**Laboratory Attendance Slip**

**Electrical Engineering Department**

**Jadavpur University**

25, 33 → Absent

Class C8E-1 Sec A1/A2 Experiment No. 04 Lab. M/C Date 30.10.2023

Name of the Experiment Power & power factor characteristics of fluorescent lamp.

Roll Nos. Assigned (25) 26, 27, 28, 29, 30, 31, 32, (33) 34, 35, 36.

Signature of Teacher [signature] Date 30-10-23

# JADAVPUR UNIVERSITY

## Faculty of Engineering & Technology

....Electrical... Engg. Laboratory

Name TATHAGATA SUR

Class CSE-UG1 Sec. A1 Roll No. 002310501030

Date of Experiment 30/10/2023 Date of Submission 06/11/2023

Marks Obtained ..... Signature of Examiner .....

| NAME | CO-WORKER | ROLL |
|---|---|---|
| | EKORSHI CHAUDHURI | 002310501034 |
| | ANIRUDH MODI | 002310501031 |
| | KUSHAL BERA | 002310501035 |
| | MOURYA SAHA | 002310501036 |
| | PRATYAY KAR | 002310501027 |

Experiment No. 04

Commence at ..... Completed at .....

Name of Teacher concerned

TITLE: POWER & POWER FACTOR CHARACTERISTICS OF FLUORESCENT LAMP

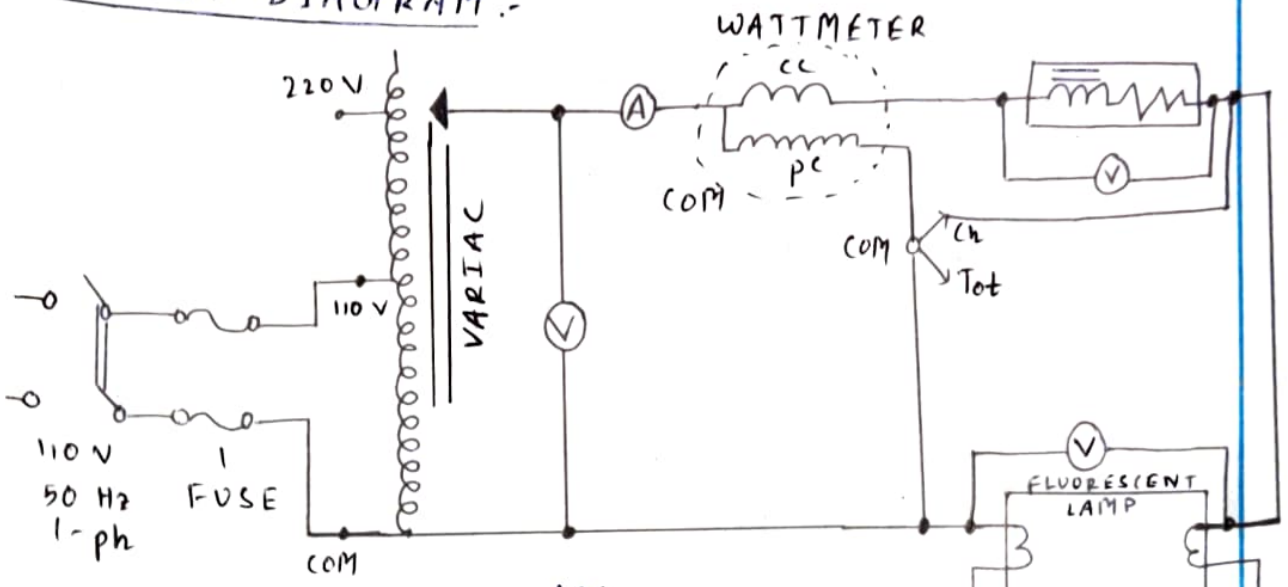
OBJECT: To obtain the power consumption and power factor of a fluorescent lamp when operated at different voltages.

## EXPERIMENT NO: 04

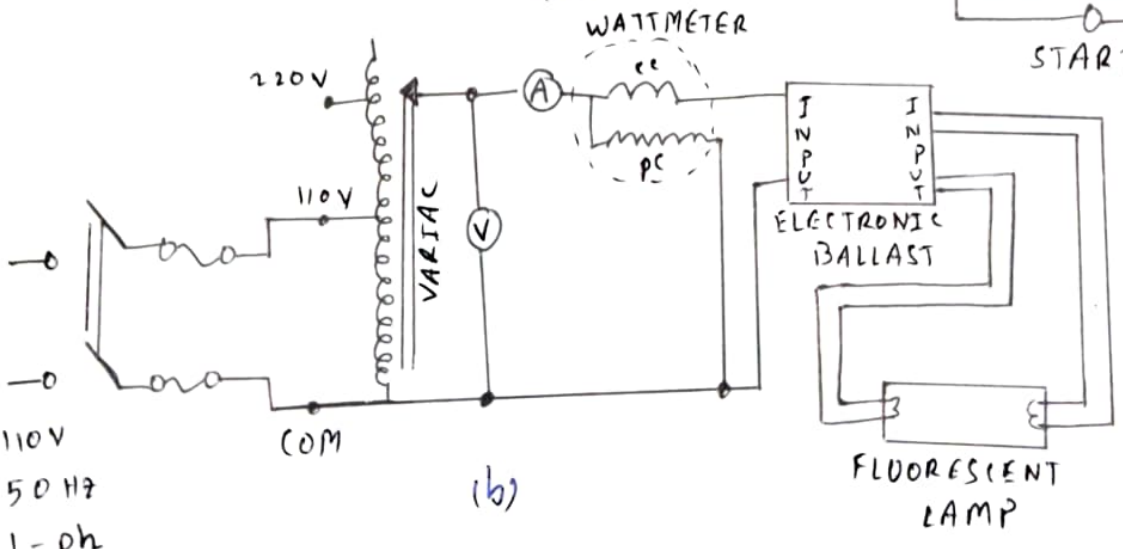
**TITLE:-** POWER AND POWER FACTOR CHARACTERISTICS OF FLUORESCENT LAMP

**OBJECTIVE:-** To obtain the power consumption and power factor of a fluorescent lamp when operated at different voltages.

**CIRCUIT DIAGRAM:-**




(a)




(b)

## APPARATUS LIST:

| Sl. No. | APPARATUS | QTY | RANGE/RATING | MAKER'S NAME | MAKER'S NO. |
|---|---|---|---|---|---|
| 1. | AC Voltmeter | 3 | 1) 0-150, 0-300, 0-600 V<br>2) 0-150, 0-300, 0-600V<br>3) 0-150, 0-300, 0-600V | 1) MECO-V<br>2) Automatic E.I<br>3) Automatic E.I. | 1) 8557<br>2) 2/76/7855/2<br>3) MHGE B305 |
| 2. | Ammeter | 1 | 0-1<br>0-2 | Automatic Electric Ltd. | 10/91/15247/46 |
| 3. | Wattmeter | 1 | 0-150 | MECO-V | 3534/2/23 |
| 4. | Fluorescent bulb | 1 | 40W, 56 Hz, 220 V | Philips | - |
| 5. | Choke<br>(i) Inductive Ballast | 1 | TLP 36/1 x TL 40W | Philips | - |
| | (ii) Electronic Ballast | 1 | TLD 18/2 x TL 20W | Philips | - |
| 6. | STARTER | 1 | 20-65 W | Philips | - |
| 7. | VARIAC | 1 | 0-270 W | Automatic Electric Limited | 1210/05233(9)/47 |

