SAGARMATHA ENGINEERING COLLEGE

(TU Affiliated)

Sanepa, Lalitpur

LAB NO:

LAB REPORT ON:

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Submitted By:

Name:…….

Faculty/Year:…….

Roll No:……..

Date:……..

Submitted To:

Department of electronics and Computer Engineering

Signature:……..

Date:……

LAB-07

TITLE: PROGRAMMING IN 8086 MICROPROCESSOR

OBJECTIVE:

1. To get familiar with 8086 commands and learn about character and string input and display.

PROGRAMS:

1) WAP in ALP to take character as input

```
.MODEL SMALL

.STACK 64

.DATA

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX

MOV AH, 01H

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP

END MAIN
```

2) Write an ALP to display a character.

```
.MODEL SMALL

.STACK 64

.DATA

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX
MOV AH, 02H

MOV DL, 'A'

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP

END MAIN
```

3) Write an ALP to take a character input and display it.

```
.MODEL SMALL
.STACK 64
.DATA
.CODE
MAIN PROC FAR
MOV AX, @DATA
MOV DS, AX
MOV AH, 01H
INT 21H
MOV AH, 02H
MOV DL, AL
INT 21H
MOV AX, 4C00H
INT 21H
MAIN ENDP
END MAIN
```

4) Write an ALP to take a character input and display it in next line.

```
.MODEL SMALL

.STACK 64

.DATA
.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX

MOV AH, 01H

INT 21H

MOV CL, AL

MOV AH, 02H

MOV DL, 0AH

INT 21H

MOV AH, 02H

MOV DL, 0DH

INT 21H

MOV AH, 02H

MOV DL, CL

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP

END MAIN
```

5) Write an ALP to take a character input and display it in uppercase in next line.

```
.MODEL SMALL

.STACK 64

.DATA

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX
MOV AH, 01H

INT 21H

MOV CL, AL

SUB CL, 32

MOV AH, 02H

MOV DL, 0AH

INT 21H

MOV AH, 02H

MOV DL, 0DH

INT 21H

MOV AH, 02H

MOV DL, CL

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP  END MAIN
```

6) Write an ALP to take a character input and display toggled case in next line.

```
.MODEL SMALL

.STACK 64

.DATA

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX

MOV AH, 01H

INT 21H

MOV CL, AL
CMP CL, 90

JA L1

ADD CL, 32

JMP L2

L1: SUB CL, 32 L2:

MOV AH, 02H

MOV DL, 0AH

INT 21H

MOV AH, 02H

MOV DL, 0DH

INT 21H

MOV AH, 02H

MOV DL, CL
```

```
INT 21H
MOV AX, 4C00H
INT 21H
MAIN ENDP
END MAIN
```

7) Write an ALP to display a string.

```
.MODEL SMALL

.STACK 64

.DATA

STR DB 'ARUN'

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX
MOV AH, 09H

LEA DX, STR

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP

END MAIN
```

8) Write an ALP to take a string input and display it.

```
.MODEL SMALL

.STACK 64

.DATA MAXLEN
DB 255 ACTLEN
DB ?

INPUT DB 255 DUP ('$')

.CODE

MAIN PROC FAR

MOV AX, @DATA

MOV DS, AX

MOV AH, 0AH

LEA DX, MAXLEN

INT 21H

MOV AH, 02H

MOV DL, 0AH

INT 21H

MOV AH, 02H

MOV DL, 0DH

INT 21H

MOV AH, 09H
LEA DX, INPUT

INT 21H

MOV AX, 4C00H

INT 21H

MAIN ENDP
```

END MAIN

DISCUSSION AND CONCLUSION:

This lab introduced fundamental programming concepts in the 8086 microprocessor using Assembly Language Programs (ALP). The lab covered character and string input/output, including tasks such as displaying characters, toggling case, converting to uppercase, and handling strings. These programs provided insights into using interrupts (INT 21H) for input/output operations.

In conclusion, this lab enhanced understanding of 8086 microprocessor programming by implementing various character and string manipulation tasks.

Lab-02

TITLE: DRAW EQUIVALENT CIRCUIT OF TRANSFORMER BY SHORT CIRCUIT AND OPEN CIRCUIT TEST

OBJECTIVE:

i) To find open circuit and short circuit parameter of transformer.
ii) To draw equivalent circuit of given transformer.

APPARATUS:

i) 1-ϕ transformer
ii) Ammeter
iii) Wattmeter
iv) Voltmeter
v) Connecting wires

THEORY:

A transformer is a static electric device that transfers electrical energy between circuits through electromagnetic induction. To analyze and understand transformer behaviour, its equivalent circuit is derived, representing the electrical characteristics in terms of resistances, reactances and other parameters. The short circuit (SC) and opencircuit(OC) tests are practical methods used to determine these parameters.

1) Open Circuit Test:

i) Conducted by applying rated voltage to the primary winding while keeping the secondary winding open.
ii) It determines the core (magnetizing) losses, which are mainly due to hysteresis and eddy currents in core.
iii) From this test, parameters like magnetizing reactance (X_0) and core loss resistance (R_0) are derived.

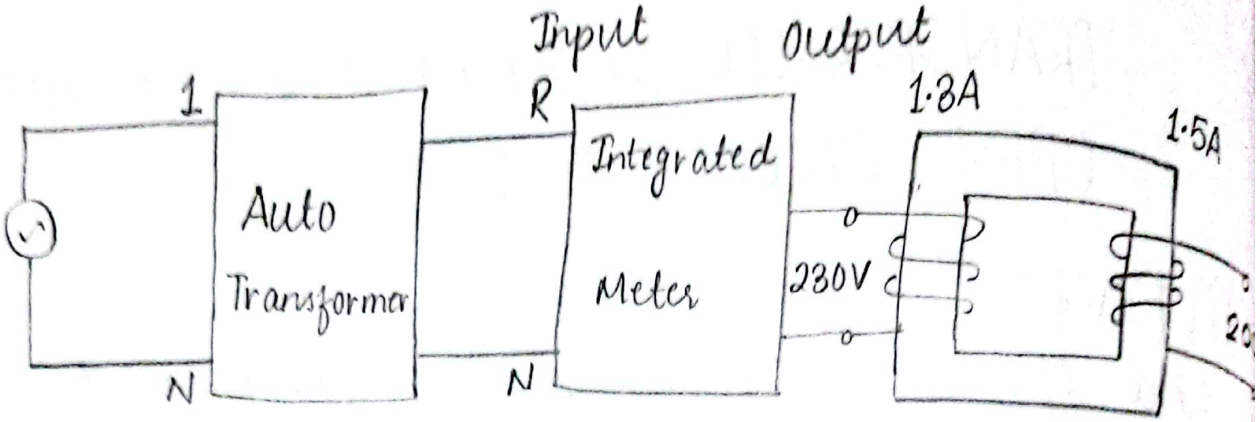

Fig (i): Open Circuit Test diagram

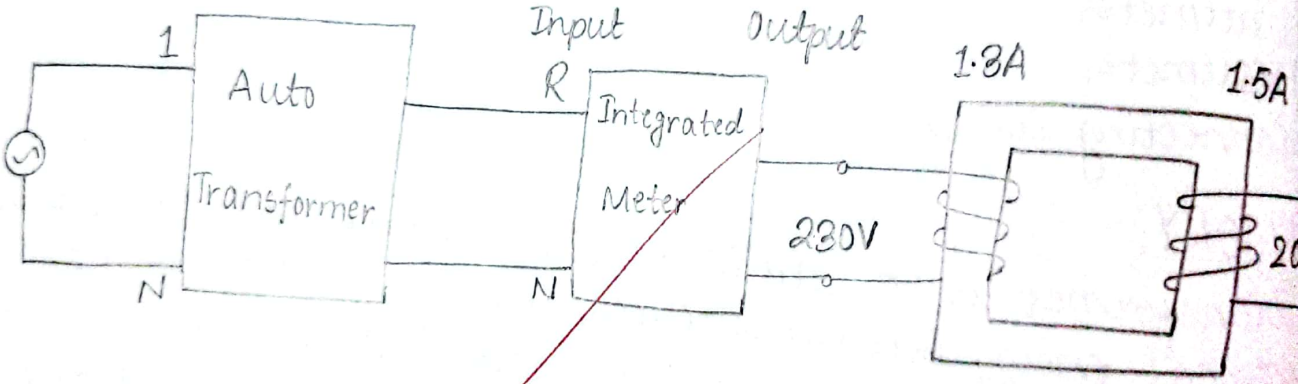

Fig (ii): Short Circuit Test diagram

2) Short Circuit Test:

i) Performed by short-circuiting the secondary winding and applying a reduced voltage to the primary winding to produce full-load current.

ii) This test determines the copper losses in winding and helps calculate the equivalent impedence (Z_{eq}) and its components equivalent resistance (R_{eq}) and reactance (X_{eq}).

By using these parameters, we can make an equivalent circuit of transformer.

