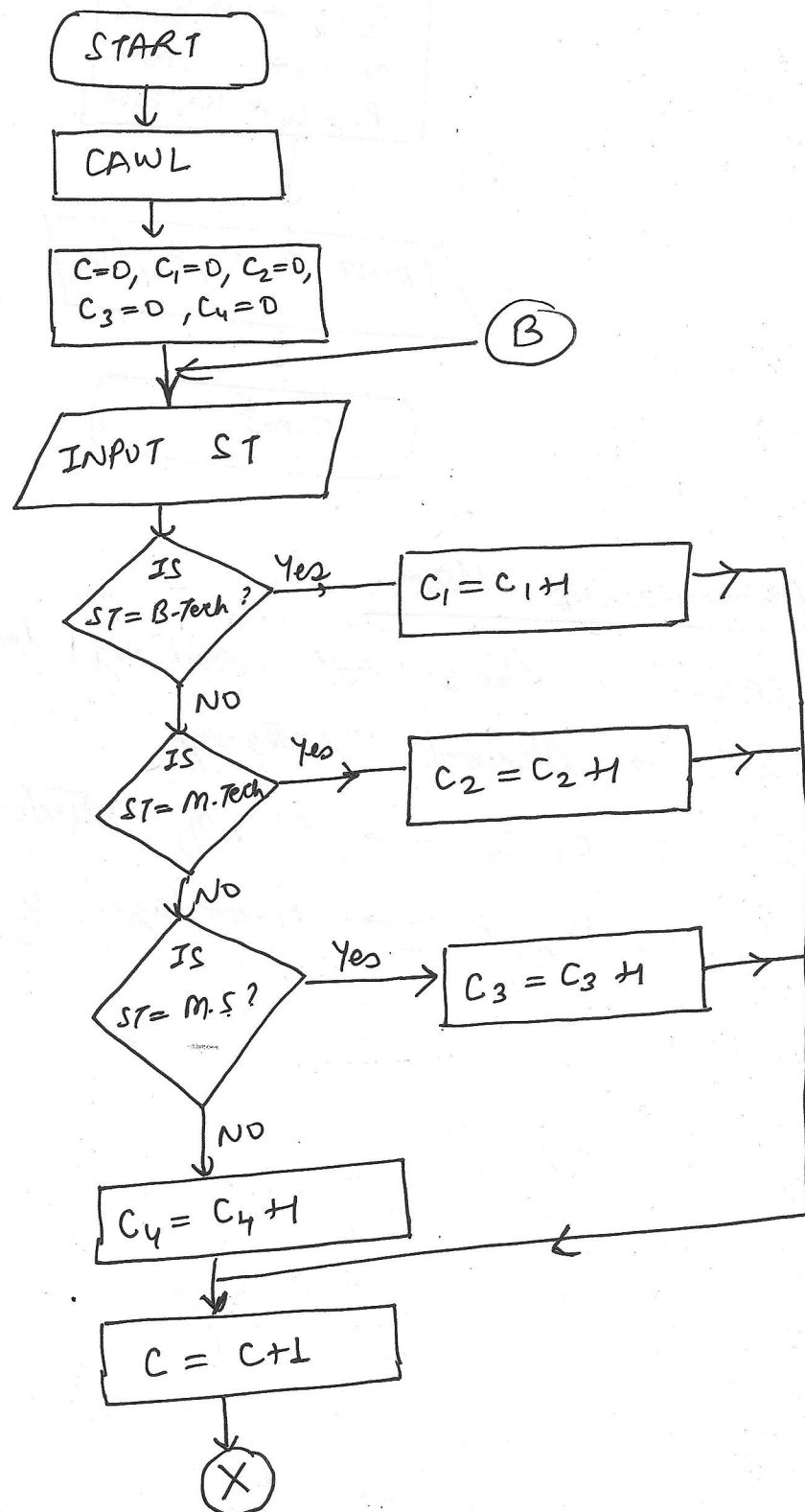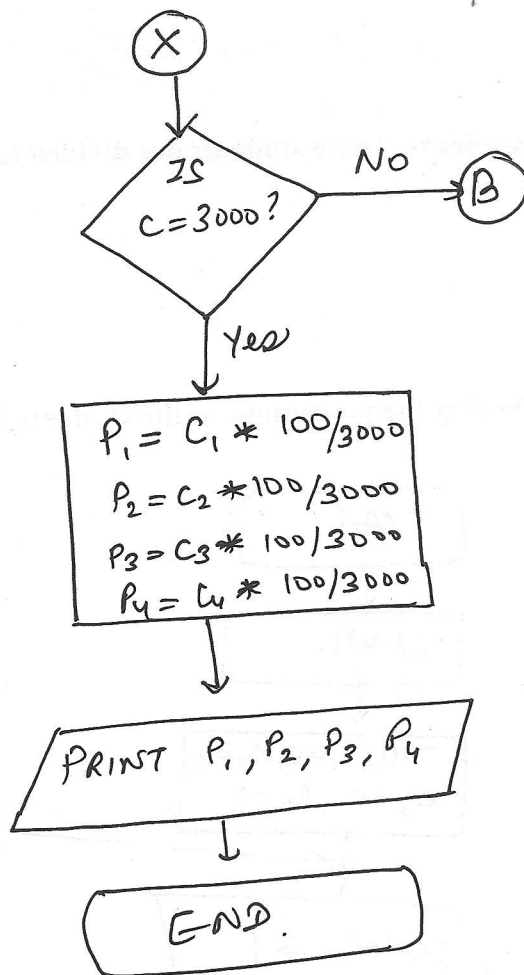10. A university has 3000 students. These students are divided into 4 categories:

- B. Tech
- M. Tech
- M.S.
- Ph.D

Draw a flowchart for finding the percentage of the students in each category.

$$P_1 = C_1 * 100/3000$$
$$P_2 = C_2 * 100/3000$$
$$P_3 = C_3 * 100/3000$$
$$P_4 = C_4 * 100/3000$$

PRINT P_1, P_2, P_3, P_4

END.

Abbreviations Used:

CAWL $\rightarrow$ Clear all working locations

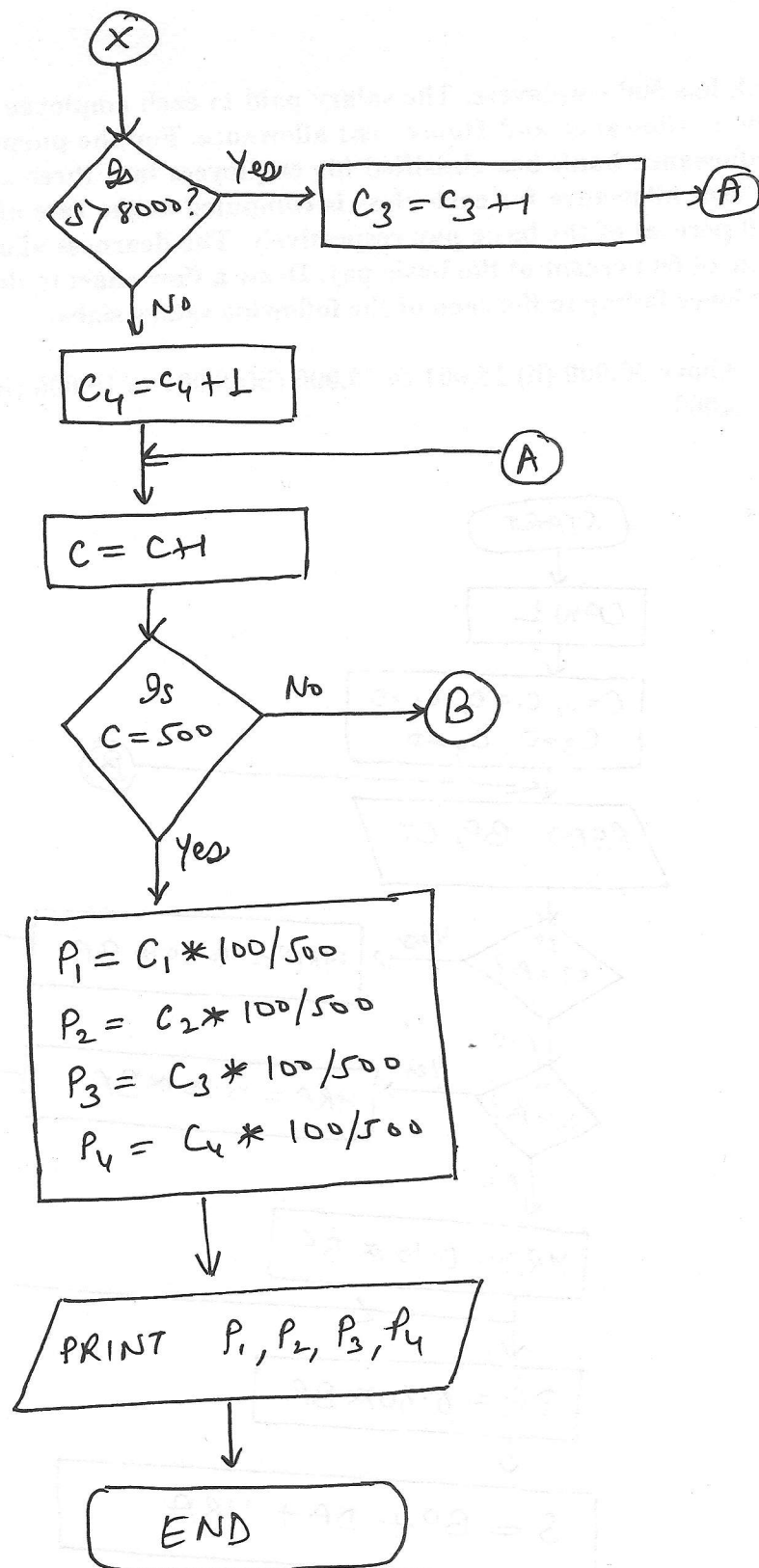ST $\rightarrow$ Student Category

$C, C_1, C_2, C_3, C_4 \longrightarrow$ No. of students

$P_1, P_2, P_3, P_4 \longrightarrow$ Percentage of students

11. A bank has 500 employees. The salary paid to each employee is sum of his basic pay, Dearness Allowance and House rent allowance. For the purpose of computing house rent allowance bank has classified his employees into three classes A, B and C. The house rent allowance for each class is computed at the rate of 30 percent, 20 percent and 10 percent of the basic pay respectively. The dearness allowance is computed at a flat rate of 60 percent of the basic pay. Draw a flow chart to determine the percentage of employee falling in the each of the following salary slabs:

(i) Above 30,000 (ii) 15,001 to 30,000 (iii) 8,001 to 15,000 (iv) Less than or equal to 8,000.