## OBSERVATIONS AND CALCULATIONS:

### RUN. I

Striking voltage: 200 V

| Supply voltage $V_i$ (V) | Line current $I_L$ (A) | Voltage across F.L. $V_{FL}$ (V) | Voltage across choke $V_{ch}$ (V) | Power consumed by Ballast $P_{ch}$ (W) | Total power consumed $P_T$ (W) | Power consumed by F.L. (W) $(P_{FL} = P_T - P_{ch})$ | Total power factor $\left(= \frac{P_T}{V_i I_L}\right)$ | Power factor of choke $\left(= \frac{P_{ch}}{V_{ch} I_L}\right)$ | Power factor of F.L. $\left(= \frac{P_{FL}}{V_{FL} \cdot I_L}\right)$ |
|---|---|---|---|---|---|---|---|---|---|
| 200 | 0.21 | 122 | 128 | 8 | 26 | 18 | 0.619 | 0.298 | 0.702 |
| 205 | 0.24 | 121 | 136 | 8 | 36 | 28 | 0.732 | 0.245 | 0.964 |
| 210 | 0.25 | 122 | 142 | 10 | 35 | 25 | 0.666 | 0.282 | 0.820 |
| 215 | 0.27 | 120 | 150 | 10 | 38 | 28 | 0.655 | 0.247 | 0.864 |
| 220 | 0.28 | 120 | 156 | 12 | 40 | 28 | 0.649 | 0.275 | 0.833 |
| 225 | 0.29 | 119 | 164 | 12 | 41 | 29 | 0.628 | 0.252 | 0.840 |
| 230 | 0.30 | 119 | 170 | 14 | 42 | 28 | 0.609 | 0.274 | 0.784 |

Extinguish Voltage = 150 V

RUN-2

Striking voltage = 48 V

| Supply voltage ($V_i$) (in V) | Line current ($I_L$) (in A) | Wattmeter ($P_T$) (in W) | Power factor = $\frac{P_T}{V_i \cdot I_L}$ |
|---|---|---|---|
| 230 | 0.17 | 38 | 0.972 |

Extinguish Voltage = 20 V

Comparison at 230 V ($V_i$)

| Supply voltage ($V_i$) (V) | | Input current ($I_L$) (A) | Total power consumed ($P_i$) (W) | Power factor = $\frac{P_T}{V_i I_L}$ |
|---|---|---|---|---|
| Run 1 | 230 | 0.3 | 42 | 0.609 |
| Run 2 | 230 | 0.17 | 38 | 0.972 |

Reasons:-

The electronic ballast circuit has power factor approximately 1. On the other hand, inductive ballast circuit has power factor very less than 1. Thus, electronic ballast circuit is more efficient, utilizing power more efficiently than inductive ballast circuit

