



Sri Adichunchanagiri Shikshana Trust®

**S.J.C. INSTITUTE OF TECHNOLOGY
CHICKBALLAPUR - 562101**

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

BASIC ELECTRICAL ENGINEERING LAB MANUAL

SUBJECT CODE:21ELE17/27

SEMESTER:I/II

**Prepared by
MADHUKARA S
Assistant Professor**

**Reviewed by
Dr. B N Shobha
Professor & HOD ECE**

||Jai Sri Gurudev||

S. J. C. INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VISION OF THE INSTITUTE

SJCIT is committed to Quality Education, Training and Research.

MISSION OF THE INSTITUTE

- Augmenting the supply of competent Engineers and Managers
- Building Engineers and Managers with Value, Vision and Versatility
- Developing and dissemination of new Knowledge and Insights

VISION OF DEPARTMENT

To Achieve Academic Excellence in Electronics and Communication Engineering by Imparting quality Technical Education and facilitating Research Activities

MISSION OF DEPARTMENT

- Establishing State of the Art Laboratory facilities and Infrastructure to develop the spirit of Innovation and Entrepreneurship
- Nurturing the Students with Technical Expertise along with Professional Ethics to provide solutions for Social Needs
- Encourage Life Long Learning And Research among the Students and Faculty

PROGRAM EDUCATIONAL OBJECTIVES[PEOs]

After successful completion of the program, the graduates will be

PEO1: Graduates of the program will have successful technical and professional career in Engineering, Technology and multidisciplinary environments.

PEO2: Graduates of the program will utilize their knowledge, technical and communication Skills to propose optimal solutions to problems related to society in the field of Electronics and Communication.

PEO3: Graduates of the program will exhibit good interpersonal skills, leadership qualities and adapt themselves for lifelong learning.

PROGRAM OUTCOMES [Pos]**Engineering Graduates will be able to:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

BASIC ELECTRICAL ENGINEERING LABORATORY

Semester:	I/II	CIE Marks :50
Course Code :	21ELE17/27	SEE Marks :50
Teaching Hours/week(L:T:P)	0:0:2	Exam Hours:03
Credits:01		

COURSE OBJECTIVES AND OUTCOMES

Course objectives:

- Provide exposure to common electrical components such as Resistors, Capacitors & Inductors, types of wires & measuring instruments.
- Verify KCL & KVL in D.C circuits.
- Measure Power & Power factor of different types of loads.
- Measure impedance & Power factor of RL-circuit.
- Explain methods of controlling a lamp from different places, Protective device & determination of earth resistance.

Course Outcomes:

After a successful completion of the course, the student will be able to:

CO1	Identify the common electrical components & measuring instruments used for conducting experiments in electrical Laboratory.
CO2	Design & Verify D.C circuits using KCL & KVL
CO3	Compare the Power factor of Different types of Lamps.
CO4	Determine impedance & power factor of Electrical circuits.
CO5	Determine earth resistance & Demonstrate Protective devices, two-way, three-way control of lamps.

INSTRUCTIONS TO THE STUDENTS

1. Students should come with thorough preparation for the experiment to be conducted.
2. Students will not be permitted to attend the laboratory unless they bring the practical record fully completed in all respects pertaining to the experiment conducted in the previous class.
3. Experiment should be started only after the staff-in-charge has checked the circuit diagram.
4. All the calculations should be made in the observation book. Specimen calculations for one set of readings have to be shown in the practical record.
5. Wherever graphs are to be drawn, A-4 size graphs only should be used and the same should be firmly attached to the practical record.
6. Practical record should be neatly maintained.
7. The students should obtain the signature of the staff-in-charge in the observation/manual book after completing each experiment.
8. Theory regarding each experiment should be written in the practical record before procedure in your own words.
9. Come prepared to the lab with relevant theory about the experiment you are conducting.
10. Do not use the multi meter, if the low battery indication comes.

Expt. No.	Particulars	Page No	Date Of Conduction	Faculty Sign
1	Verification of Kirchhoff's Laws			
2	Measurement of Voltage, Current, Power and Power Factor of Different Lamps			
3	Measurement of Resistance and Inductance of a Coil by Three Voltmeter Method			
4	Determination of Phase and Line Quantities in Three Phase Star and Delta Connected Loads			
5	Measurement of 3-phase Power using two Watt-Meter Method			
6	Two-way and Three Way Control of Lamp and Formation of Truth Table.			
7	Study the Effect of Open and Short Circuit			
8	Measurement of Earth-Resistance			
9	Verification of Maximum Power Transfer Theorem			
10	Determination of Efficiency of a Single Phase Transformer by Direct Load Test			

EXPERIMENT NO. 1**VERIFICATION OF KIRCHOFF'S LAWS**

AIM: To verify KVL and KCL for DC Circuits

COMPONENTS REQUIRED:

Resistors: $330\Omega/5W$ -1no,
 $330\Omega/1W$ -1no,
 $220\Omega/1W$ -2no
 $1K\Omega$ -1no

Voltmeters: (0-10V)-3no

Ammeters: (0-50ma)-3no

DC Power supply: 1no

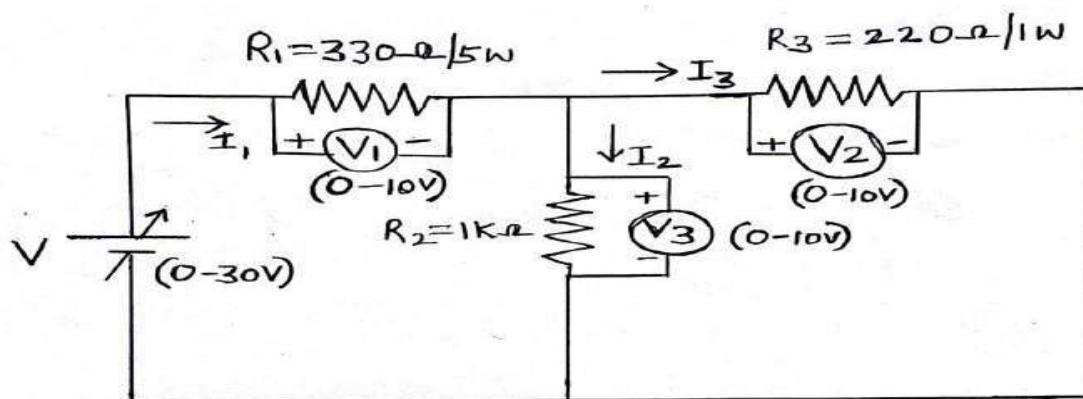
CIRCUIT DIAGRAM FOR KVL:

Fig-1: Circuit diagram to verify KVL

DESIGN: Total Resistance: $R_T = R_1 + R_2 \parallel R_3 = 510\Omega$.

