SCHOOL OF COMPUTING
Faculty of Engineering

UNIVERSITI TEKNOLOGI MALAYSIA

PROBLEM-SOLVING TEST (PST)

SEMESTER I 2018/ 2019

SUBJECT CODE	: SCSJ 1013
SUBJECT NAME	: PROGRAMMING TECHNIQUE I
YEAR/COURSE	: 1 (SCSJ / SCSV / SCSB / SCSR /SCSP)
TIME	: 9.00 am – 11.00 am (2 HOURS)
DATE	: 5th OCTOBER 2018 (FRIDAY)
VENUE	: BK1 – BK7, N28

INSTRUCTIONS TO THE STUDENTS:

Please answer all questions in the answer booklet.

PART A:	5 QUESTIONS	(50 MARKS)
PART B:	1 QUESTION	(20 MARKS)
TOTAL		**(70 MARKS)**

ANSWER ALL QUESTIONS IN THIS BOOKLET IN THE SPACES PROVIDED.

Name	
I/C No.	
Section	
Lecturer's Name	

This question booklet consists of **9 pages** inclusive of the cover page.

PART A: STRUCTURED QUESTIONS

QUESTION 1   **[5.5 MARKS]**

Fill in the blank with a proper statement that will calculate the area of a shape. The pseudocode will require an input of the shape code, and other necessary values of parameters based on the shape code. **Table 1** summarizes the shape code, the parameters that required values, and the formula to calculate the area. Finally, the pseudocode will display the area of the shape.

Table 1: Area calculation

Shape Code	Parameters	Area Calculation
S	L H	Area = L x H
T	B H	Area = B x H x 0.5
C	R	Area = 3.142 x R x R

Pseudocode:

```
1. Start
2. Read code
3. _____
   3.1. Read L, H
   3.2. Area = L x H
4. _____
   4.1. Read B, H
   4.2. Area = B x H x 0.5
5. _____
   5.1. Read R
   5.2. Area = 3.142 x R x R
6. _____
   6.1. Print "Unknown code"
   6.2. End
7. End if
8. _____
9. End
```

QUESTION 2   **[10 MARKS]**

Trace the output of the following pseudocode given the following input as in **Table 2**. Write your output in **Table 2**.

```
1.   Start
2.   Read a, b, c
3.   x = a
4.   y = b
5.   If b is greater than x
     5.1.  x = b
6.   End If
7.   If b is less than y
     7.1.  y = b
8.   End if
9.   If c is greater than x
     9.1.  x = c
10.  End If
11.  If c is less than y
     11.1. y = c
12.  End if
13.  End
```