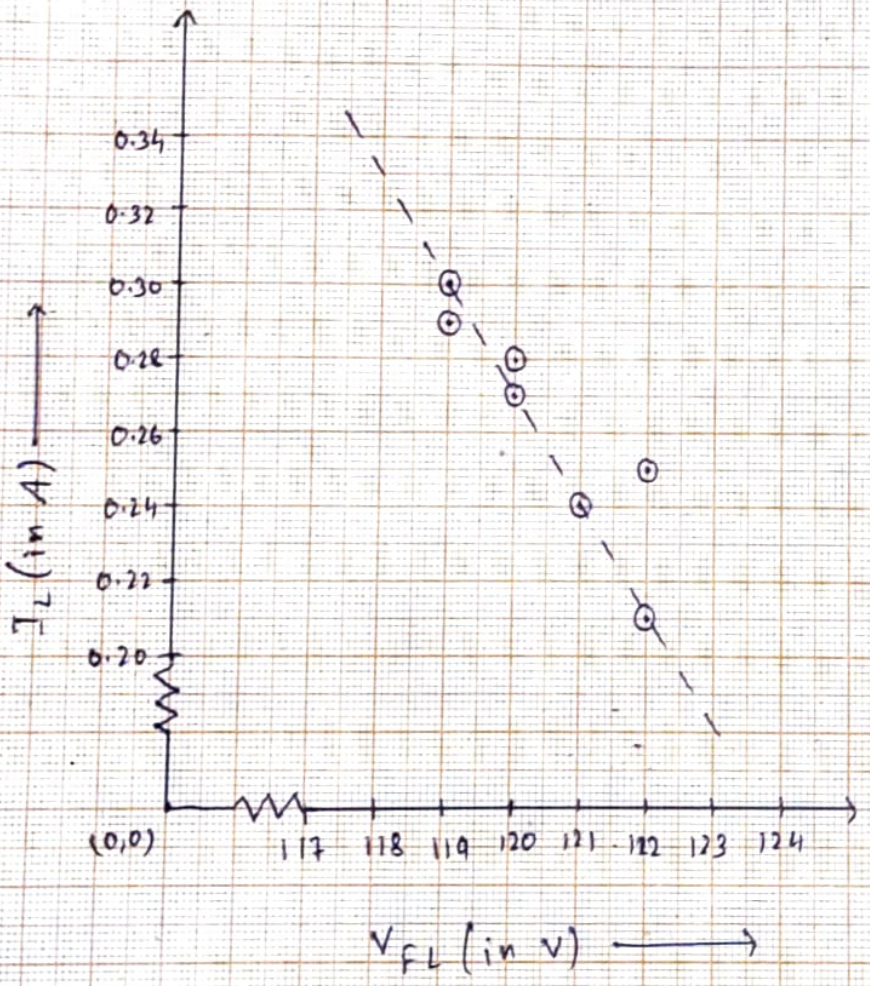
Scale:-

Along x-axis,

1 S.D. = 0.1 V

Along y-axis,

1 S.D. = 0.02 A




$I_L$ vs. $V_{FL}$ curve for fluorescent lamp

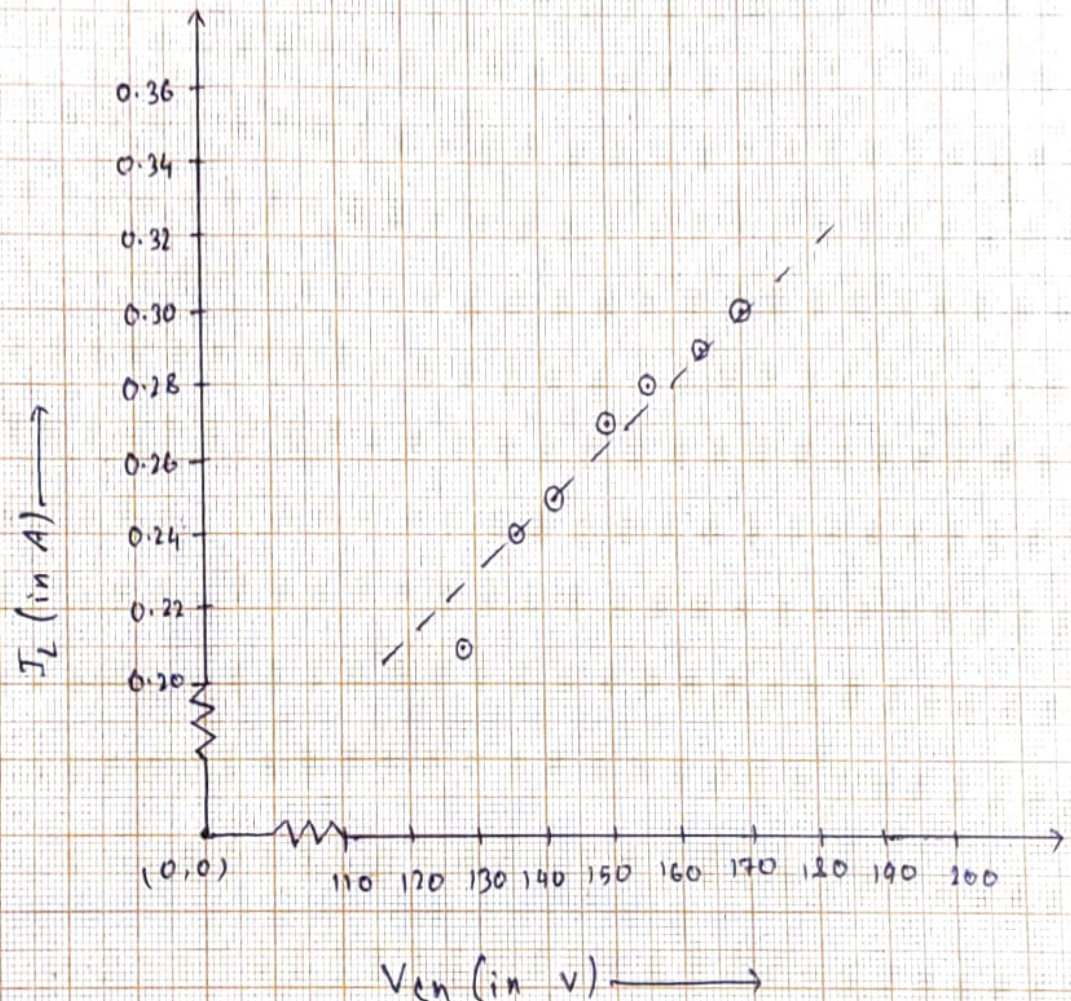