Maximum current: $I_1 = 30/510 = 0.0588A$.

Power dissipation across the resistor R_1 : $W_1 = I_1^2 \times R_1 = 1.141W$; use 5W

Power dissipation across the resistor R_2 : $I_2 = (I_1 \times 220)/1220 = 0.0107A$,

$W_2 = I_2^2 \times R_2 = 0.112W$ use half watt

Power dissipation across the resistor R_3 :

$I_3 = I_1 - I_2 = 0.0481A$, $W_3 = I_3^2 \times R_3 = 0.511W$ use 1W Resistor.

CONDUCTION PROCEDURE FOR KVL:

- 1) Rig up the circuit as shown in the Fig-1 with specified components.
- 2) Slowly vary supply voltage 'V' in the step of 5 V and note down the corresponding voltage V₁, V₂ and V₃ and tabulate the readings.
- 3) Verify KVL so that $V = V_1 + V_2$ or $V_1 + V_3$.
- 4) Repeat step 2 and 3 for the maximum supply voltage V of 30V.

TABULAR COLOUMN

Sl. no	Supply voltage V	V ₁ in V	V ₂ in V	V ₃ in V	KVL; $V = V_1 + V_2$ or $V_1 + V_3$
1	5V				
2	10V				
3	15V				
4	20V				

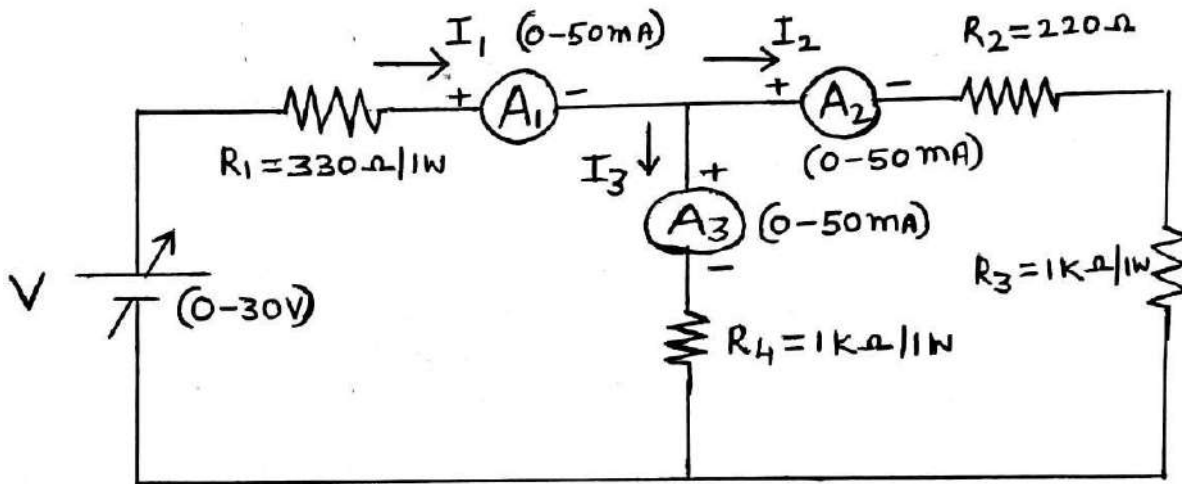
CIRCUIT DIAGRAM FOR KCL:

Fig-2: Circuit diagram to verify KCL

DESIGN: Total Resistance $R_T = (R_1 + R_4 \parallel (R_2 + R_3)) = 880 \Omega$

Maximum Current $I_1 = 30/880 = 0.0341 \text{ A}$

Power dissipation across R_1 , $W_1 = I_1^2 \times R_1 = 0.383 \text{ W}$; Use 1W resistor.

$I_2 = (I_1 \times R_4) / (R_4 + R_2 + R_3) = 0.0153 \text{ A}$

Power dissipation across R_2 , $W_2 = I_2^2 \times R_2 = 0.051 \text{ W}$ use half watt resistor.

Power dissipation across R_3 , $W_3 = I_2^2 \times R_3 = 0.237 \text{ W}$; Use 1W Resistor.

$I_3 = I_1 - I_2 = 0.0188 \text{ A}$.

Power dissipation across R_4 , $W_4 = I_3^2 \times R_4 = 0.353 \text{ W}$; Use 1W Resistor.

CONDUCTION PROCEDURE FOR KCL:

- 1) Rig up the circuit as shown in the Fig-2 with specified components.
- 2) Slowly vary supply voltage 'V' in the step of 5V and note down the corresponding current I_1, I_2 & I_3 and tabulate the readings.
- 3) Verify KCL so that $I_1 = I_2 + I_3$.
- 4) Repeat step 2 & 3 for the maximum supply voltage V of 30V.

TABULAR COLOUMN

Sl. no	Supply voltage V	I ₁ in amps	I ₂ in amps	I ₃ in amps	KCL; I ₁ =I ₂ +I ₃
1	5V				
2	10V				
3	15V				
4	20V				
5	25V				
6	30V				

Result: KVL and KCL for DC circuits is verified.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 2**MEASUREMENT OF VOLTAGE, CURRENT, POWER AND POWER FACTOR OF DIFFERENT LAMPS**

Aim: To study and measure electrical Quantities for different types of lamps (Incandescent, Fluorescent and LED Lamps)

COMPONENTS REQUIRED:

- 1) Trainer kit
- 2) MCB
- 3) Fuse
- 4) Voltmeter
- 5) Ammeter
- 6) Auto transformer
- 7) Different types of Lamps.

