CONFIDENTIAL

Fakulti Komputeran

UNIVERSITI TEKNOLOGI MALAYSIA

PROBLEM SOLVING TEST

SEMESTER I 2015/2016

SUBJECT CODE	**: SCSJ1013**
SUBJECT NAME	**: PROGRAMMING TECHNIQUE I**
YEAR/COURSE	**: 1 (SCSJ / SCSV / SCSB / SCSR)**
TIME	**: 2 HOURS**
DATE	**: 29 SEPTEMBER 2015**
VENUE	**: N28 BK1-BK6**

INSTRUCTIONS TO THE STUDENTS:

This test book consists of 2 sections:

Part A: Output tracing [39 Marks]

Part B: Problem solving [50 Marks]

ANSWER ALL QUESTIONS IN THIS QUESTION PAPER.

Name	
I/C No.	
Year/Course	
Section	
Lecturer Name	

PART A – OUTPUT TRACING QUESTION

QUESTION 1

Based on the following pseudo code in **Figure 1**, complete the trace table given in **Table 1**.

[5 marks]

```
1. START
2. READ n, m
3. IF (n > = m)
   3.1 START_IF
      3.1.1   IF (n > 10)
         3.1.1.1 START_IF
            3.1.1.1.1   IF (m> 10)
               3.1.1.1.1.1 START_IF
                  3.1.1.1.1.1.1   PRINT "both n and m is greater than 10"
               3.1.1.1.1.2 END_IF
            3.1.1.1.2   IF (n = = m)
               3.1.1.1.2.1 START_IF
                     3.1.1.1.2.1.1.1 PRINT "n is equal to m"
               3.1.1.1.2.2 END_IF
         3.1.1.2 END_IF
   3.2 END_IF
4. ELSE
   4.1 PRINT (n-m)*2
5. PRINT n, m
6. END
```

Figure 1

ANSWER

Table 1

n	m	Output
0	**0**	**0, 0**
10	**0**	**10, 0**
20	**10**	**20, 10**
20	**20**	**both n and m is greater than 10, n is equal to m, 20, 20**
0	**10**	**-10, 0, 10**

1 m for each line

QUESTION 2

Based on the following pseudo code in **Figure 2**, complete the trace table given in **Table 2**.

[9 marks]

Data to be used for this problem is:

noItems

3

itemID	CP	SP	units
1111	32	40	10
2222	25	30	5
3333	57	65	2

```
1. START
2. SET Total to 0
3. READ noItems
4. WHILE (noItems IS NOT 0)
   4.1 START_WHILE
       4.1.1 READ itemID, CP, SP, units
       4.1.2  P = (SP * units) - (CP * units)
       4.1.3  ADD P to Total
       4.1.4  PRINT itemID, P
       4.1.5 SUBTRACT 1 from noItems
   4.2 END_WHILE
5. PRINT Total
6. END
```

Figure 2

ANSWER:

Table 2

Total	noItems	P	Output

Total	noItems	P	Output
0 0.5m **80** 0.5m **105** 0.5m **121** 1m	**3** 0.5m	**80** 1m **25** 1m **16** 1m	**1111** **80** 0.5m each **2222** **25** 0.5m each **3333** **16** 0.5m each

QUESTION 3

Use the flowchart in **Figure 3** to answer Question 3. **[10 marks]**

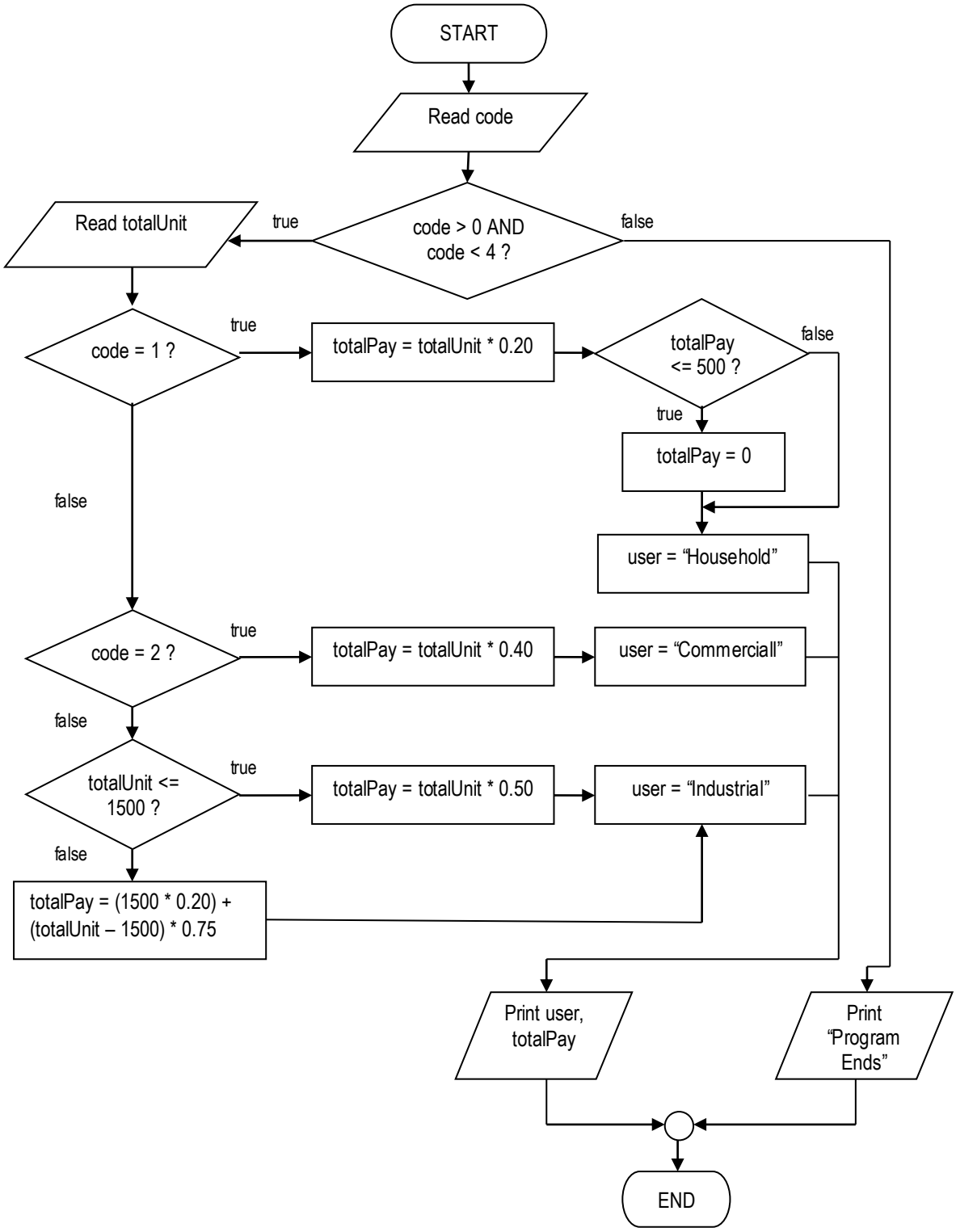


Figure 3

Trace the variables of the flowchart in **Figure 3** using the following input values:

	Code	totalUnit
i.	0	200
ii.	1	375
iii.	2	550
iv.	3	4500
v.	1	30
vi.	2	1000
vii.	3	1200

ANSWER:

Fill your answers in the **Table 3** provided below.

Table 3

0.5m each

code	totalPay	output
0	---	Program Ends
1	75	Household 75
2	220	Commercial 220
3	2550	Industrial 2550
1	0	Household 0
2	400	Commercial 400
3	600	Industrial 600

QUESTION 4

Trace the flowchart below in **Figure 4** by fill in the table given in **Table 4.** **[15 marks]**

!

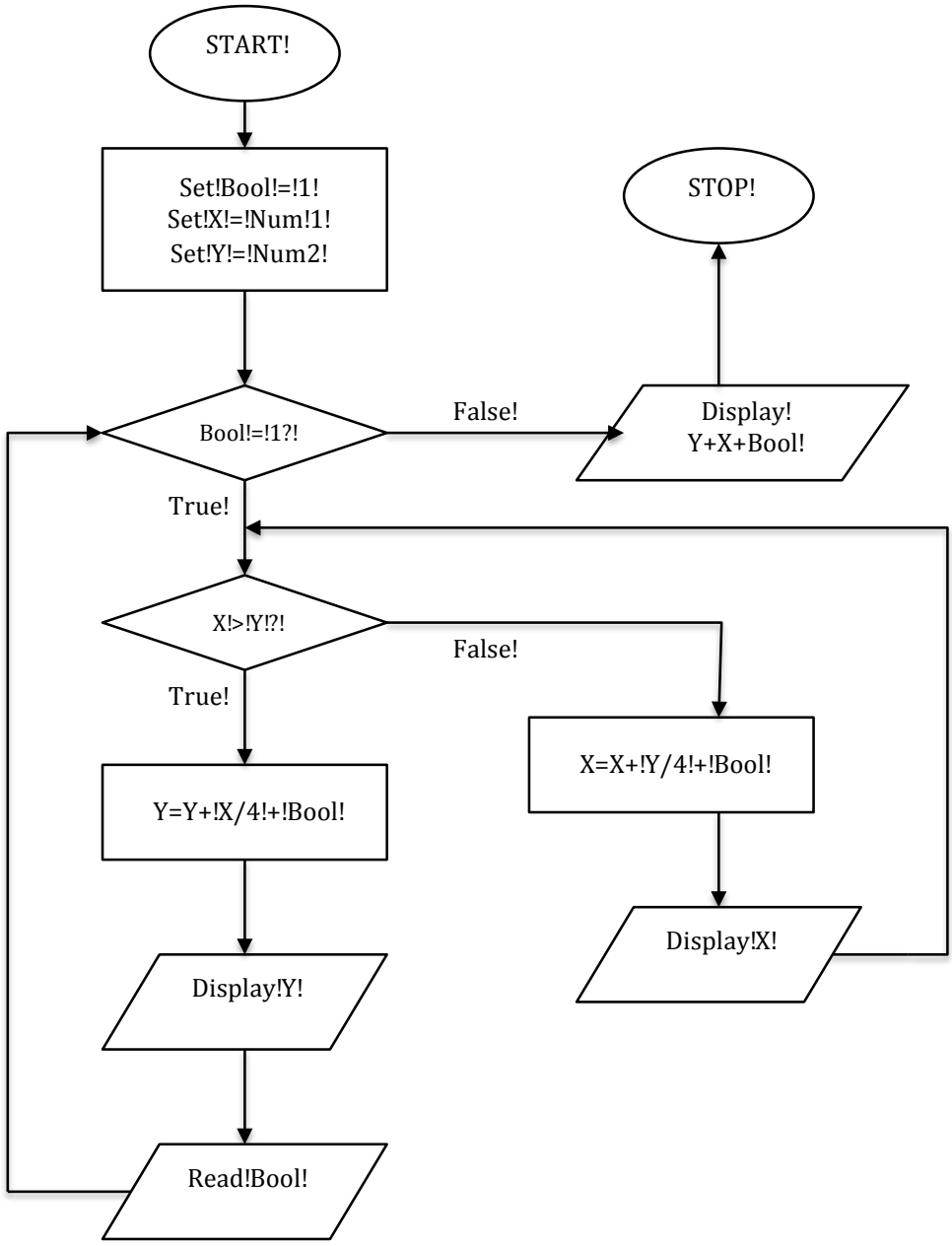


Figure 4

ANSWER:

Table 4

Num1	Num2	Bool	X	Y	Output
7	8	1 1 2	10 10 13.07	8 11.5 11.5	10 11.5 26.57
23	5	1 1 -5	23 23 23	11.75 18.5 18.5	11.75 18.5 36.5
32	23	1 1 1 10	32 41 41 41	32 32 43.25 43.25	32 41 43.25 94.25

Note : 0.5 mark each

PART B – PROBLEM SOLVING QUESTION

QUESTION 1

[20 marks]

Write a pseudo code for a program that will implement the following decision table in **Table 5**. The program will print the input grade point and the class of degree based on a user input. The program will terminate the loop when a user input a sentinel value other than 'y' or 'Y'.

Table 5

GRADE POINT	Class of Degree
0.0 – 0.99	Failed
1.0 – 2.00	General degree
2.1 – 2.7	Second class lower
2.71 – 3.69	Second class upper
3.7 – 4.00	First Class

ANSWER:

Pseudo code

1. Start
2. Set ans = 'y'
3. While (ans =='y' or y=='Y') do
   3.1 Start while
   3.1 read gradePoint
   3.1.1 If (gradePoint < 0.99)
   3.1.1.1 start if
   3.1.1.1.1.1 class = "Failed"
   3.1.1.2 end if
   3.1.2 Else
   3.1.2.1 If (gradePoint <= 2.00)
   3.1.2.1.1 start if
   3.1.2.1.1.1 class = "General degree"
   3.1.2.2.end if
   3.1.3 Else
   3.1.3.1 If (gradePoint <=2.70)
   3.1.3.1.1 start if
   3.1.3.1.1.1 class = "Second class lower"
   3.1.3.2 end if
   3.1.4 Else

3.1.4.1 If (gradePoint <=3.69)
3.1.4.1.1 start if
3.1.4.1.1.1 class = “Second class upper”
3.1.4.2 end if
3.1.5 Else
3.1.5.1 class= “First Class”