OBSERVATION TABLE:

i) Open Circuit Test:

SN	I_o (A)	V_o (V)	P_o (W)
1	0.11	230	8
2	0.137	200	9
3	0.241	115	9

ii) Short Circuit Test:

SN	I_{sc} (A)	V_{sc} (V)	P_{sc} (W)
1	1.3	13.7	17
2	1.3	10.9	14
3	1.3	5.1	6

CALCULATION:

i) For Open circuit test:

$$\cos\phi_o = \frac{P_o}{V_o I_o}$$

$$\therefore \cos\phi_{o1} = \frac{8}{230 \times 0.11} = 0.316$$

$$\cos\phi_{o2} = \frac{9}{200 \times 0.137} = 0.328$$

$$\cos\phi_{o3} = \frac{9}{115 \times 0.241} = 0.324$$

$I_w = I_0 \cos\phi$

$\therefore I_{w_1} = 0.11 \times 0.316 = 0.035A$

$I_{w_2} = 0.137 \times 0.328 = 0.045A$

$I_{w_3} = 0.241 \times 0.324 = 0.078A$

$I_\mu = I_0 \sin\phi$

$I_{\mu_1} = 0.11 \times 0.949 = 0.104A$

$I_{\mu_2} = 0.137 \times 0.945 = 0.129A$

$I_{\mu_3} = 0.241 \times 0.946 = 0.228A$

$R_0 = \frac{V_1}{I_w}$

$R_{01} = \frac{230}{0.035} = 6.57 \times 10^3 \Omega$

$R_{02} = \frac{200}{0.045} = 4.44 \times 10^3 \Omega$

$R_{03} = \frac{115}{0.078} = 1.47 \times 10^3 \Omega$

$X_0 = \frac{V_1}{I_\mu}$

$X_{01} = \frac{230}{0.104} = 2.212 \times 10^3 \Omega$

$X_{02} = \frac{200}{0.129} = 1.55 \times 10^3 \Omega$

$X_{03} = \frac{115}{0.228} = 504.39 \Omega$

Mean $R_0 = \frac{(6.57 + 4.44 + 1.47) \times 10^3}{3} = 4160 \Omega$

Mean $X_0 = \frac{2.212 \times 10^3 + 1.55 \times 10^3 + 504.39}{3} = 1422.13 \Omega$

ii) For short circuit test:

$R_{eq} = \frac{P_{sc}}{I_{sc}^2}$

$R_{eq_1} = \frac{17}{(1.3)^2} = 10.06 \Omega$

$R_{eq_2} = \frac{14}{(1.3)^2} = 8.28 \Omega$

$R_{eq_3} = \frac{6}{(1.3)^2} = 3.55 \Omega$

$Z_{eq} = \frac{V_{sc}}{I_{sc}}$

$Z_{eq_1} = \frac{13.7}{1.3} = 10.54 \Omega$

$Z_{eq_2} = \frac{10.9}{1.3} = 8.38 \Omega$

$Z_{eq_3} = \frac{5.1}{1.3} = 3.92$

Mean $R_{eq} = \frac{10.06 + 8.28 + 3.55}{3} = 7.3 \Omega$

Mean $Z_{eq} = \frac{10.54 + 8.38 + 3.92}{3} = 7.61 \Omega$

$X_{eq} = \sqrt{Z_{eq}^2 - R_{eq}^2} = \sqrt{(7.61)^2 - (7.3)^2} = 2.15 \Omega$

RESULT:

The equivalent circuit will look like:

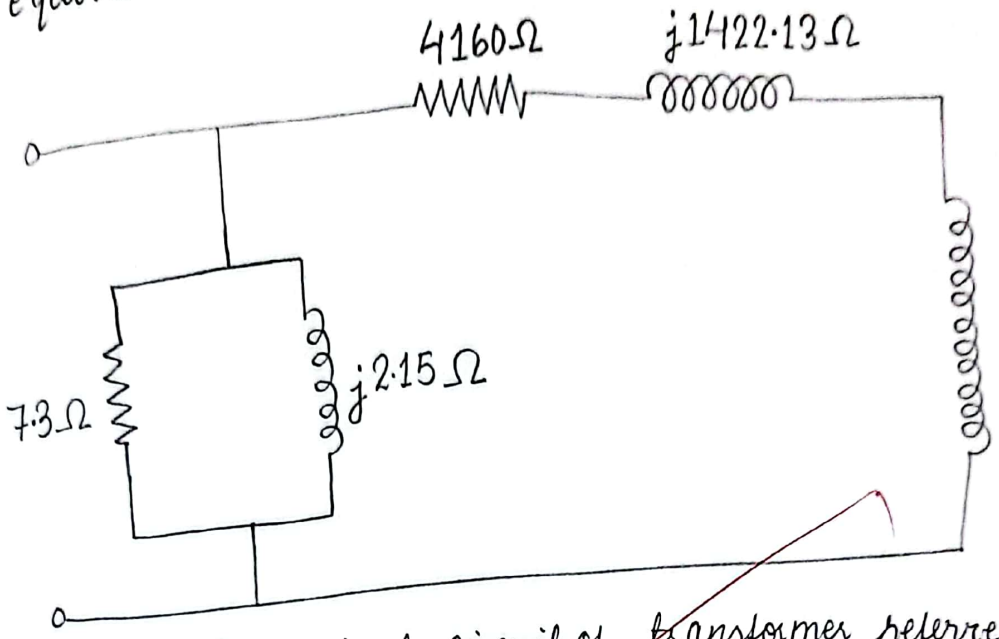

Fig: Equivalent circuit of transformer referred to primary side.