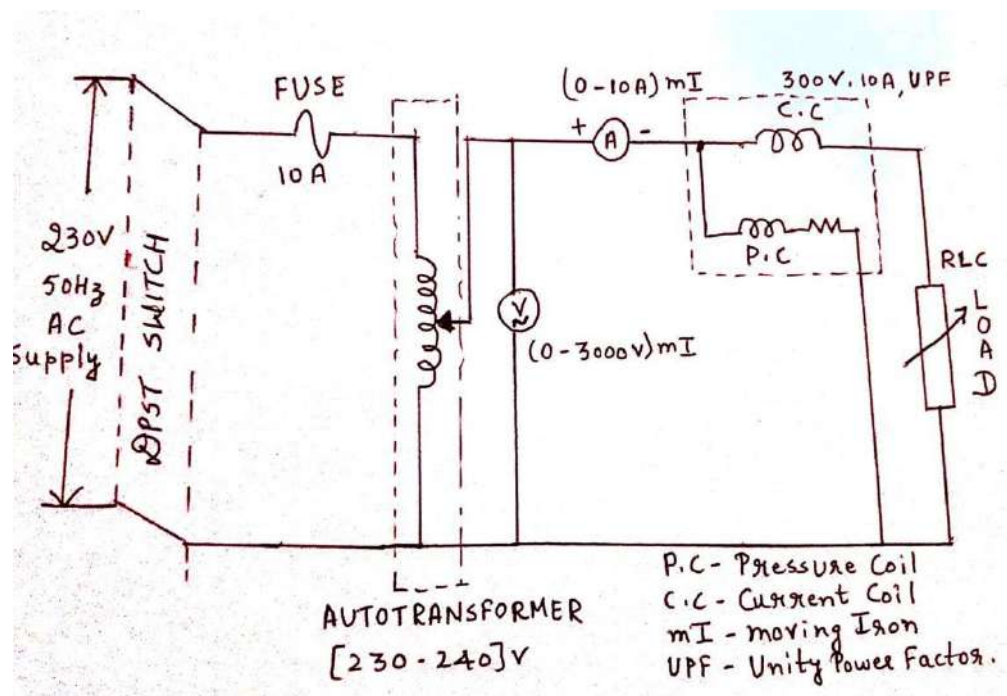
Circuit Diagram

Fig-1: Circuit diagram for Experiment no.2

CONDUCTION PROCEDURE:

- 1) Rig up the circuit for the LED Load as shown in the Fig-1.
- 2) Keep auto transformer in minimum position before switch on DPST switch.
- 3) Switch on the DPST switch.
- 4) Vary the Auto transformer, so that the Voltmeter shows the readings above 60V as response.
- 5) Set the voltmeter readings to 70V by varying auto transformer, note down the voltage and Current I from Voltmeter and Ammeter respectively and tabulate.
- 6) Note down the frequency, Cos ϕ and Power(W) from Multi function meter and tabulate.
- 7) Repeat steps 5 and 6 for the voltmeter reading 80V and 90V and soon.

Tabular column1– LED bulb

Sl.No	V(volts)	I(amps)	Freq in Hz	Cos ϕ	W(watt)
1.					
2					
3					

Tabular column2– Incandescent Lamp

Sl.No	V(volts)	I(amps)	Freq in Hz	Cos ϕ	W(watt)
1.					
2					
3					

Tabular column3– CFL (Fluorescent bulb)

Sl.No	V(volts)	I(amps)	Freq in Hz	Cos ϕ	W(watt)
1.					
2					
3					

Calculate

- 1) Apparent Power = VI =-----
- 2) Real Power = VI Cos ϕ = -----
- 3) Power factor (Cos ϕ) = Real Power/Apparent Power

- Repeat the same procedure for Incandescent Lamp and Fluorescent lamp load.

Result:

Electrical quantities of LED, incandescent and fluorescent lamps are found out.

It has been observed that as LED bulb consumes less Power and it is more efficient.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 3
MEASUREMENT OF RESISTANCE & INDUCTANCE OF A COIL BY
THREE VOLT METER METHOD

AIM: TO MEASURE THE RESISTANCE & INDUCTANCE OF THE COIL BY 3-VOLT METER METHOD

COMPONENTS REQUIRED:

1	MCB	16 Amps	1no
2	Auto Transformer	6 Amps	1no
3	Voltmeter	(0-300V) AC	3nos
4	Ammeter	(0-50A) AC	1no
5	Isolation Transformer	230V/115V-1 KVA	1no
6	Rheostat	500Ω/1.8Amps	1no
7	Power indication lamp	Pilot Lamp	2no

CIRCUIT DIAGRAM:

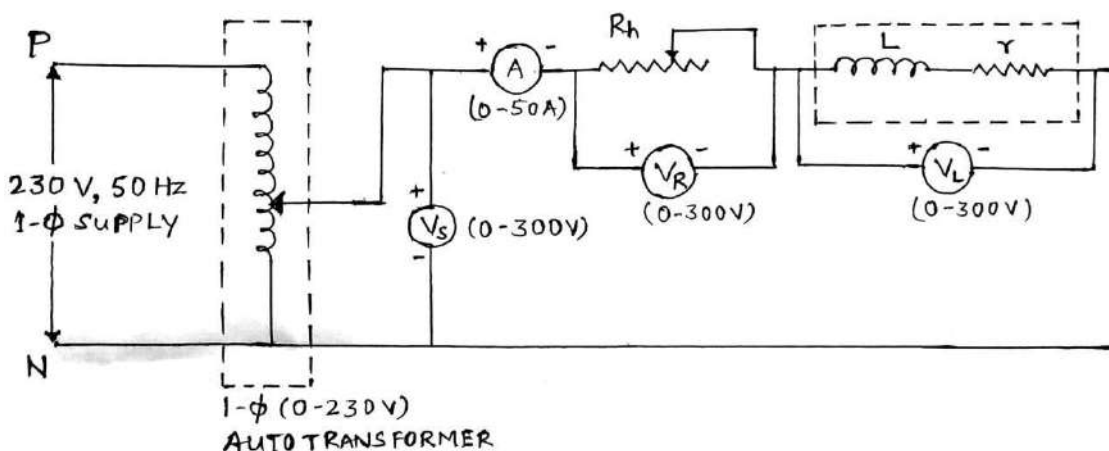


FIG-1: Experiment no.3

CONDUCTION PROCEDURE:

- 1) Rig up the circuit as shown in the FIG-1.
- 2) Keep the auto transformer in minimum position before switch on the supply.
- 3) Keep the Rheostat in maximum.
- 4) Then switch on the power supply keep the auto transformer to 140V.
- 5) Observe the readings of VS, VR, VL and the current I.