Table 2: User input and output

a	b	c	x	y
2	4	6		
1	10	5		
63	25	10		
25	25	1		
0	36	36		

Trace the execution of the flowchart in **Figure 1** by filling in the tracing table in **Table 3**. The loop will execute as long as N is smaller than 4. In this flowchart, N is the number of 4 workers' data (input).
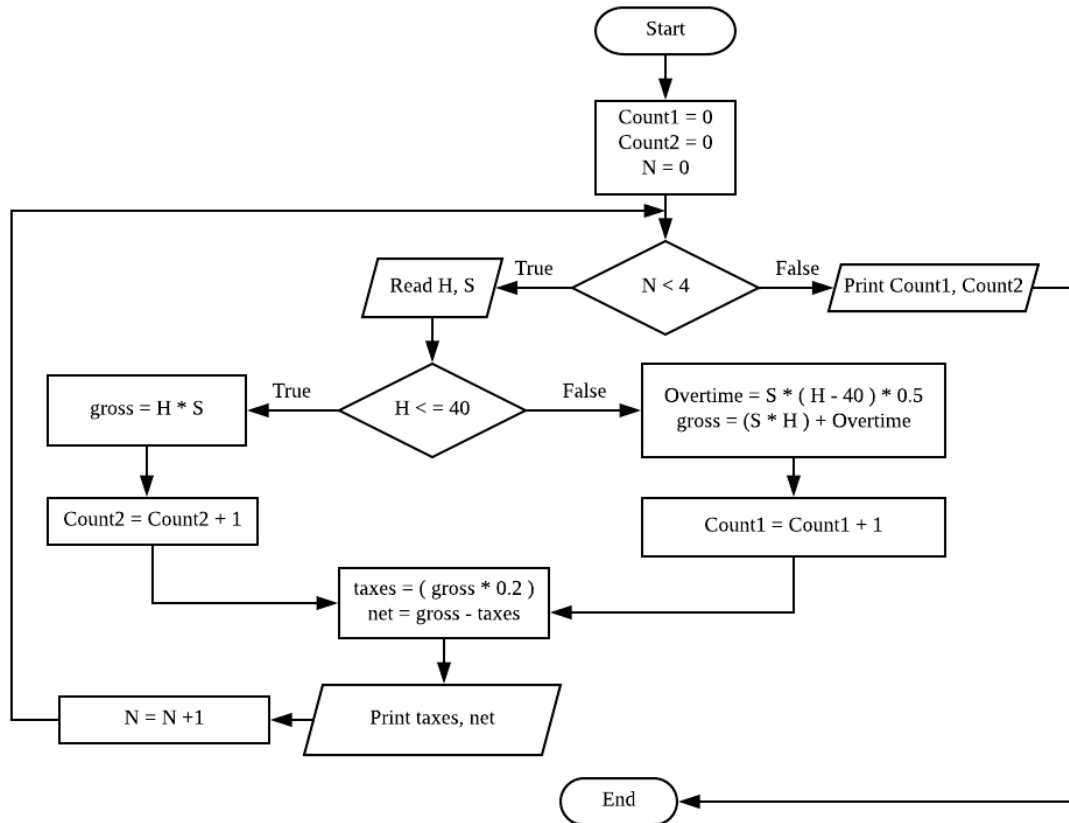

Figure 1: Flowchart

Table 3: Tracing table

N < 4	Count1	Count2	Hours (H)	Salary (S)	Output / Display
-	0	0	-	-	-
True	0	1	35	2000	14000, 56000
True	0	2	40	1750	14000, 56000
True	1	2	42	1500	12900, 51600
True	2	2	45	1200	11400, 45600
False	-	-	-	-	2, 2

The purpose of the flowchart in **Figure 2** is to identify and display weather the patient state is Normal, Pre-diabetes or Diabetes. User will input the type of Diagnostic Test (Type) and proceed with the input value of the test (V). Fill in the blank graphical symbols in **Figure 2** with appropriate instruction/ statement by referring **Table 4**. The output should display weather the state is Normal, Prediabetes or Diabetes.

Table 4: Diagnostic test value

Type	Diagnostic Test	Value for Normal	Value for Prediabetes	Value for Diabetes
1	Hemoglobin A1C (HbA1C)	$V < 5.7$	$5.7 <= V < 6.5$	$V \geq 6.5$
2	Fasting plasma glucose (FPG)	$V < 100$	$100 <= V < 125$	$V \geq 125$
3	Oral glucose tolerance test (OGTT)	$V < 140$	$140 <= V < 200$	$V \geq 200$

Start → Read Type → 1 <= Type <= 3 (False → Read Type; True → Read V) → Type == 1? (True → ...; False → Type == 2?) → Type == 2? (True → ...; False → ...)
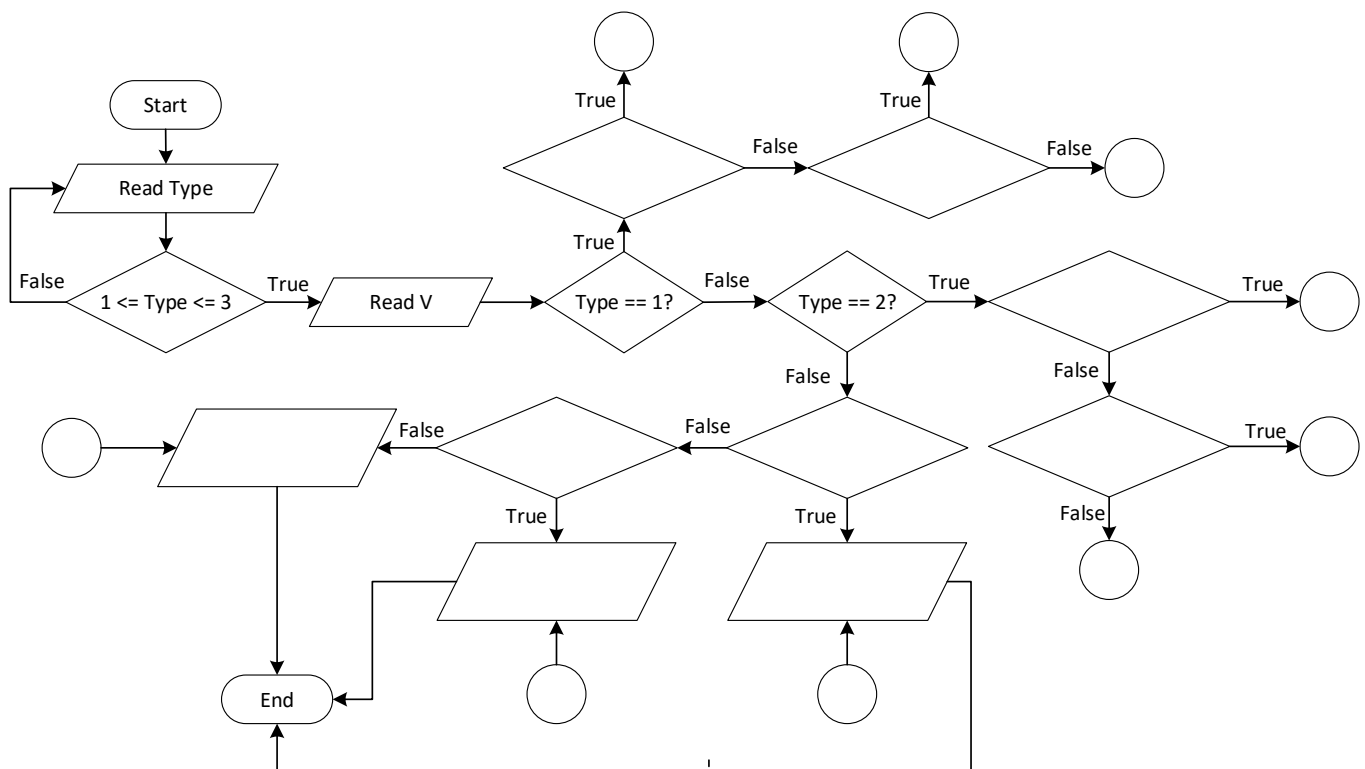
Figure 2: Incomplete flowchart

QUESTION 5 [13 MARKS]

Flowcharts in **Figure 3** with subroutine in **Figure 4** are used to read 10 integer values by the user. If the number of positive numbers is greater than the number of negative numbers, the program will print "MORE POSITIVE" and vice versa. The program will also print "SAME" if the number of positive numbers equals with the number of negative numbers. The zero integer is a non-positive and non-negative number, its input is ignored.