START

CAW L

$C=0, C_1=0, C_2=0$
$C_3=0, C_4=0$

(B)

READ BP, CT

IS CT = A ? — Yes → HRA = 0.30 * BP

NO

IS CT = B ? — Yes → HRA = 0.20 * BP

NO

HRA = 0.10 * BP

DA = 0.60 * BP

S = BP + DA + HRA

IS S > 30,000 — Yes → $C_1 = C_1 + 1$ → (A)

NO

IS S > 15,000 — Yes → $C_2 = C_2 + 1$ → (A)

NO

(X)

(X)

Is $S > 8000$? → Yes → $C_3 = C_3 + 1$ → (A)

↓ No

$C_4 = C_4 + 1$ ← (A)

↓

$C = C + 1$

↓

Is $C = 500$ → No → (B)

↓ Yes

$P_1 = C_1 * 100/500$

$P_2 = C_2 * 100/500$

$P_3 = C_3 * 100/500$

$P_4 = C_4 * 100/500$
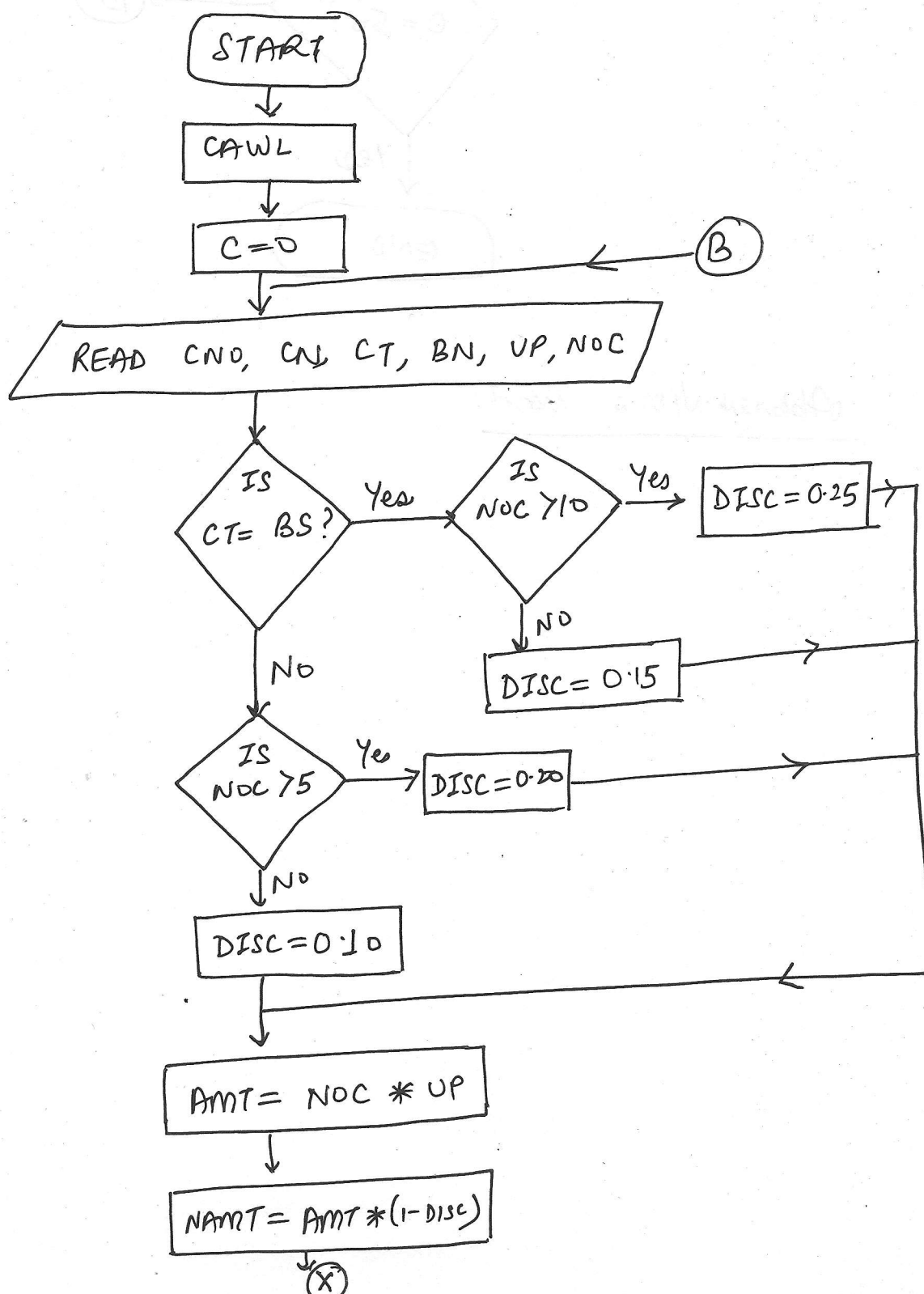
↓

PRINT P_1, P_2, P_3, P_4
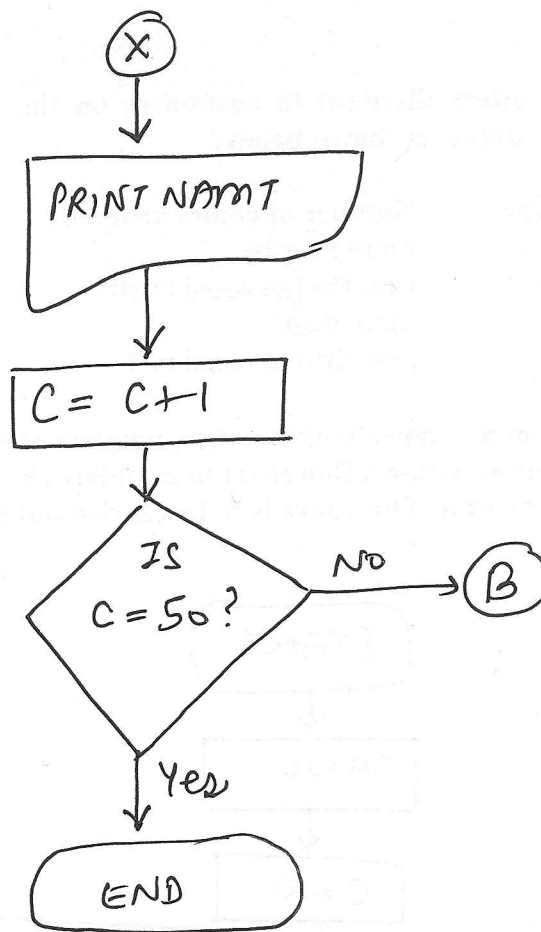
↓

END
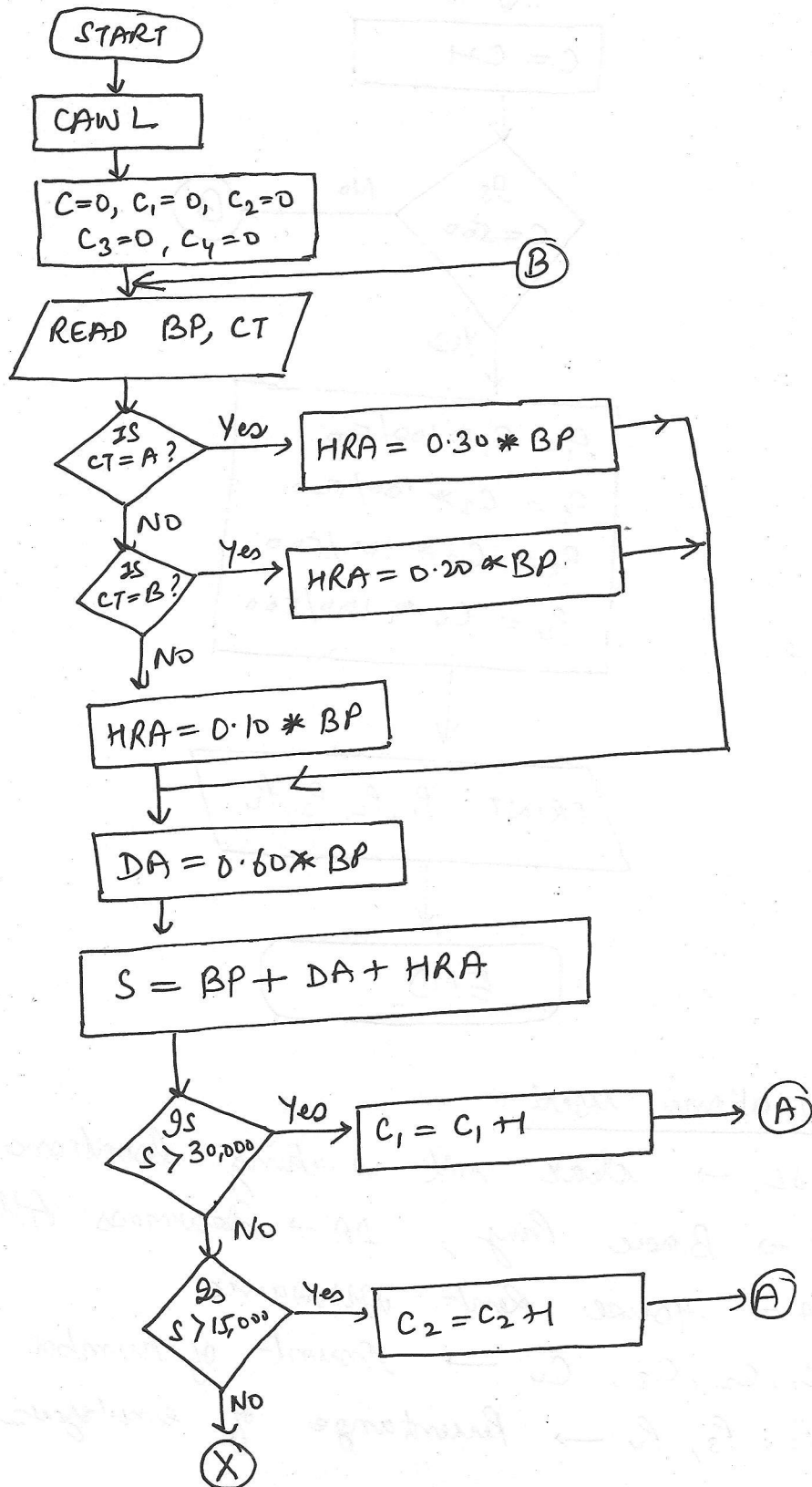
Abbreviations used :

CAWL → clear all working locations

BP → Basic Pay , DA → dearness Allowance

HRA → House Rent Allowance

C, C_1, C_2, C_3, C_4 → count of number of employees

P_1, P_2, P_3, P_4 → Percentange of employees.

12. A Book publisher offers discount to customers on the basis of customer type and number of copies ordered as shown below:

Customer Type	Number of copies ordered	% of Discount
Book Seller	More than 10	25
	Less than or equal to 10	15
Library	More than 5	20
	Less than or equal to 5	10

Customer number, name, type, book number, number of copies ordered and unit price are given as input. Draw a flowchart to calculate the net amount of the bill for each customer and print it. The above is to be carried out for 50 customers.

```
        (X)
         |
         v
   PRINT NAMT
         |
         v
   [ C = C+1 ]
         |
         v
        / IS \         No
       < C = 50? >------------> (B)
        \      /
         |
         | Yes
         v
     ( END )
```
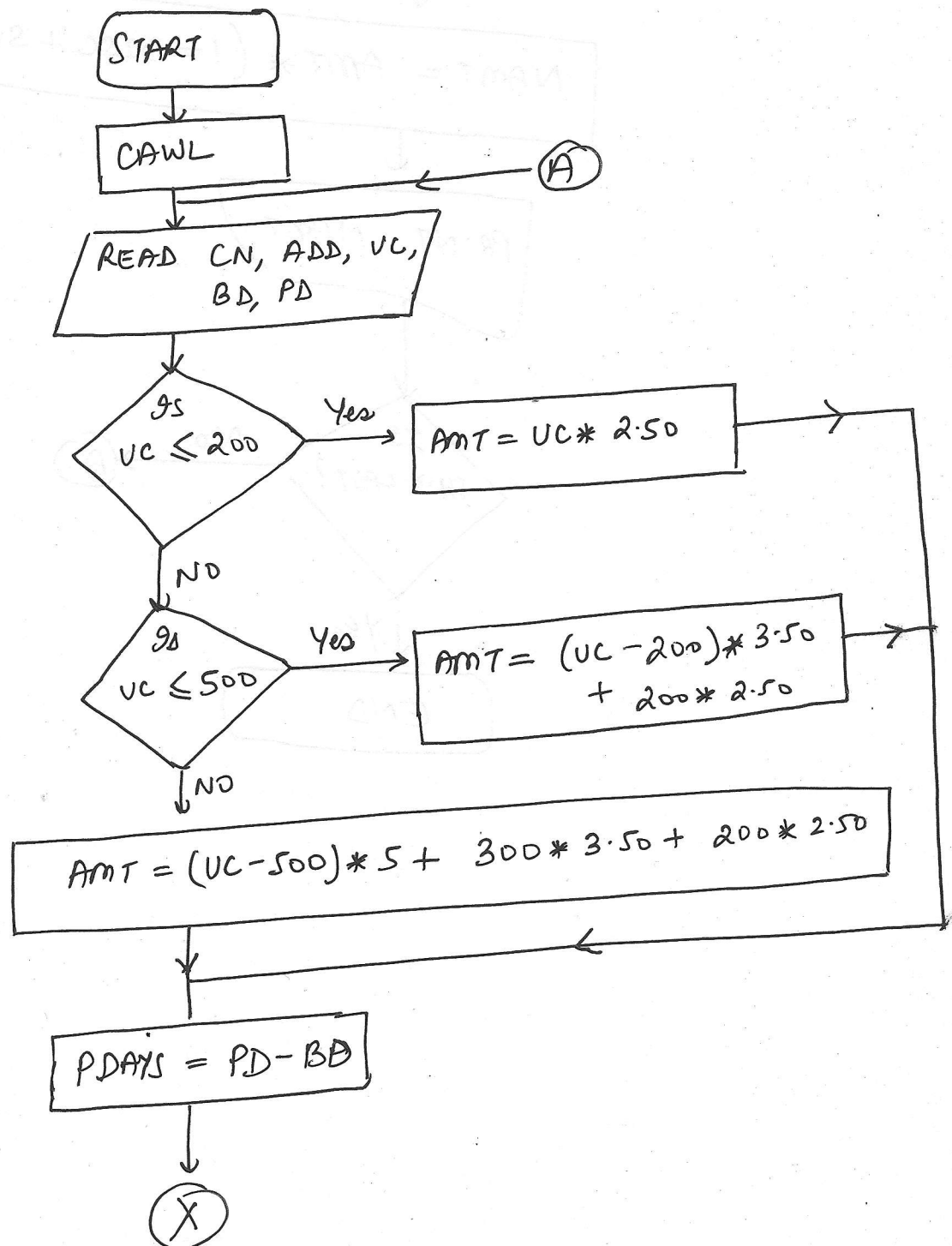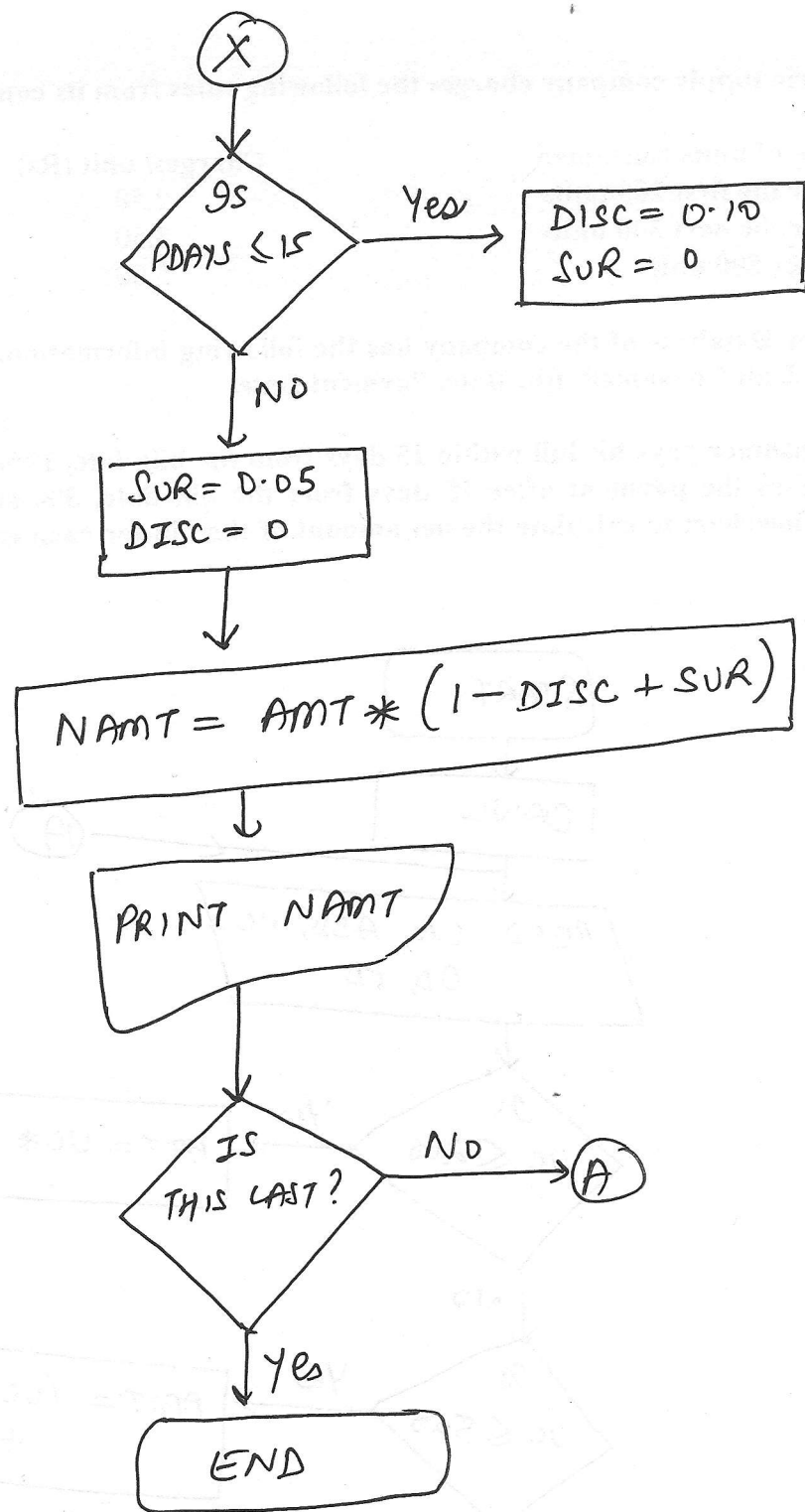
Abbreviations used:

13. An electric supply company charges the following rates from its consumers:

No. of units consumed	Charges/ unit (Rs)
For the first 200 units	2.50
For the next 300 units	3.50
Over 500 units	5.00

Computer Database of the company has the following information: Consumer Name, Address, Unit Consumed, Bill Date, Payment Date.

If the consumer pays his bill within 15 days from the bill date, 10% discount is given. If he makes the payment after 15 days from the bill date, 5% surcharge is levied. Draw a flowchart to calculate the net amount of the bill for each consumer and print it.

START

CAWL → (A)

READ CN, ADD, UC, BD, PD

Is $UC \leq 200$ — Yes → $AMT = UC * 2.50$

NO

Is $UC \leq 500$ — Yes → $AMT = (UC - 200) * 3.50 + 200 * 2.50$

NO

$AMT = (UC - 500) * 5 + 300 * 3.50 + 200 * 2.50$

$PDAYS = PD - BD$

(X)

$$\left(X \right)$$

Is PDAYS ≤ 15 ? — Yes → DISC = 0.10, SUR = 0

NO ↓

SUR = 0.05
DISC = 0

↓

$$NAMT = AMT * (1 - DISC + SUR)$$

↓

PRINT NAMT

↓

IS THIS LAST? — NO → (A)

Yes ↓

END

14. Draw a flow chart to compute and print Income-tax, Surcharge and Education cess on the income of a person, where income is to be read from terminal and tax is to be calculated as per the following rates:

Slab (in Rs.)	Rate
1 to 100000	No Tax
100001 to 150000	@10% of amount above 100000
150001 to 250000	Rs. 5000 + 20% of amount above 150000
250001 onwards	Rs. 25000 + 30% of amount above 250000

- Surcharge: @ 10% on the amount of total tax, if the income of the person exceeds Rs. 10 lacs.
- Education Cess: 2% on total tax.

$$EC = 0.02 * (TAX + SUR)$$

PRINT TAX, SUR, EC

IS THIS LAST?