3.1.6. End else
3.1.7. Display gradePoint, class
3.1.7 read ans
3.2. end whie
4. End.

To examiner, please note that the answer consists of the followings:

- 5 if x2 10 marks
- 2 read x2 4 marks
- 1 loop x2 2 marks
- 2 display data x2 4 marks

QUESTION 2

[30 marks]

Mode Auto Dealer is a used car business owned by Mr. Muhammad. He employs you to develop a program that will calculate the sales discount to be applied to a vehicle, based on its year of manufacture and type. The discount is extracted from a two-dimensional table as in **Table 6** below:

Table 6

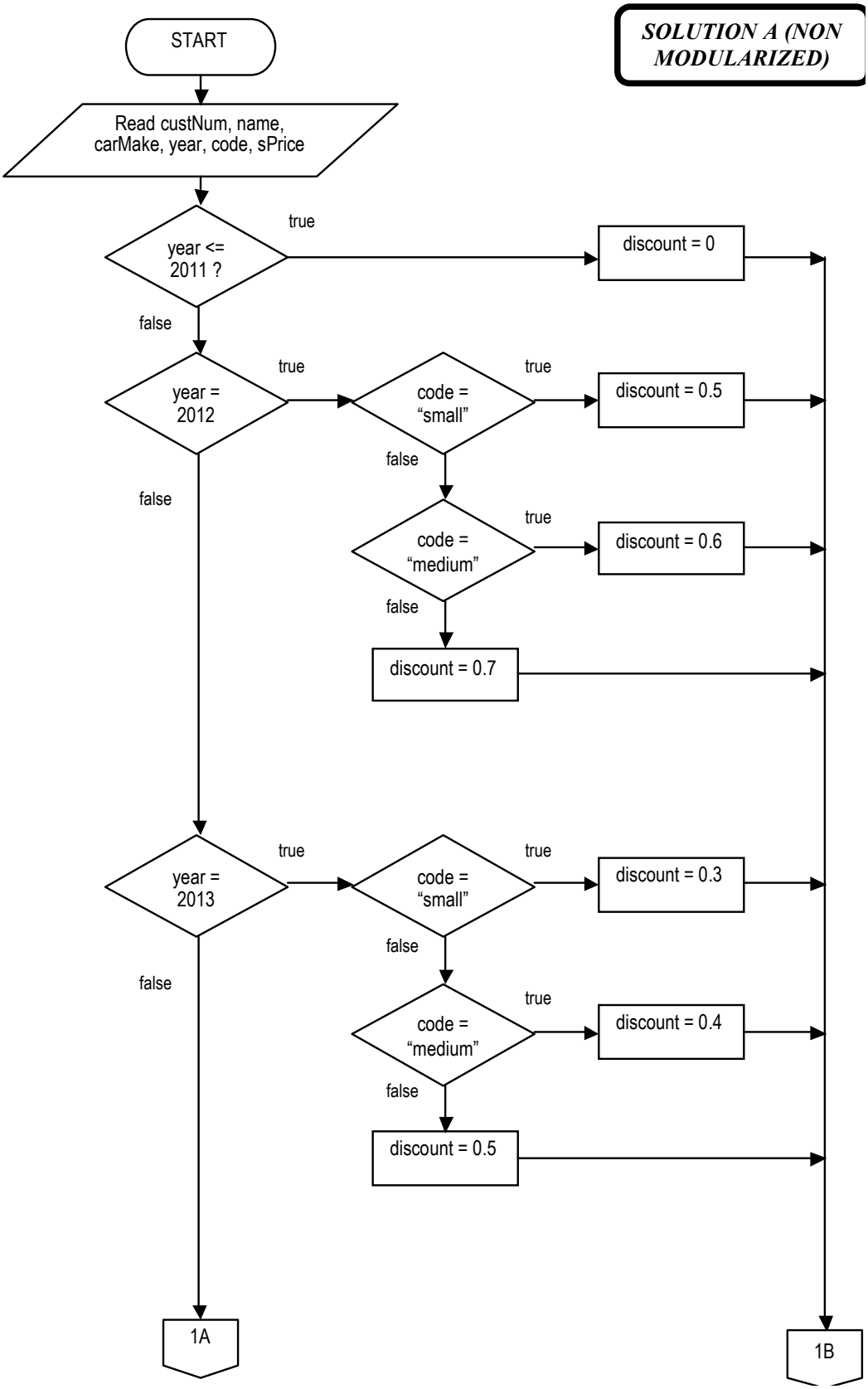
Year of manufacture	Discount Percentage		
	Small	Medium	Luxury
	1	2	3
2012	0.05	0.06	0.07
2013	0.03	0.04	0.05
2014	0.01	0.02	0.03