- 6) Vary the Rheostat note down the above readings again and then tabulate the readings.
- 7) Calculate the impedance(Z), Resistance of coil(r), Inductance of the coil(L) using The following equations.
- 8) Repeat the step 6&7 for five set of readings.

$$Z = (V_L / I) \text{----- (1)}$$

$$V_S^2 = V_R^2 + V_L^2 + 2V_R V_L \cos \theta$$

$$\sin \theta = (1 -$$

$$\cos^2)^{1/2}$$

$$r = Z \cos \theta \text{----- (3)}$$

$$X_L = Z \sin \theta$$

$$L = X_L / 2\pi f \text{---- (4)}$$

TABULAR COLUMN:

SL. No	V _S (V)	V _R (V)	V _L (V)	I (amps)	Z (Ω)	Cos θ	R (Resistance of the coil)	X _L (Reactance of the coil)	L=X _L /2πf (Inductance of the coil)
1									
2									
3									

RESULT: The measurement of resistance & inductance of the coil is measured experimentally using 3-voltmeter method.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 4**DETERMINATION OF PHASE AND LINE QUANTITIES IN THREE PHASE STAR AND DELTA CONNECTED LOADS**

AIM: TO MEASURE PHASE AND LINE QUANTITIES IN A 3PHASE STAR AND DELTA CONNECTED LOADS.

COMPONENTS REQUIRED:

Sl no	Apparatus	Range	Quantity
1	AC Voltmeter	(0-600)	2
2	A Cam meter	(0-10A)	2
3	3-phase auto transformer	4A	1
4	Resistive load	5A	1

Circuit Diagram for Star Connection:

Measurement of Line and Phase quantities for 3 Phase star connected Load

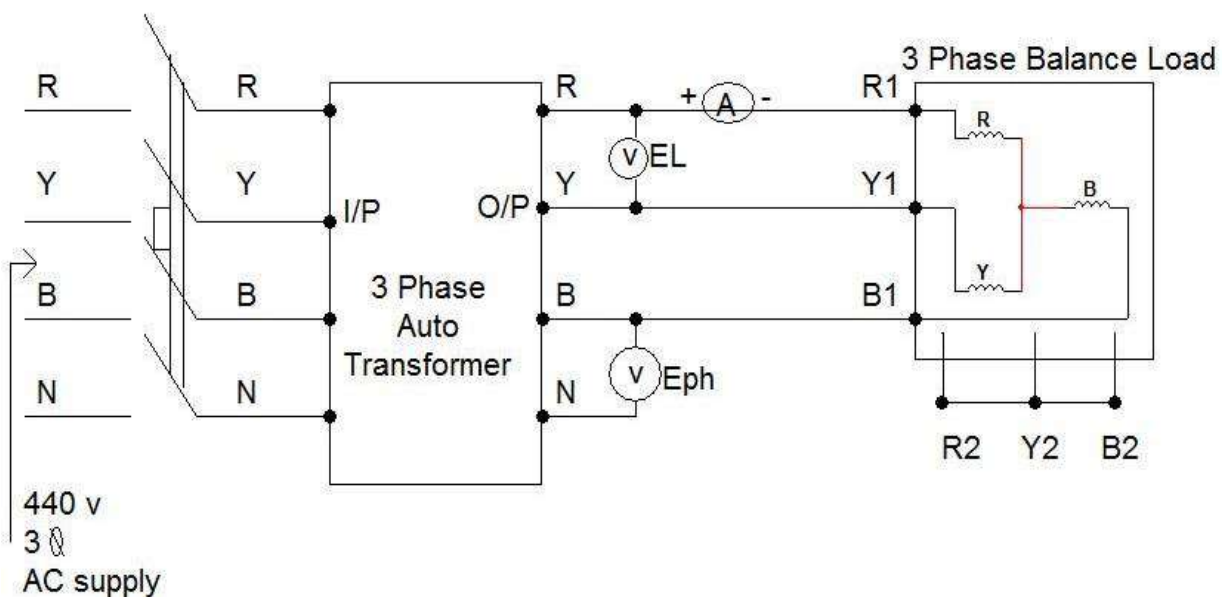


Fig-1: For Star connection.

PROCEDURE STAR CONNECTION:

1. Rig up the circuit diagram as shown in Fig-1
2. Keep the auto transformer in min. Position and switch ON MCB.
3. Slowly vary the auto transformer to the rated voltage(440V) of the load.
4. Apply the load L1 by turn ON the load switches.
5. Note down Phase voltage(Eph), Line voltage(EL) and Phase current/Line current I and tabulate.
6. Verify line voltage is equal to, $E_L = \sqrt{3} E_{ph}$
7. Repeat step no 4, 5 and 6 for all load combinations as shown in the Tabular column.

Tabular column for star connection:

Sl.No	Loads	Eph volts	EL line volts	Iphase amps	I line amps	$E_L = \sqrt{3} E_{ph}$ volts
1	L1					
2	L1,L2					
3	L1,L2,L3					
4	L1,L2,L3,L4					
5	L1,L2,L3,L4,L5					

Circuit Diagram for Delta Connection:

Measurement of Line and Phase quantities for 3 Phase Delta connected Load

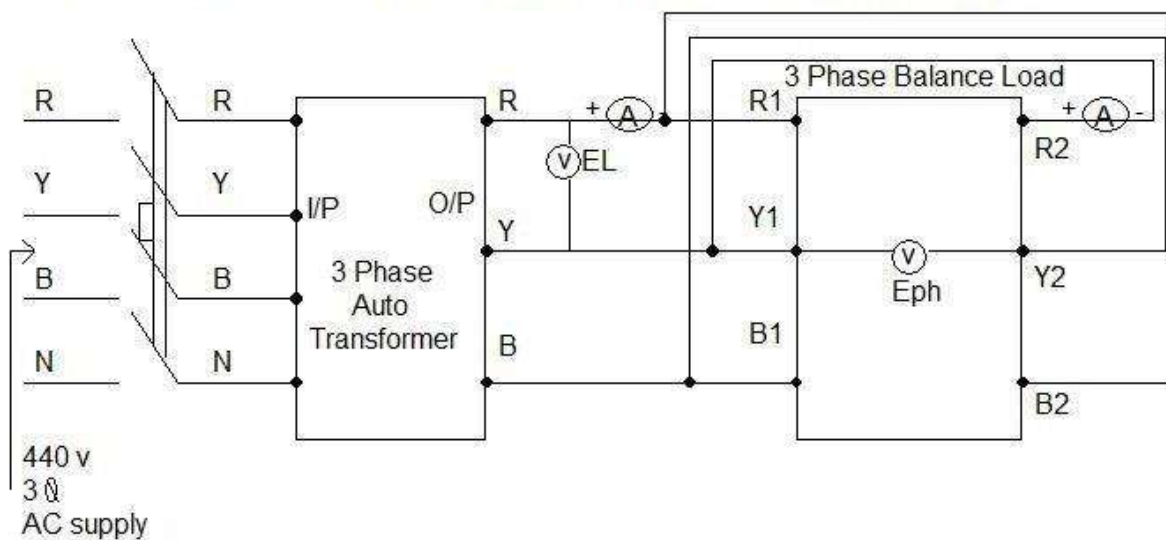


Fig-2: For Delta connection.

PROCEDURE DELTA CONNECTION:

1. Rig up the circuit diagram as shown in Fig-2
2. Keep the auto transformer in minimum Position and switch on MCB.
3. Slowly vary the auto transformer to the rated voltage (440V) of the load.
4. Apply the load L1 by turn on the load switches.
5. Note down Phase voltage(E_{ph}) / Line voltage(E_L), Phase current and Line current and tabulate.
6. Verify line current is equal to, $I_L = \sqrt{3}I_{ph}$
7. Repeat step no 4, 5 and 6 for all load combinations as shown in the Tabular column.
8. Repeat step no4, 5 and 6 for all load combinations as shown in the Tabular column.

Tabular column for delta connection:

Sl.No	Loads	E_{ph} volts	E_{line} volts	I phase amps	I line amps	$I_L = \sqrt{3}I_{ph}$
1	L1					
2	L1,L2					
3	L1,L2,L3					
4	L1,L2,L3,L4					
5	L1,L2,L3,L4,L5					

Result: Line and phase Quantities for star and delta connected loads are measured and verified.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT-5**MEASUREMENT OF 3PHASE POWER USING 2 WATT-METER METHOD**

AIM: Measurement of three phase power using two watt-meter method.

COMPONENTS REQUIRED:

1. Voltmeter 0-600V AC -1
2. Ammeter 0-10A AC -1
3. Wattmeters
DIGITAL Type-2nos
4. 3Phase Autotransformer-1no
5. 3Phase balancedLoad-1no

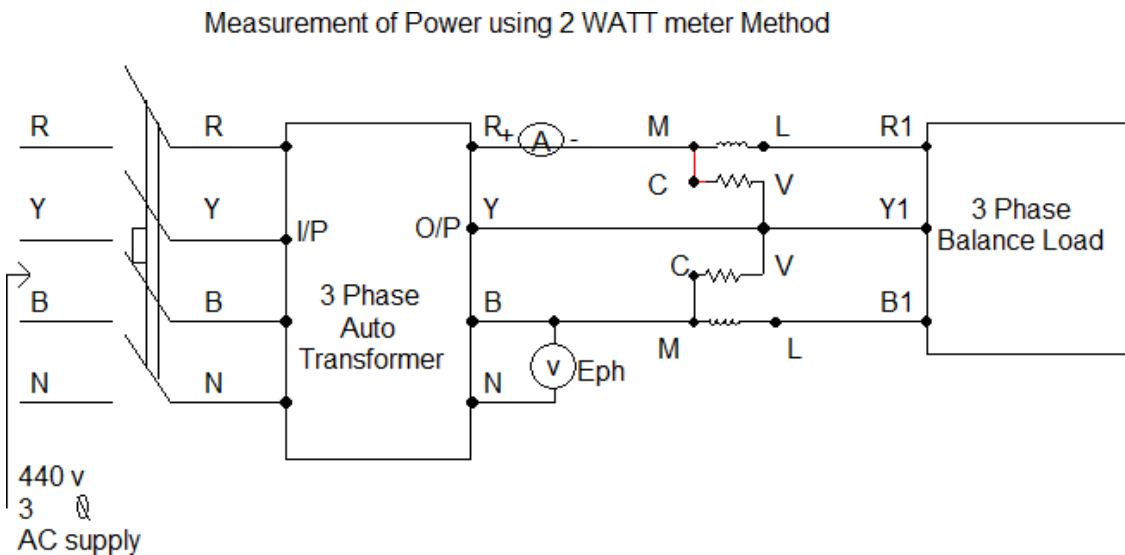
Circuit diagram:

Fig-1:Experiment no-5

CONDUCTION PROCEDURE:

1. Rig up the circuit as shown in the Fig-1.
2. Keep the autotransformer to min. position before switch on the main supply.
3. Switch ON (MCB) the power supply, set auto-transformer voltage to 200V, apply all 5 loads and tabulate.
4. Note down both Wattmeter's readings as W1, W2.
5. Calculate the three phase power P, θ and the power factor $\cos\theta$.
6. Repeat step 3, 4 and 5 for auto-transformer voltage 250V, 300V and 350V.

Tabular column:

Sl. no	Load	Supply voltage	W1 watts	W2 watts	P=W1+W2 watts	$\theta = \tan^{-1}(\sqrt{3}(W1-W2)/(W1+W2))$	Cos θ
1	L1,L2,L3,L4,L5	200V					
2	L1,L2,L3,L4,L5	250V					
3	L1,L2,L3,L4,L5	300V					
4	L1,L2,L3,L4,L5	350V					

Result: Measurement of three phase power using two wattmeter method the power factor is verified.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 6**TWO WAY & THREE WAY CONTROL OF LAMP AND FORMATION OF TRUTH TABLE**

- AIM:** a) To control one lamp from two places.
b) To control one lamp from three places.