No → C

Yes

END
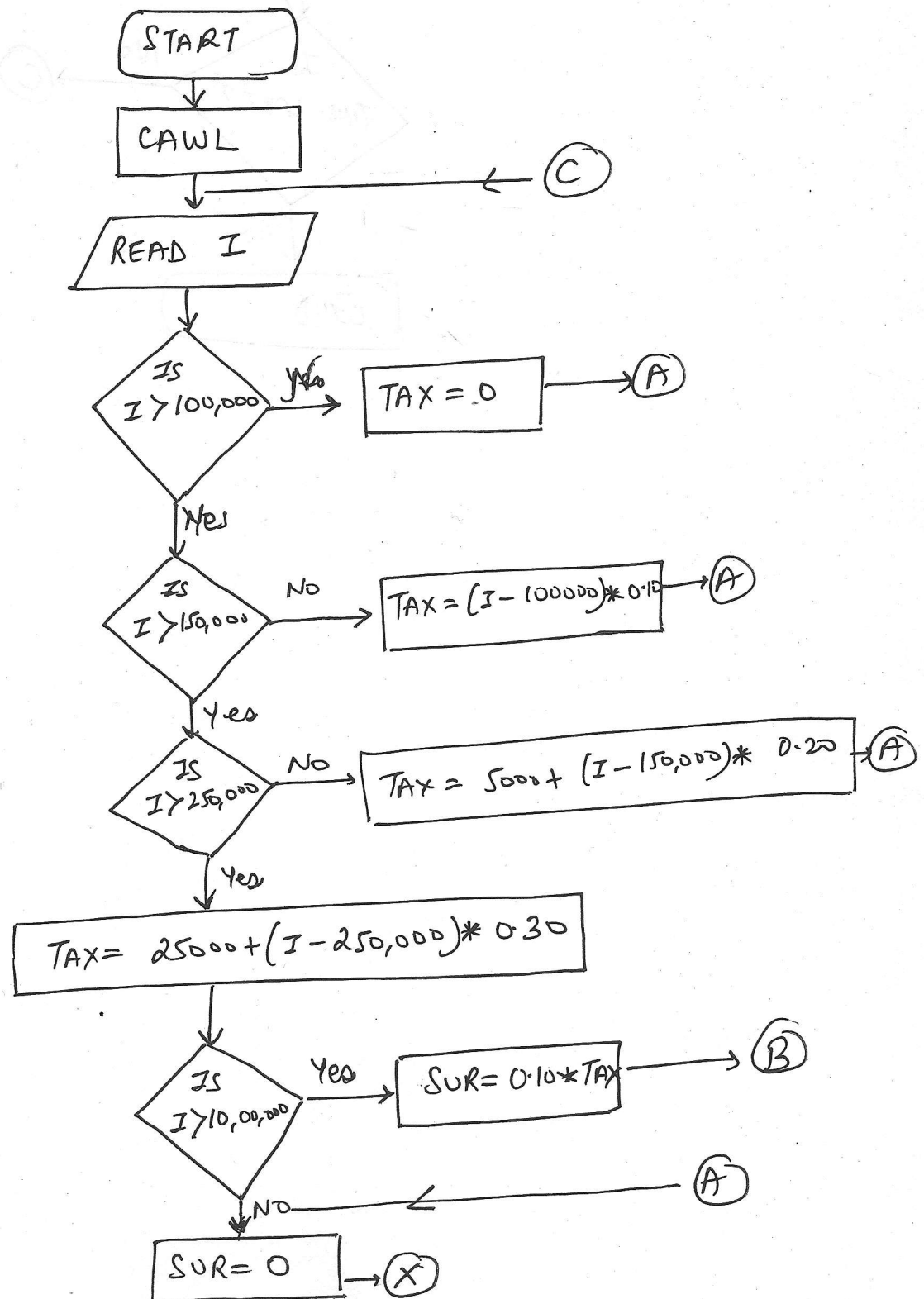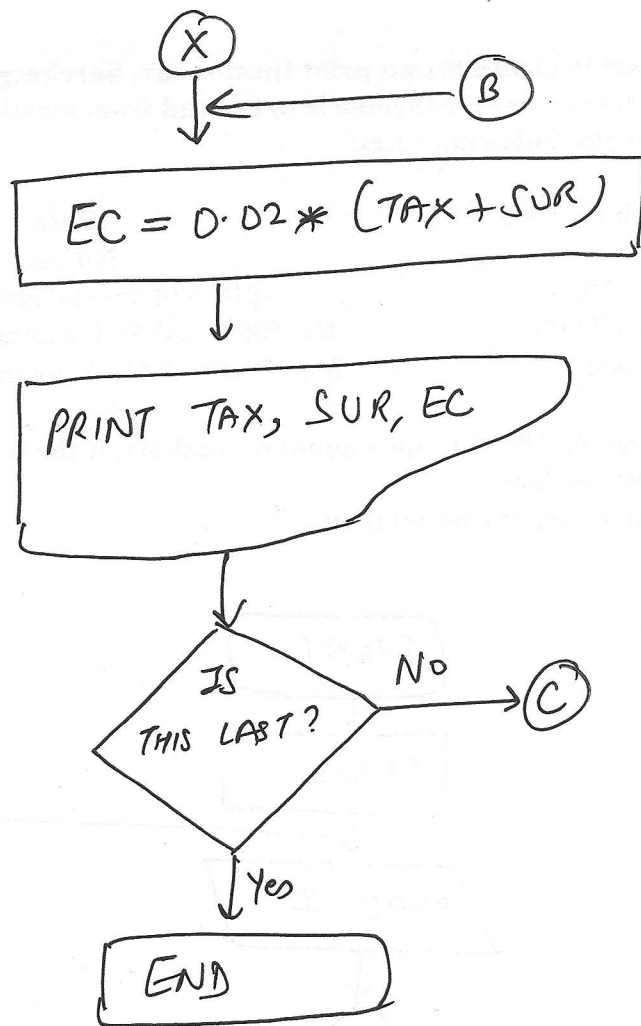
15. Consider the following flowchart:
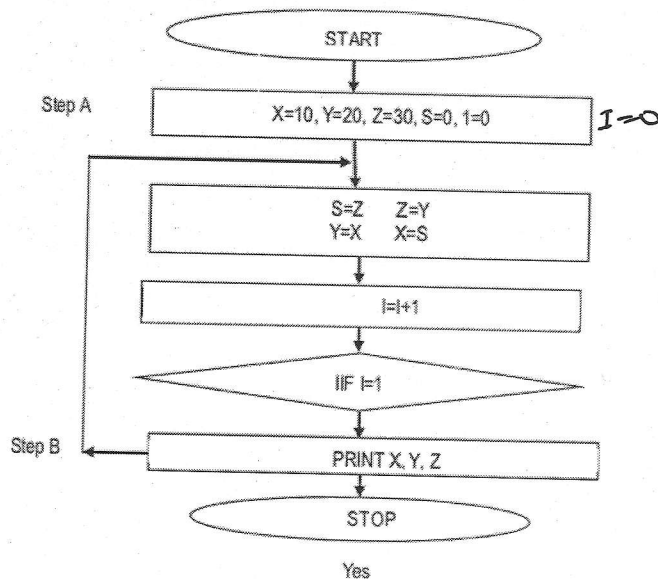
a) What is the output of the flowchart?
b) In Step B, put 1=3 in place of 1=1, what will be the output then?
c) In Step B, put 1=6 in place of 1=1, what will be the output then?
d) In the given flowchart, replace 1= 0 by 1=1 at step A. What will be the output?