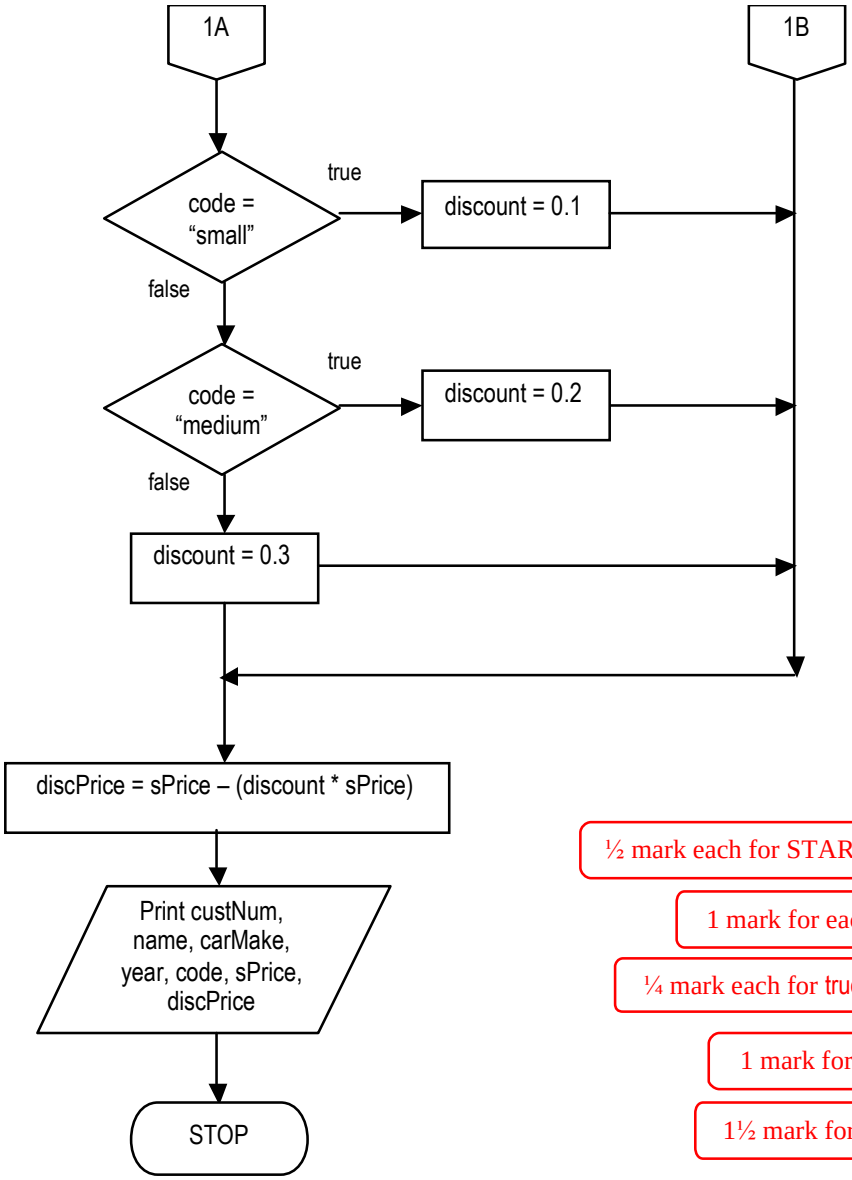
The year of manufacture of the vehicle is divided into three categories (2012, 2013 and 2014), and the type of car is divided into three categories (small, medium and luxury). No discount is given for a vehicle older than 2012. Your program is to read the vehicle file, which contains the customer number and name, the make of car, year of manufacture, car type code (1, 2, or 3) and the sales price. Use the year of manufacture and the car type code as guidelines to retrieve the discount percentage table, then apply the discount percentage to the sales price to determine the discounted price of the vehicle. Print all the details including discounted price. Before writing the program you are required to plan your problem solving steps in a flowchart(s).

Note: Additional papers will be given to answer this question.

ANSWER:

Answer to Part B : Drawing of Flowchart (30 marks)





½ mark each for START and STOP : 1m

1 mark for each symbol : 22m

¼ mark each for true and false : 4½m

1 mark for connectors : 1m

1½ mark for flowlines : 1½m

SOLUTION B (MODULARIZED)