Scale :-

Along x-axis,

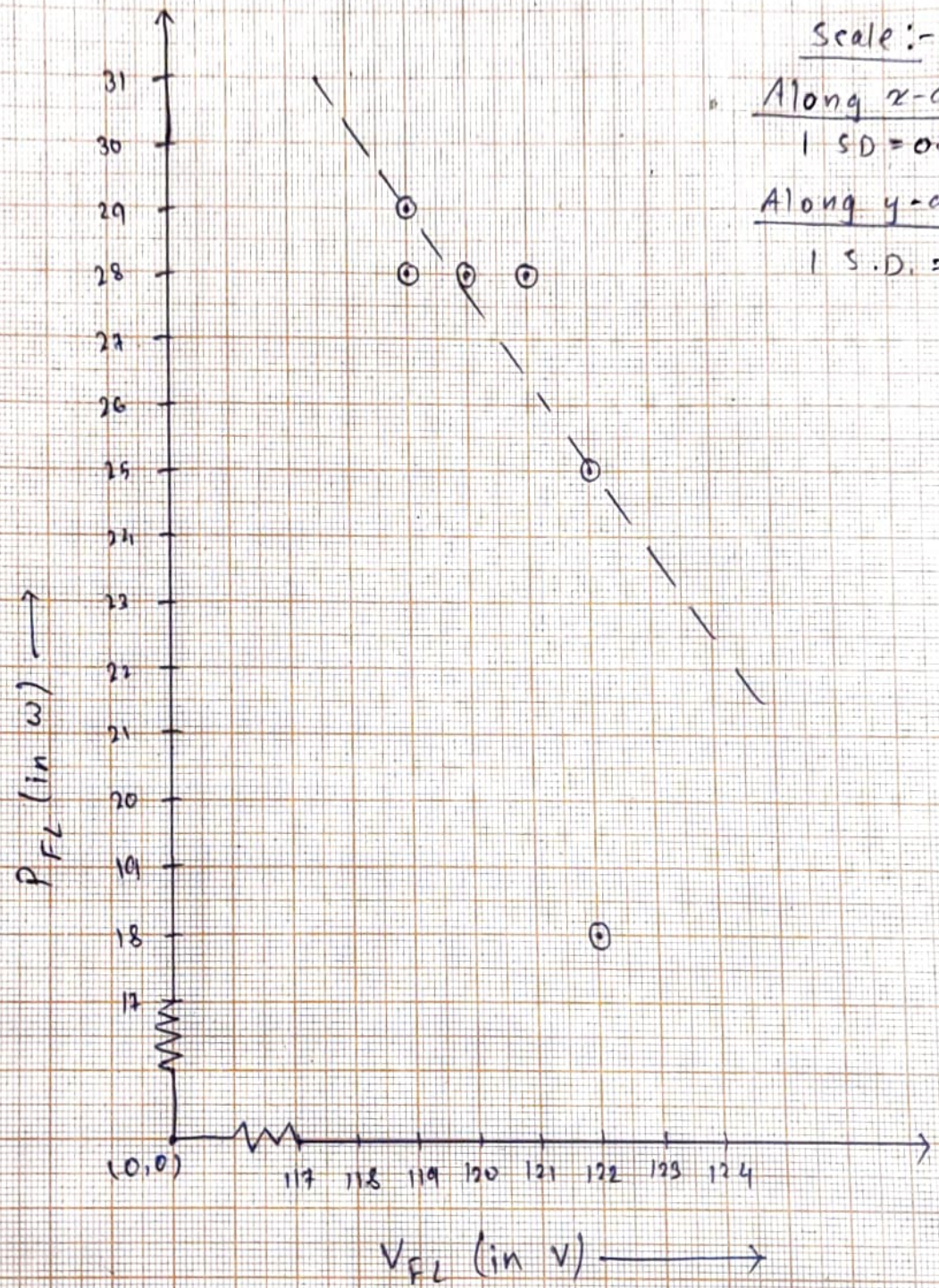
10 S.D. = 10 V

Along y-axis,

10 S.D. = 0.02 A




$I_L$ vs. $V_{cn}$ curve for choke coil




