Practical No. 11: Use of Multimeter for measurement of voltage, current (AC, DC), resistance and continuity of the given electrical circuit.

I Practical Significance:

Multimeter is used for measurement of voltage, current in AC and DC circuit. Also resistance and continuity of the given electrical circuit can be checked by using multimeter.

II Industry/Employer Expected Outcome(s):

In the industry, Electrical Engineering diploma graduate are expected to handle digital multimeter to measure basic parameters like voltage, current and resistance of the field devices. Therefore this practical will help you to acquire necessary skills.

III Course Level Learning Outcome(s):

Use different electrical machines by making connections.

IV Laboratory Learning Outcome(s):

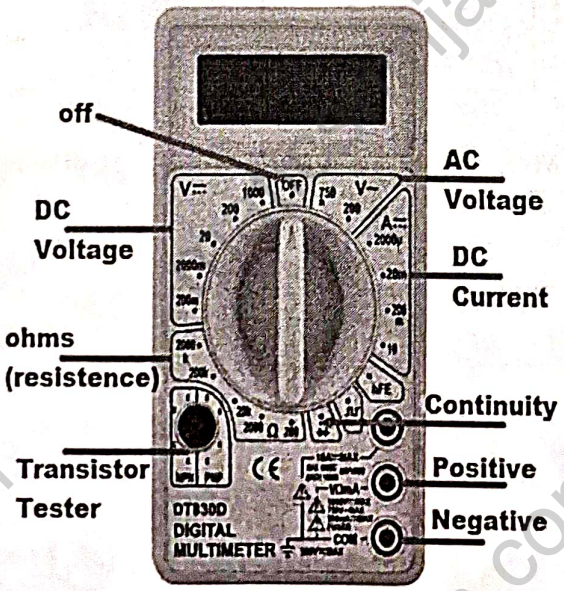
Use of Multimeter for measurement.

V Relevant Affective Domain related outcome(s):

Follow safety electrical rules for safe practices.

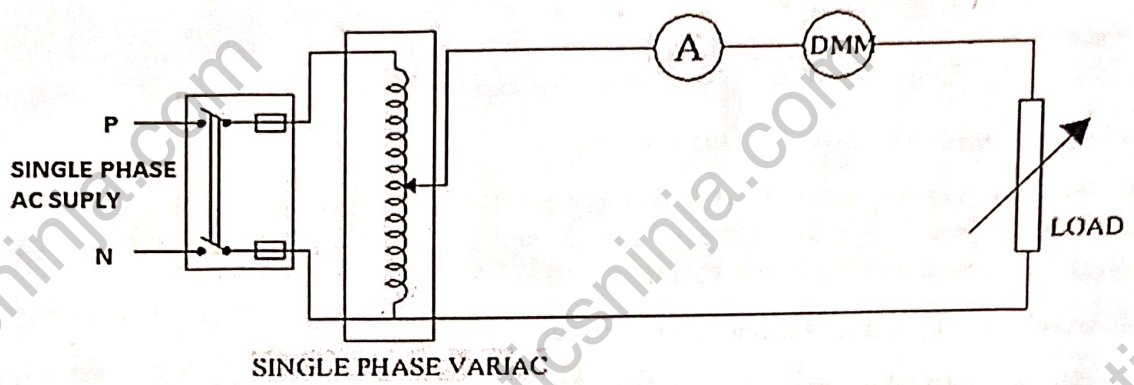
VI Relevant Theoretical Background:

Multimeter is a portable multi range instrument used for measurement of current voltage and resistance. Front panel of digital multimeter consists of Display panel, selector switch, common input connector.

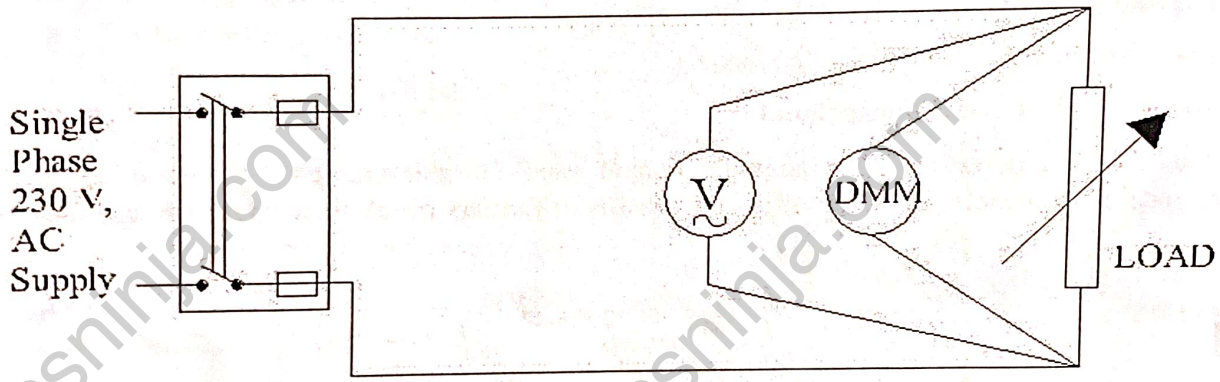


VII Circuit diagram:

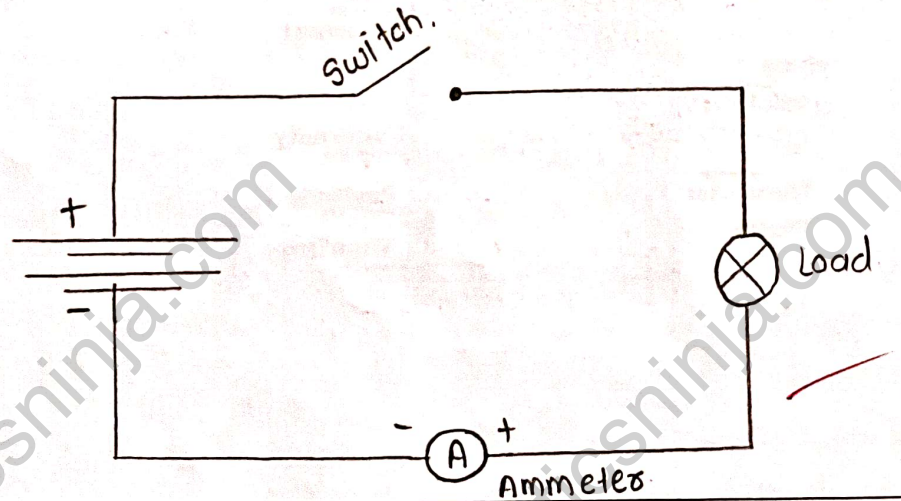
a) AC Current Measurement



b) AC Voltage Measurement

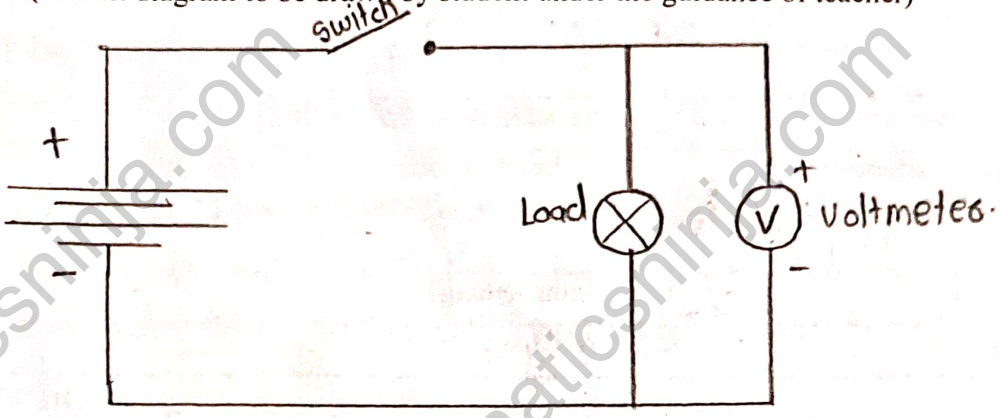


c) DC Current Measurement (Circuit diagram to be drawn by student under the guidance of teacher)

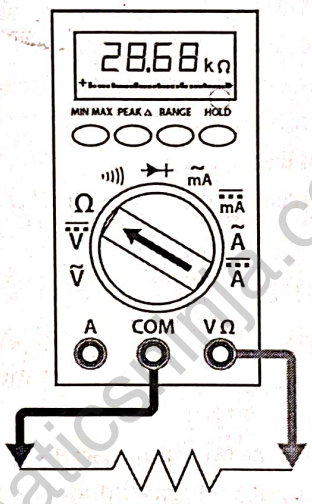


d) DC Voltage Measurement

(Circuit diagram to be drawn by student under the guidance of teacher)

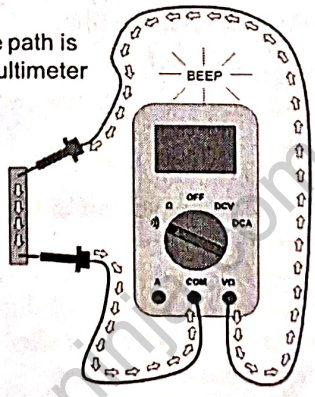


e) Resistance Measurement



f) Continuity checking

If a conductive path is formed, the multimeter will beep.



7) Set the DMM at correct AC voltmeter mode by operating selector switch, record DMM voltage reading.
8) Increase the load on by switching on one more switch of the load bank.
9) Repeat steps 6-9 for more readings.

