will be depicted as follows:

```
INTRAVENOUS RATE ASSISTANT

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 1
Enter rate in ml/hr => 150
```

```
Enter tubing's drop factor(drops/ml) => 15
The drop rate per minute is 38.

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 2
Enter rate in mg/kg/hr => 0.6
Enter patient weight in kg => 70
Enter concentration in mg/ml => 1
The rate in millilitres per hour is 42.

Enter the number of the problem you wish to solve.
     GIVEN A MEDICAL ORDER IN            CALCULATE RATE IN
(1) ml/hr & tubing drop factor             drops/min
(2) mg/kg/hr & concentration in mg/ml      ml/hr
(3) QUIT

Problem => 3
You have chosen to quit the program.
Thank you for using our system.
```

For choices which are not in the range of 1 to 3 example -1 or 6:

```
Problem => 6
Please run the system again and choose a problem number between 1
and 5.
```