Input : 10 integer numbers

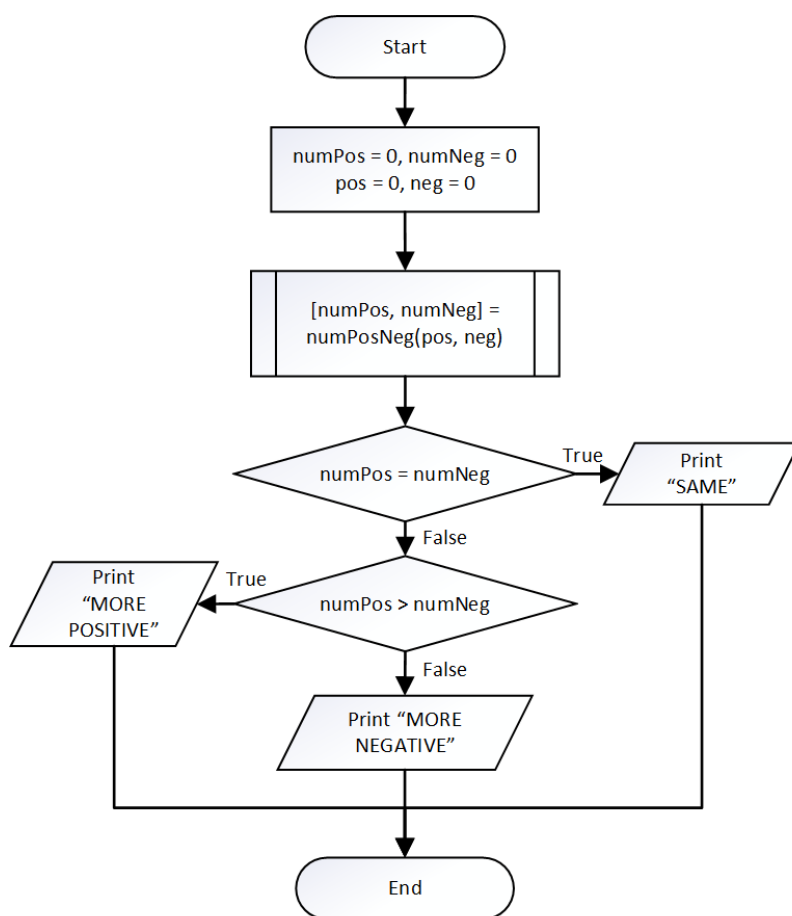Output : Message MORE POSITIVE, MORE NEGATIVE or SAME
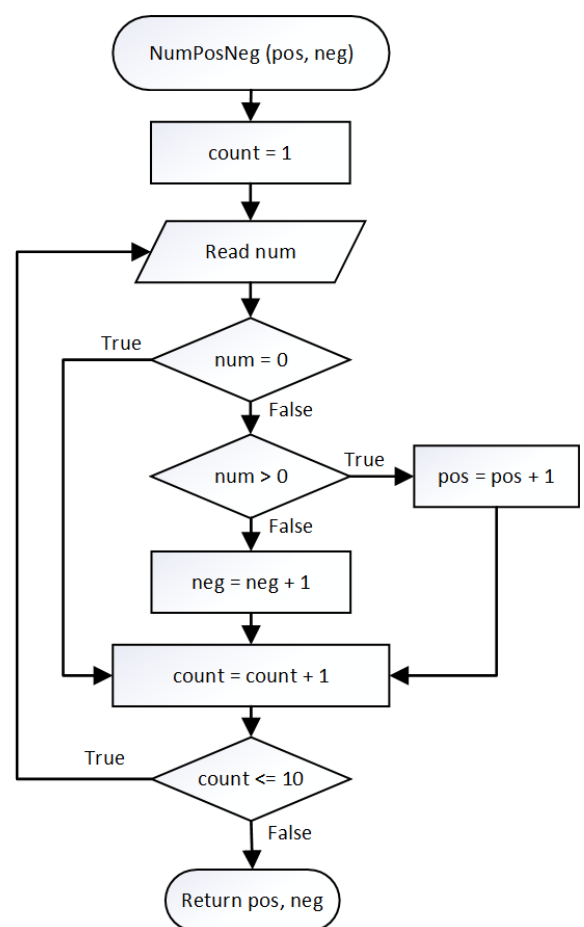
Figure 3: Main flowchart with output   **Figure 4:** Subroutine

Complete the tracing table in **Table 5** if the input data is

5, 13, -4, 0, 9, 2, 11, -9, 22, -1

Table 5: Tracing table

num	num=0	num>0	numPos	numNeg	pos	neg	count	count <= 10	numPos = numNeg	numPos > numNeg	Output

PART B: PROBLEM SOLVING

QUESTION [20 MARKS]

Draw a complete flowchart that can display Multiplication Table. The flowchart needs some requirements as follows:

   i)   The input **must be integer number (N)** that larger than 0 (zero).

   ii)   Use a **subroutine/ function** named *Multiply()* to implement the multiplication operation and to display the result. This subroutine should **accept** *N* value, **calculate** and **display** the result of *N × 1* to *N × 12*.

   iii)   Task (i) and task (ii) will be repeated as long as user entered sentinel value that valid for this repetition, otherwise flowchart will terminate.

The flowchart will prompt the user to enter an input (font in **bold**) and display the output as shown in **Figure 5** below:

```
Please enter any number (larger than zero) : 5
5    10   15   20   25   30    35    40    45    50    55    60
Input other numbers (Y/N) ? : Y


Please enter any number (larger than zero) : 7
7    14   21   28   35    42    49    56    63    70    77   84
Input other numbers (Y/N) ? : Y

Please enter any number (larger than zero) : 0
Please enter any number (larger than zero) : 2
2    4    6    8    10   12    14    16    18   20    22    24
Input other numbers (Y/N) ? : N
```

Figure 5: The output

(Space for Answer of Part B)