APPARATUS REQUIRED:

SL.No.	Apparatus	Range	Quantity
1	Two way switches	5A	2
2	Intermediate switch	5A	1
3	Lamp	40W	1

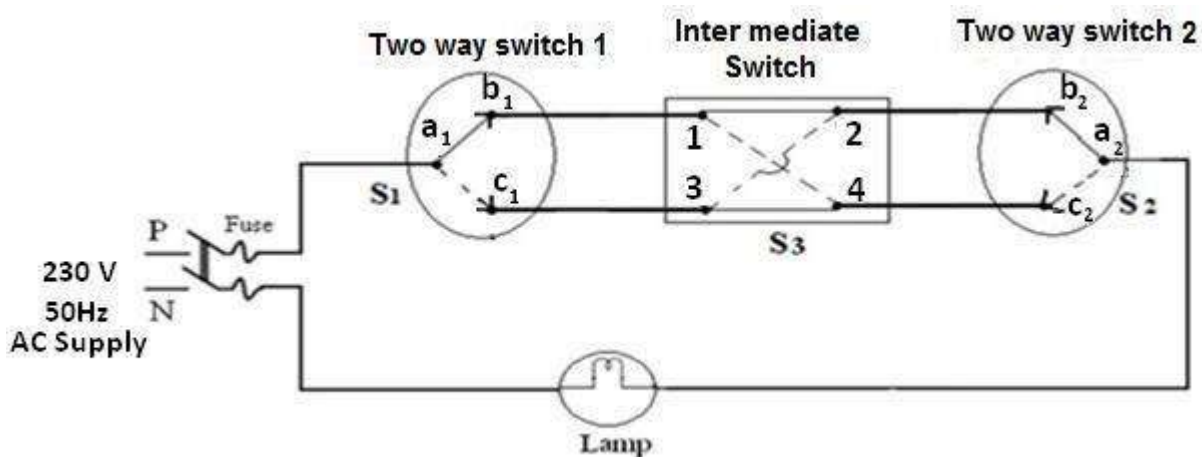
CIRCUIT DIAGRAM: THREE WAY CONTROL OF LAMP

Fig-1: Experiment no-6

CONDUCTION PROCEDURE: (Three way control of lamp)

1. Make the connections as per circuit diagram of two way lamp control.
2. Supply switch is closed.
3. By operating the two way switches 1 and 2, observe the condition of lamp in the truth table.
4. Supply switch is opened.

Truth table for three way control of lamp :

Sl. No.	Position of switch S ₁	Position of switch S ₂	Intermediate switch S ₃	Condition of lamp
1	a ₁ b ₁	a ₂ b ₂	1,2 & 3,4	
2	a ₁ b ₁	a ₂ c ₂	1,2 & 3,4	
3	a ₁ c ₁	a ₂ c ₂	1,2 & 3,4	
4	a ₁ c ₁	a ₂ b ₂	1,2 & 3,4	
5	a ₁ b ₁	a ₂ b ₂	1,4 & 2,3	
6	a ₁ b ₁	a ₂ c ₂	1,4 & 2,3	
7	a ₁ c ₁	a ₂ c ₂	1,4 & 2,3	
8	a ₁ c ₁	a ₂ b ₂	1,4 & 2,3	

RESULT:**Rubrics for Continuous Evaluation (30Marks) - 2021 scheme**

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 7**STUDY THE EFFECT OF OPEN AND SHORT CIRCUIT IN SIMPLE DC CIRCUIT**

AIM: To study the effect of Open and Short Circuit condition in a simple DC circuit.

COMPONENTS REQUIRED:

Sl.No.	Apparatus	Range	Quantity
1	Regulated power supply	(0-30)V	1
2	Resistors	30 Ω 11 Ω	1 1
3	Voltmeter	0-30V	1
4	Ammeter	(0-5)A	1
5	SPST	-	1

CONDUCTION PROCEDURE:

1. Make the connection as per circuit diagram.
2. Keeping the RPS voltage knob in minimum position, supply switch is closed.
3. Keeping the SPST switch in open-position, apply around 20V.
4. Note down the volt meter and ammeter readings (This gives open-circuit condition)
5. Close the SPST switch and readings of volt meter and ammeter readings (This gives Short-circuit condition)
6. Reduce the RPS to zero position and supply switch is opened.

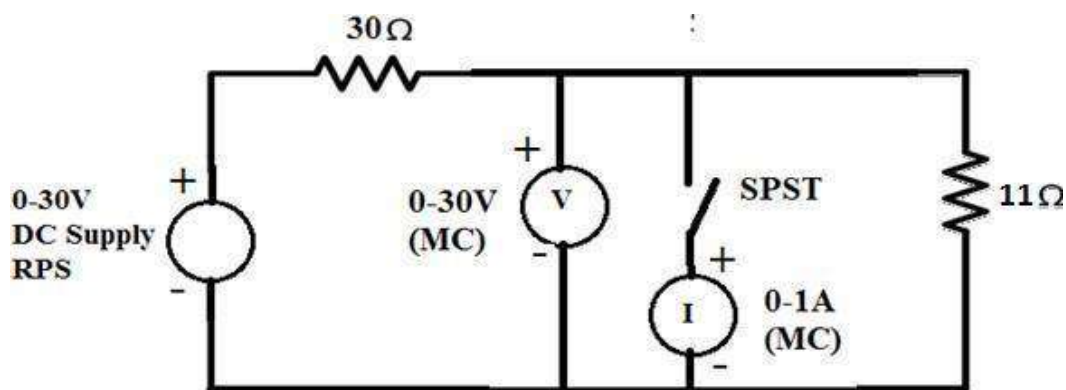
CIRCUIT DIAGRAM: Short and open circuit

Fig-1: Experiment no-7

TABULAR COLUMN:

Sl.No.	Open-circuit		Short-circuit	
	I (amps)	V (volts)	I (amps)	V (volts)

RESULT:**Rubrics for Continuous Evaluation (30Marks) - 2021 scheme**

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 8

MEASUREMENT OF EARTH-RESISTANCE

AIM: To measure earth-resistance.

COMPONENTS REQUIRED:

1. EarthTester-01
2. Spikes -02
3. Earth plate under test
4. Hammer-1
5. Measuring tape

THEORY: Ground resistance testing covers the testing of earth electrode and the measurement of soil resistivity. Megger offers top end systems for design and soil surveys as well as tough easy to use testers for field engineers. We have tried to make the testers self-checking as much as we can, to allow you to concentrate on collating and understanding the results. The instrument requirements depend on the range of applications.

CIRCUITDIAGRAM:

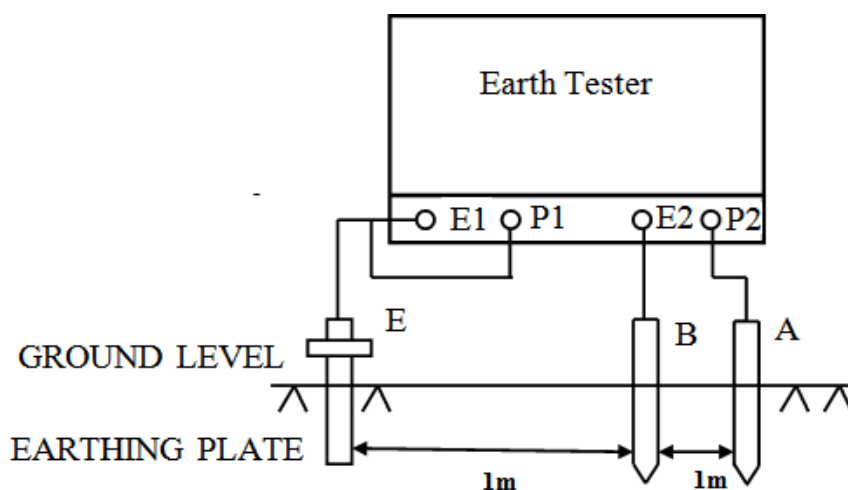


Fig:1 Schematic diagram for measurement of earth-resistance

CONDUCTION PROCEDURE:

1. Insert the three spikes in to the ground at a distance of 1m between the spikes.
2. Connect the two spikes to E2 & P2 terminals.
3. Short the P1 & E1 terminals and connect to earthing plate
4. Switch on the tester and press the test switch note down the reading and tabulate.
5. Apply the water to all three spikes again note down the reading and tabulate
6. Press the spikes to little bit more deeper, again note down the reading.

Tabular column:

Depth.	In dry place	In wet place
0.5 feet		
1feet		
2feet		

Result: The earth resistance at different depth is verified It is observed that earth resistance is more in Dry condition.

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 9**VERIFICATION OF MAXIMUM POWER TRANSFER THEOREM****Aim:**

To measure power in a dc load

To verify experimentally that the maximum power transfer to load occurs when the resistance of the load equals the resistance of the source.

Introduction:

In any electric circuit, the electrical energy from the supply is delivered to the load where it is converted into a useful work. Practically, the entire supplied power will not present at loaded to the heating effect and other constraints in the network. Therefore, there exist a certain difference between drawing and delivering powers.

The load size always affects the amount of power transferred from the supply source, i.e., any change in the load resistance results to change in power transfer to the load. Thus, the maximum power transfer theorem ensures the condition to transfer the maximum power to the load.

1) Maximum Power Transfer Theorem Statement

It states that in a linear bilateral network the maximum power transferred to the load When the load resistance equal to the internal resistance of the source.

Components Required:

Regulated Power Supply(0-30V) – 01

Voltmeter(0-30v) – 01

Ammeter(0-500mA) – 01

Resistor ($50\Omega/5W$) – 01

Potentiometer ($1k\Omega$) – 01

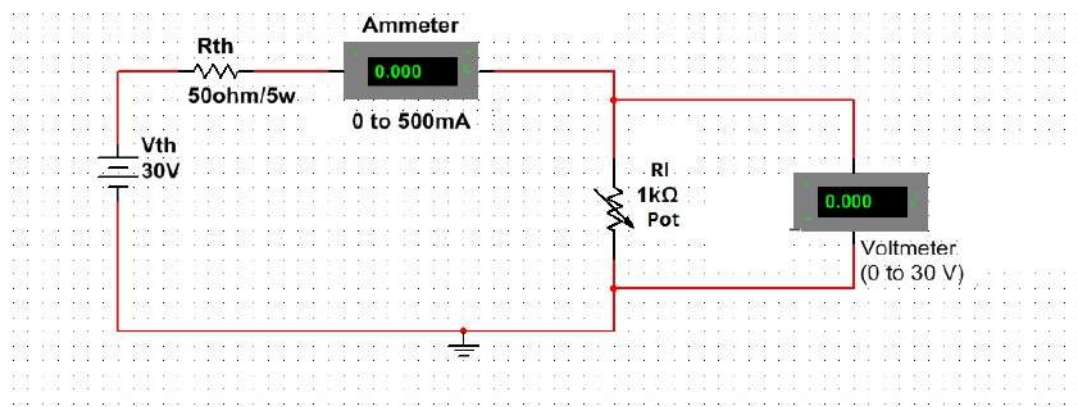
Circuit Diagram

Fig-1: Circuit Diagram for Exp 9

Conduction Procedure:

1. Rig up the circuit as shown in Fig 1.
2. Set V_{Th} to 30V.
3. Vary the load Resistor R_L using potentiometer and note down I_L and V_L , Calculate the power across the load $P=I_L*V_L$ and the load resistor $R_L=V_L/I_L$ and tabulate values.
4. Repeat step 3 for Min. power to Max. and to Min power
5. Observe at Max. power $R_L=R_{Th}$.
6. Plot the graph R_L V/S P

Tabular Column:Set $V_{Th}= 30V$ $R_{Th}= 50\Omega/5W$

Sl no.	Voltage V_L	Current I_L		$P=I_L*V_L$ Watt.	$R_L=V_L/I_L$
		mA	A		

Result: Maximum Power Transfer theorem verified at $R_L=R_{Th}$ from the table.**Rubrics for Continuous Evaluation (30Marks) - 2021 scheme**

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

EXPERIMENT NO. 10

DETERMINATION OF EFFICIENCY OF A SINGLE PHASE TRANSFORMER BY DIRECT LOAD TEST

Aim:

To determine efficiency and voltage regulation of a single phase transformer

Components Required:

Transformer(1KVA) – 1

Dimmer stat – 1

Ammeter (0-5A) – 2

Wattmeter -2

Voltmeter(0-100v) – 2

Circuit Diagram:

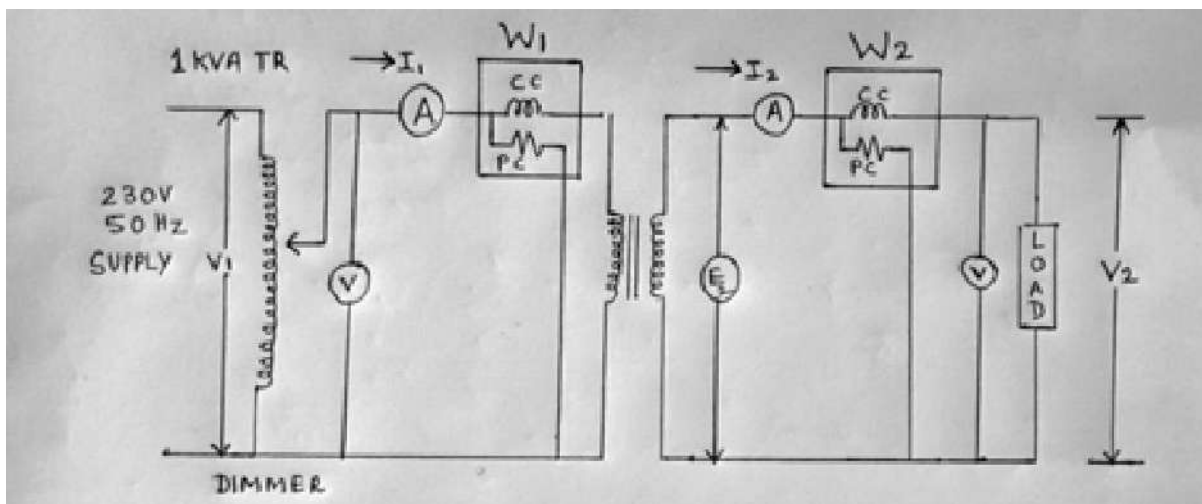


Fig-1: Circuit Diagram for Exp 10

Conduction Procedure:

1. Rig up the circuit as shown in Fig 1
2. Set V1 for rated voltage of 230v.
3. Note down I_1 , W_1 , V_2 , I_2 and W_2 for no load condition.
4. Vary the dimmer stat from 100V to 230V in the step of 20v and again note down the above values and tabulate.

Calculate

- i) $I_1 = 1000/230 = 4.34A$
 - ii) efficiency $\eta = (W_2/W_1) * 100$
 - iii) % of regulation $R = [(E_{2(NL)} - V_{2(FL)}) / E_{2(NL)}] * 100$
5. Plot the graph efficiency v/s I_2 and % of regulation v/s I_2 .

Tabular Column

SI NO	Primary			Secondary		
No Load	V_1	I_1	W_1	V_2	I_2	W_2
1	Rated voltage	0	0	$E_2 = V_2$	0	0
2						
3						
4						
5						
6						
7						

Result: Plot for efficiency has been drawn and it is observed that maximum efficiency at $I_2 = I_{2max}$. % regulation is linear with respect to I_2 .

Rubrics for Continuous Evaluation (30Marks) - 2021 scheme

Particulars		Marks allotted	Marks obtained
a	Circuit diagram & write up	06	
b	Conduction and Observation	10	
c	Viva voce	04	
d	Record write up	10	
Total		30	

Signature of lab Incharge/Co Faculty

VIVA QUESTIONS:

1. State Kirchhoff's voltage law?
2. State Kirchhoff's current law?
3. State ohm's law?
4. Which law is required for applying Kirchhoff's voltage law to a closed path if we know only resistances and current flowing in that path?
5. Is Kirchhoff voltage law applicable to loop containing open in it?
6. Are Kirchhoff's laws applicable to A.C circuits?
7. Limitations of Kirchhoff's laws?
8. What will be the power factor for a purely resistive load? And what is the formula for pf?
9. How can the power factor of an inductive circuit be improved?
10. What are the disadvantages of a low power factor?
11. How does a wattmeter work? And what is the meaning of MLCV in wattmeter?
12. What happens to the current when you reduce the voltage?
13. When voltage is increased what happens to the current?
14. What is current load? Is a light bulb an inductive load?
15. What is an example of a load in an electrical circuit?
16. What is source and load? Which are the three types of electrical loads and What is the use of lamp load?
17. What is Electro-dynamo meter type wattmeter?
18. What are RC and RL circuits used for?
19. Is resistance and impedance the same?
20. What is the impedance of an RLC circuit?
21. What is the formula for the impedance of a capacitor?
22. What is the relation between frequency and capacitive reactance of a capacitor?
23. What is the response of Resistor e frequency?
24. What is the response of Inductor to DC?
25. What are the three types of electrical loads?
26. What is the significance of power factor?
27. What is the difference between star and delta with respect to I/V?
28. What is the advantage of star connection over delta connection?
29. What is the magnitude of 3 phase voltage?
30. What are the advantages of 3 phase system?
31. Define phase voltage & line current in 3phase?

32. What is the phase difference between 3 electrodes of 3 phase?
33. Define line voltage and line current?
34. Define balanced load?
35. Define unbalanced load?
36. What is a three-phase circuit (source, line and load)?
37. What are the terminals of wattmeter?
38. What is the difference between a two and three-way switch?
39. What is the purpose of a two-way switch?
40. What is the purpose of a three-way switch?
41. What is an SPST switch?
42. How many terminals are needed in a two-way switch?
43. Staircase wiring is an example of which type of control of lamp?
44. What is the frequency of DC?
45. What are the ideal values of Voltage and Current for Short and Open Circuit?
46. What is the relation between power, voltage and resistance?
47. Write the phasor diagram for RC circuit.
48. What is the effect on total resistance in a circuit if an open occurs in (a) a parallel branch (b) series portion of circuit?
49. What is the effect on total current in a circuit if an open occurs in (a) a parallel branch (b) series portion of circuit?
50. Why do we need to measure earth's resistance?

Dept. of Electronics and Communication Engg.	
Vision & Mission	
Vision	To achieve academic excellence in electronics and communication engineering by imparting quality technical education and facilitating research activities
Mission	M1: Establishing state of the art laboratory facilities and infrastructure to develop the spirit of innovation and entrepreneurship M2: Nurturing the students with technical expertise along with professional ethics to provide solutions for societal needs M3: Encourage lifelong learning and research among the students and faculty