$P_{FL}$ vs $V_{FL}$ curve for Fluorescent Lamp

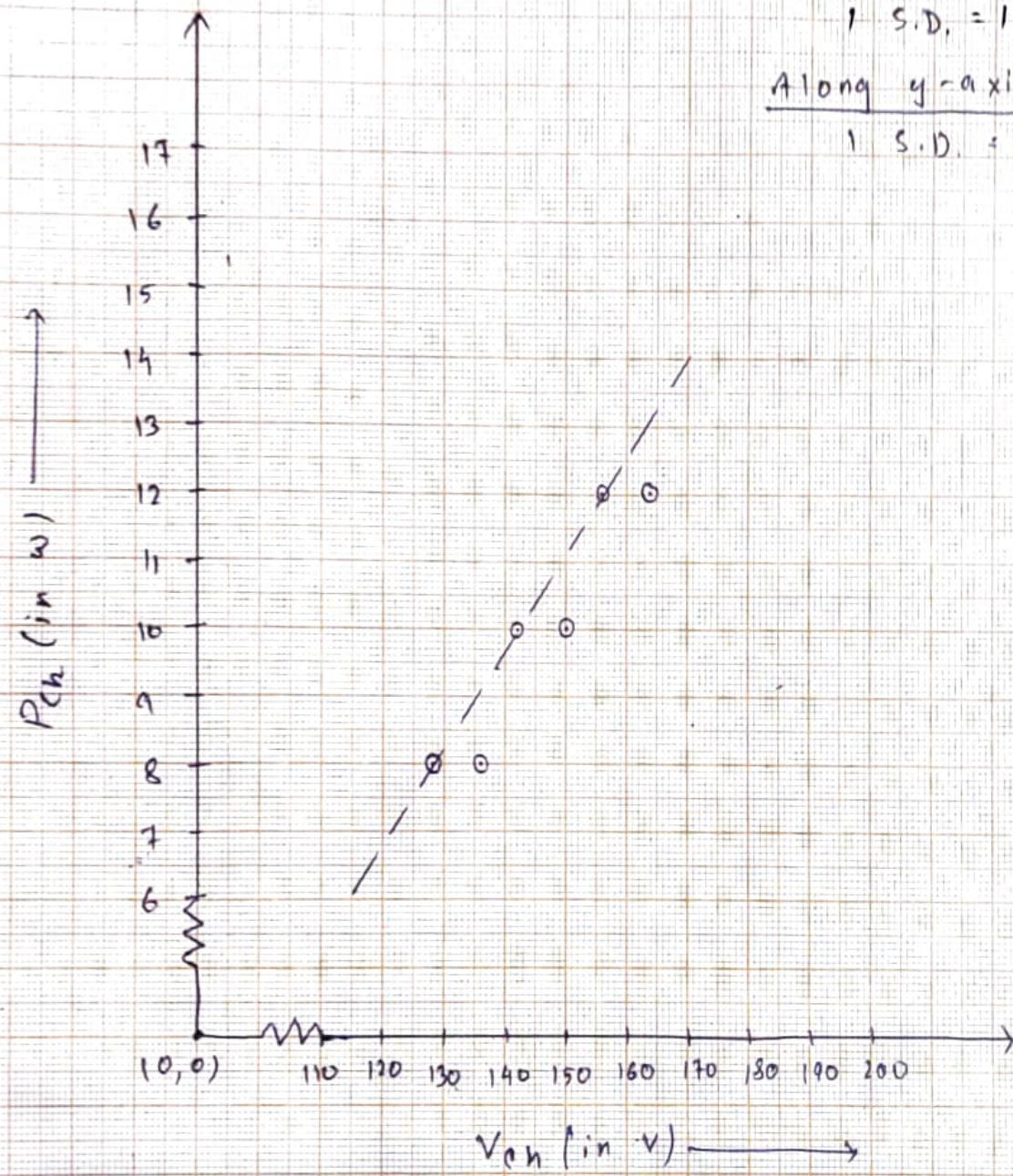
Scale :-

Along x-axis,

1 S.D. = 1 V

Along y-axis,

1 S.D. = 0.1 W




$P_{ch}$ vs $V_{ch}$ curve for choke coil