Answer

Working of the Flowchart

Initial Values	Sequence of Steps	Output - 1	Output - 2	Output - 3	Output - 4	Output - 5	Output - 6
I = 0							
S = 0	S = Z	S = 30	S = 20	S = 10	S = 30	S = 20	S = 10
Z = 30	Z = Y	Z = 20	Z = 10	Z = 30	Z = 20	Z = 10	Z = 30
Y = 20	Y = X	Y = 10	Y = 30	Y = 20	Y = 10	Y = 30	Y = 20
X = 10	X = S	X = 30	X = 20	X = 10	X = 30	X = 20	X = 10
I = 0	I = I + 1	I = 1	I = 2	I = 3	I = 4	I = 5	I = 6
		Answer (a)		Answer (b)			Answer (c)

(a)   X = 30, Y = 10, Z = 20

(b)   For I = 3; X = 10, Y = 20, Z = 30

(c)   For I = 6; X = 10, Y = 20, Z = 30

(d)   For I = 1 at Step A; the flowchart will enter into an Infinite Loop as the condition I = 1 will never be true.

16. a) **Draw a flowchart to incorporate the following steps:**
    L1   N=1
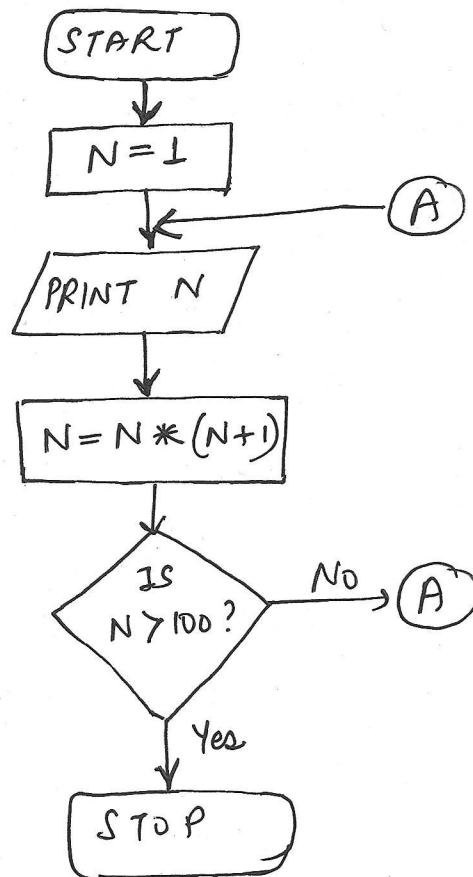   L2   Print N
    L3   N = N x (N+1)
    L4   STOP when N exceeds 100
    L5   GOTO L2

    b) **List the output for the above program.**
    c) **List the output if the above program is modified in the step L1 as N=0**

a)

```
            ( START )
                |
                v
            [ N = 1 ]  <------- (A)
                |
                v
           / PRINT  N /
                |
                v
          [ N = N * (N+1) ]
                |
                v
             < IS      >   No
             < N > 100 ? > -----> (A)
                |
               Yes
                |
                v
            ( STOP )
```

b) OUTPUT :   1, 2, 6, 42

c) If N=0, output will be 0, 0, 0, 0 ...... (Infinite loop)