C) DC Current Measurement

1) Connect a circuit as shown in fig. for measurment of DC current
2) Switch ON the supply.
3) keep dimmerstat at minimum position.
4) Increase the output voltage of dimerstat up to rated value.
5) Record the ammeter readings.

D) DC Voltage Measurement

1) Connect a circuit as shown in fig for measurment of DC voltage
2) Switch on the supply.
3) keep dimmerstat at minimum position.
4) Increase the output voltag of dimmerstat up to the rated value.
5) Record the voltmeter readings.

E) Resistance Measurement

1) Put the DMM on the "resistance" range. 2) select the highest range. 3) Short the two probes of the DMM. The DMM should indicate a zero resistance. 4) Connect the +ve probe of DMM to one end of the resistance & -ve to other end.
5) Mesure the resistance.

F) Continuity checking

1) Make sure all the power is off.
2) set selecter dial audible alarm symbal.
3) Touch the probes together to check the lids & observe the sound.

XI Required Resources

Sr. No.	Name of Resource	Suggested Broad Specification	Quantity
1	Single Phase variac / Dimmetet.	(0-270 V) . 4A .	1
2	Ammetes.	Suitable range PMMC / MI	1.
3	voltmetes	Suitable range PMMC / MI	1
4	Digital multimetes.	voltage : DC : 600V. AC : 600V.	1
5		current : DC : 20 A ; AC : 20 A.	
6	Lamp bank / lamp bad.	5 kW.	1
7	Rheostas.	Suitable range.	1
8	DC supply.	suitable range.	

XII Observation table:

a) AC Current Measurement

Sr. No.	Ammeter Reading	DMM Reading
1	0.3 A	1 A
2	0.5 A	1.2 A
3	2 A	2.6 A.

b) AC Voltage Measurement

Sr. No.	Voltmeter Reading	DMM Reading
1	190 V	220 V
2	200 V.	250 V
3	210 V	230. V.

c) **DC Current Measurement**

Sr. No.	Ammeter Reading	DMM Reading
1	1 A.	0.9 A
2	0.45 A	0.5 A
3	0.5 A	0.56 A

d) **DC Voltage Measurement**

Sr. No.	Voltmeter Reading	DMM Reading
1	8.45 V	9 V
2	5.75 V	6 V
3	6.75 V.	7 V
4		

e) **Resistance Measurement**

Sr. No	Resistance measured by DMM
1	6.33.33 Ω.
2	400 Ω
3	105 Ω.

f) **Checking continuity**

Sr. No	If circuit is continued alarm beeps	If circuit is open alarm doesn't beeps
1	~~At~~ ON	OFF
2	short circuit	open circuit.

c) DC Current Measurement

Sr. No.	Ammeter Reading	DMM Reading
1	1 A.	0.9 A
2	0.45 A	0.5 A
3	0.5 A	0.56 A

d) DC Voltage Measurement

Sr. No.	Voltmeter Reading	DMM Reading
1	8.45 V	9 V
2	5.75. V	6 V
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e) Resistance Measurement

Sr. No	Resistance measured by DMM
1	6.33.33 Ω.
2	400 Ω
3	105 Ω.

f) Checking continuity

Sr. No	If circuit is continued alarm beeps	If circuit is open alarm doesn't beeps
1	~~No~~ ON	OFF
2	short circuit	open circuit.

XIII Result(s):

Resistance is a ration of voltage to the current.

XIV Interpretation of results:

In digital multimeter we get exact value of parameter.

XV Conclusion and recommendation:

Hence, we learnt to use of multimeter for measurment of voltage, current (AC, DC), resistance & continuity of given electrical circuit.

XVI Practical related questions:

(Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identifies CO.)

1. List the minimum and maximum range of current that can be read with multimeter given to you.
2. State the procedure for continuity test using multi-meter.
3. State the applications of multimeter.

[Space for answers]

1] → minimum 50 UA to 2.5 mA and maximum 25 mA to 250 mA.

2) → set your multimeter to the appropiate setting (can usually continuity or ohms) & place your lead onto the two points that requires testing the device. will then tell you if a connection is present usually through beeping or an indicated voltage reading. on the display.

3] → A multimeter is test equipment used to measure two or more electrical values - voltage, current & resistance.

XVII References/Suggestions for further reading:

1. Experiments in Basic Electrical Engineering S.K.Bhattacharya K.M.Rastogi ISBN:978-81-224-1041-6 New Age International Publication
2. https://en.wikipedia.org/wiki/current_clamp
3. Electrical Measurement and Measuring Instruments U.A.Bakshi A.V.Bakshl K.A.Bakashi ISBN 9788184314380First Edition -2008Technical Publications Pune

XVIII Suggested Assessment Scheme: