



Bharath UNIVERSITY
பாரத் பல்கலைக்கழகம்
BHARATH INSTITUTE OF HIGHER EDUCATION AND RESEARCH
(Declared as Deemed-to-be-University, u/s 3 of the UGC Act, 1956)



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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

LABORATORY MANUAL

SUBJECT CODE : BEE1L1

**SUBJECT NAME : BASIC ELECTRICAL AND
ELECTRONICS ENGINEERING
LABORATORY**

LEARNING OUTCOMES

- ✓ Students will be able to handle basic electrical and electronics equipment's.
- ✓ Students will be able to do staircase wiring.
- ✓ Students will be able to understand domestic wiring procedures practically.
- ✓ Student will be able to assemble electronic systems.
- ✓ Students will understand all the fundamental concepts involving electrical Engineering.
- ✓ Students will understand all the fundamental concepts involving electronics Engineering.

I LIST OF EXPERIMENTS FOR ELECTRICAL ENGINEERING LAB

1. Fluorescent lamp wiring
2. Stair case wiring
3. Measurement of electrical quantities-voltage current, power & power factor in RLC circuit
4. Residential house wiring using fuse, switch, indicator, lamp and energy meter
5. Measurement of energy using single phase energy meter
6. Measurement of resistance to earth of electrical equipment

II LIST OF EXPERIMENTS FOR ELECTRONICS ENGINEERING LAB

1. Study of electronic components and equipment's.
 - a. Resistor Colour coding using digital multi-meter.
 - b. Assembling electronic components on bread board.
2. Measurement of ac signal parameters using cathode ray oscilloscope and function generator.
3. Soldering and desoldering practice.
4. Verification of logic gates (OR, AND, OR, NOT, NAND, EX-OR).
5. Implementation of half adder circuit using logic gates.

ELECTRICAL

ELECTRICAL ENGINEERING PRACTICE

INTRODUCTION

Electric power is supplied for commercial and residential use in three phases with a neutral. Some of the low power consumption residential connections will have only a single phase with a neutral. The single-phase AC supply is 230V but a three-phase supply is 440V.

SAFETY MEASURES

1. Use approved tools, equipment's and protective devices.
2. Do not work under poor light or when you are tired.
3. Do not work in damp areas or in wet shoes or clothes.
4. Keep tools and equipment's clean and in good working condition.
5. Read all instructions carefully before using the appliances.
6. To prevent electrical hazards, **DO NOT** immerse appliances in water or Other liquids.
7. Always unplug an appliance before cleaning, or whenever it is not in use. Ensure that you pull by the plug and not the cord.
8. **DO NOT** operate any appliance with a damaged cord or plug.
9. Always use an appliance on a dry, level surface.
10. Keep appliances away from heated surfaces and open flames.
11. Check the electric power supply from the switch position.

TOOLS USED IN WIRING

PLIERS

Pliers are used to cut wire and also to hold it. Pliers have an insulated handle. Long nose pliers are used to hold wires in small space and also to tighten or loose small nuts.

SCREW DRIVERS

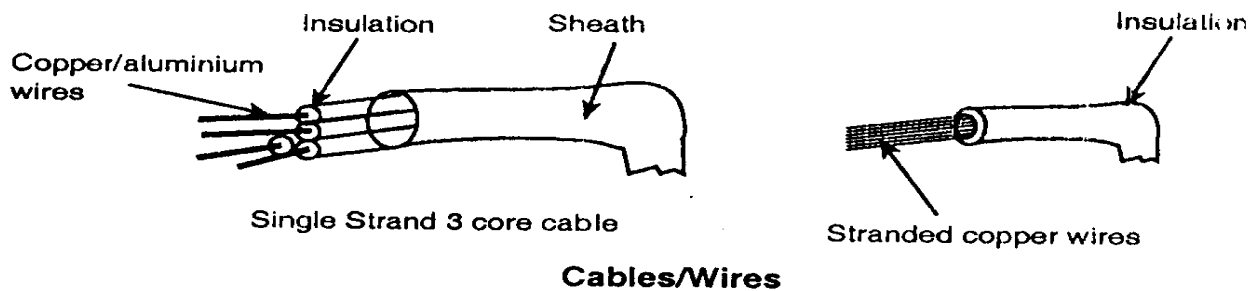
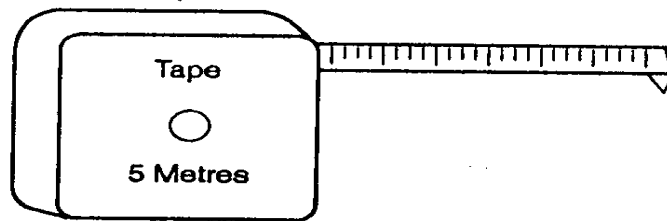
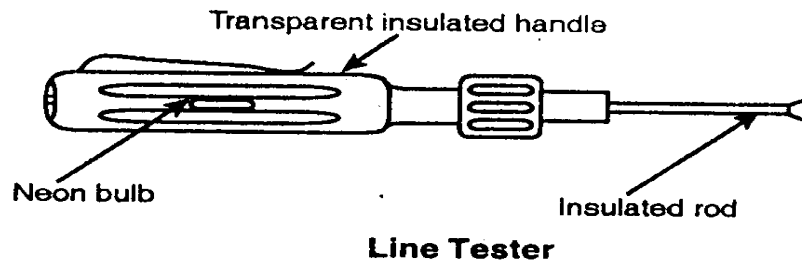
Screw drivers are used to tighten screws in the switches and electrical machines. Screw drivers of various sizes are used. Normally screw drivers used in electrical work are insulated.

HAMMERS

Ball peen and claw hammers are commonly used in electrical work where greater power is required striking.

HACKSAW

A hacksaw is used to cut cable armour, conduit pipes, etc. it has a frame where the blade is tightened by means of a wing nut.



LINE TESTER

A line tester is used to check the electric supply in the line or phase wire. It has a small neon bulb which indicates the presence of power supply. It can also be used as a screw driver to tighten small screws in switches.

MEASURING TAPE

A measuring tape is used to measure the length of the wire and also to mark the positions of the switches and other electrical fittings.

WIRES

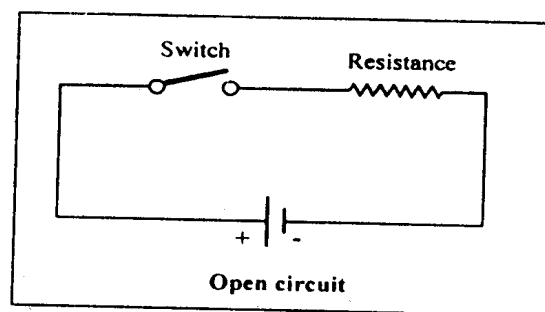
An electric wire is a copper or aluminum insulated wire and has one or more twisted strands. Vulcanized Indian Rubber (VIR) wire, cotton flexible or rubber flexible wire and poly vinyl chloride (PVC) wires are commonly used in house wiring.

TYPES OF CIRCUIT

There are three types of circuits. They are

- Open circuit
- Closed circuit
- Short circuit

OPEN CIRCUIT

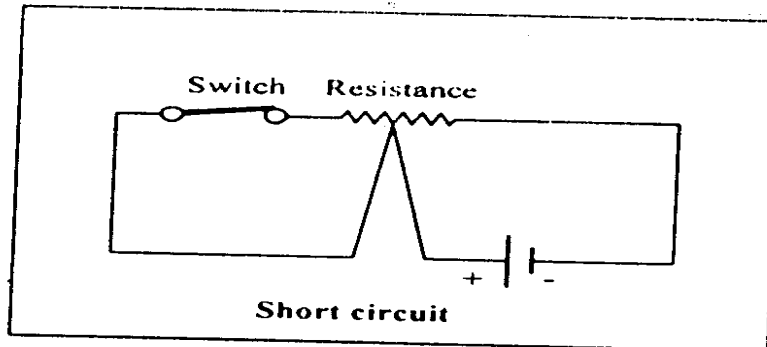


If the switch used in the circuit is in 'off' position, then the circuit is said to be open circuit. There will not be any flow of current in open circuit.

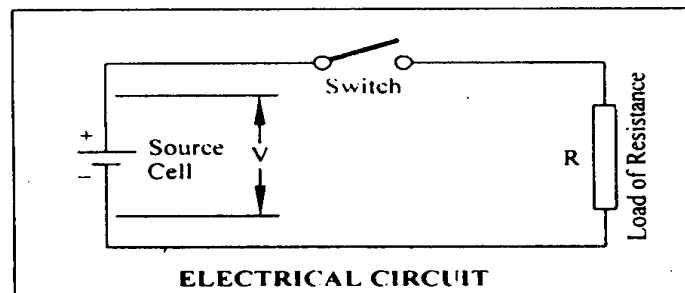
CLOSED CIRCUIT

If the switch used in the circuit is in 'on' position, then the circuit is said to be closed circuit. There will be normal flow of current in closed circuit.

SHORT CIRCUIT



When the positive terminal and negative terminal of any circuit comes in contact and very high current flows through the circuit, then it is called as short Electrical Circuit.



An electrical circuit should consist of the following.

- An energy source is used to provide the voltage needed to force the current through the circuit.
- Conductor is used through which the current can flow.
- A load (resistor) is used to control the amount of current and to convert the Electrical energy into other forms.
- A control device (switch) is used to start or stop the flow of current.

TYPICAL LIGHTING CIRCUITS

- House – wiring is as simple as one lamp is controlled by one switch or may be a special requirement of controlling one lamp from two or more number Of places. Such type of

circuits is used for staircase, bedroom and corridor lighting Systems. The basic principle involved in such circuits and the requirement of additional special accessories are discussed below:

BEDROOM LIGHTING

A bedroom requires one lamp at the dressing table controlled by a switch and one lamp just above the bed which may require dual control by two 2 way switches, one provided near the entrance (door) and the other provided above the bed. The circuit which describes the lighting in bedroom is as follows:

WIRING

WIRING METHODS

A circuit is a path along which the electric current flows from the negative Side of the power source to the positive side. There are three types of electrical circuit.

- (i) Series circuit
- (ii) Parallel circuit
- (iii) Combination of series and parallel circuit.

SERIES CIRCUIT

The series circuit provides a single, continuous path through which current flows. In this the devices are connected one after another and the current flows through them until it returns to the power source. The circuit is shown in fig. Hence, even when one device breaks down the remaining devices will not operate because the circuit is broken.

PARALLEL CIRCUIT

In parallel circuit the devices are connected side by side so that, current flows in a number of parallel path. The parallel circuit is shown in fig. In this type of circuit each device is connected across the power source so that even if one device breaks down, the other devices continue to operate. Hence this type of circuit is used in home wiring.

EXP NO: 1**FLUORESCENT LAMP WIRING****Aim:**

To prepare wiring for a fluorescent tube light with switch control.

Tools Required:

1. Screw driver
2. Hammer
3. Pliers
4. Line tester

Components Required:

1. Switch
2. Tube light with fitting
3. Joint clips
4. Wires
5. Screws
6. Switch board

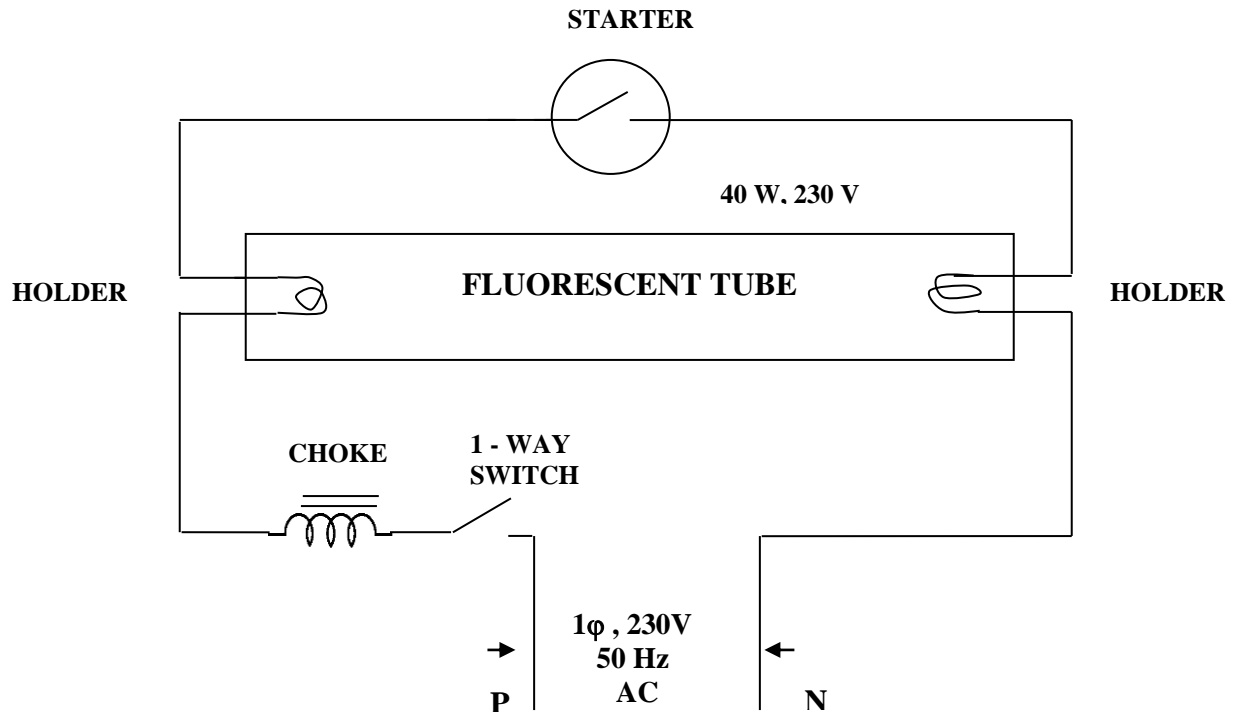
Working of the Fluorescent Tube Light:

The fluorescent lamp circuit consists of a choke, a starter, a fluorescent tube and a frame. The length of the commonly used fluorescent tube is 100 cm; its power rating is 40 W and 230V. The tube is filled with argon and a drop of mercury. When the supply is switched on, the current heats the filaments and initiates emission of electrons. After one or two seconds, the starter circuit opens and makes the choke to induce a momentary high voltage surge across the two filaments. Ionization takes place through argon and produces bright light.

Procedure:

1. Mark the switch and tube light location points and draw lines for wiring on the wooden board.
2. Place wires along the lines and fix them with the help of clips.
3. Fix the switch and tube light fitting in the marked positions.
4. Complete the wiring as per the wiring diagram.
5. Test the working of the tube light by giving electric supply to the Circuit.

CIRCUIT DIAGRAM - TUBE LIGHT



Result:

The wiring for the tube light is completed and tested.

EXP NO: 2**STAIR CASE WIRING****Aim:**

To wire for a stair case arrangement using a two-way switch.

Tool Required:

1. Screw driver 2.Hammer 3.Pliers 4.Line tester

Components Required:

1. Two-way switches 2. Bulb holders 3. Bulbs
4. Joint clips 5. Wires 6. Screws
7. Ceiling rose and 8. Switch board

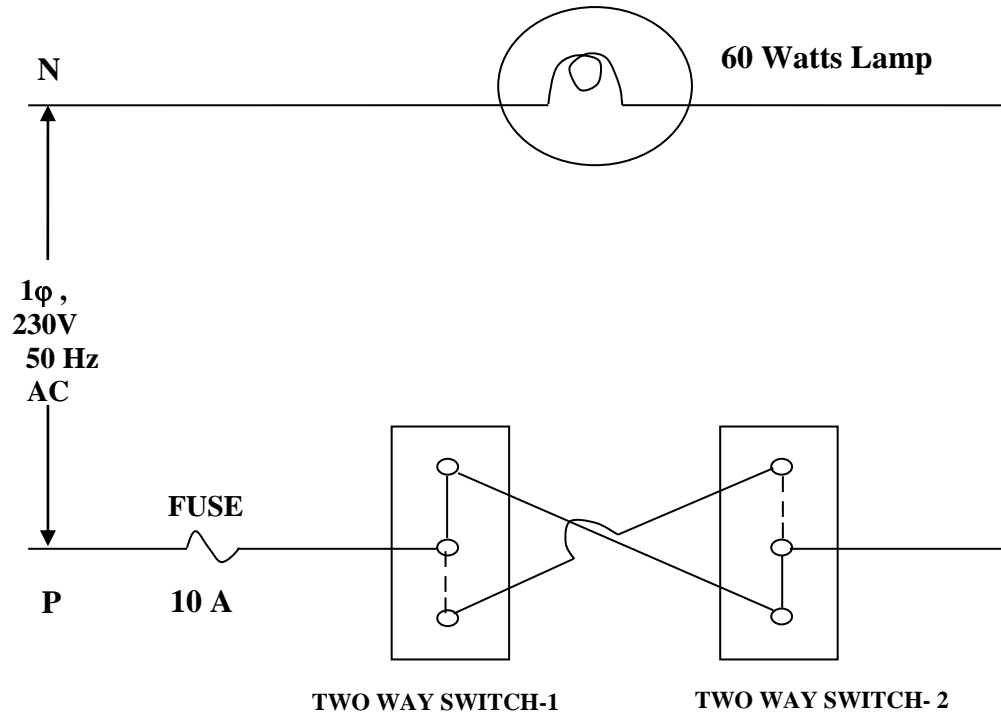
Procedure:

1. Mark switch and bulb location points and draw lines for wiring on the wooden Board.
2. Place wires along the lines and fix them with the help of clips.
3. Fix the two-way switches and bulb holder in the marked position on the wooden Board.
4. Complete the wiring as per the wiring diagram.
5. Test the working of the bulbs by giving electric supply to the circuit.

Theory:

A two switch is installed near the first step of the stairs. The other two way switch is installed at the upper part where the stair ends. The light point is provided between first and last stair at an adequate location and height if the lower switch switches on the light. The switch at the top or vice versa can switch it off. Two number of two way switches are used for the purpose. The supply is given to the switch at the short circuited terminals. The connection to the light point is taken from the similar short circuited terminal of the second switch; other two independent terminals of each circuit are connected through cables.

CIRCUIT DIAGRAM --STAIRCASE WIRING



TABULATION

SWITCH POSITION		LAMP CONDITION
SWITCH- 1	SWITCH- 2	
OFF	OFF	OFF
ON	OFF	ON
OFF	ON	ON
ON	ON	OFF

Result:

The staircase wiring is completed and tested.

**EXP NO: 3 MEASUREMENT OF ELECTRICAL QUANTITIES-VOLTAGE
CURRENT, POWER & POWER FACTOR IN RLC CIRCUIT**

Aim:

To measure electrical quantities for the given single phase circuit.

Apparatus:

SL.NO	Components Required	Range	Type	Quantity
1	Ammeter	(0-10)	MI	1
2	Load	Variable	RLC	1
3	Volt meter	(0-300)	MI	1
4	Watt meter	300V, 10A	UPF	1
5	Autotransformer	1KVA 230/(0-240) V	1PH	1

Formulas:

Apparent Power = VI (Voltmeter reading x Ammeter reading)

Real Power = VI Cos Φ (Watt meter reading)

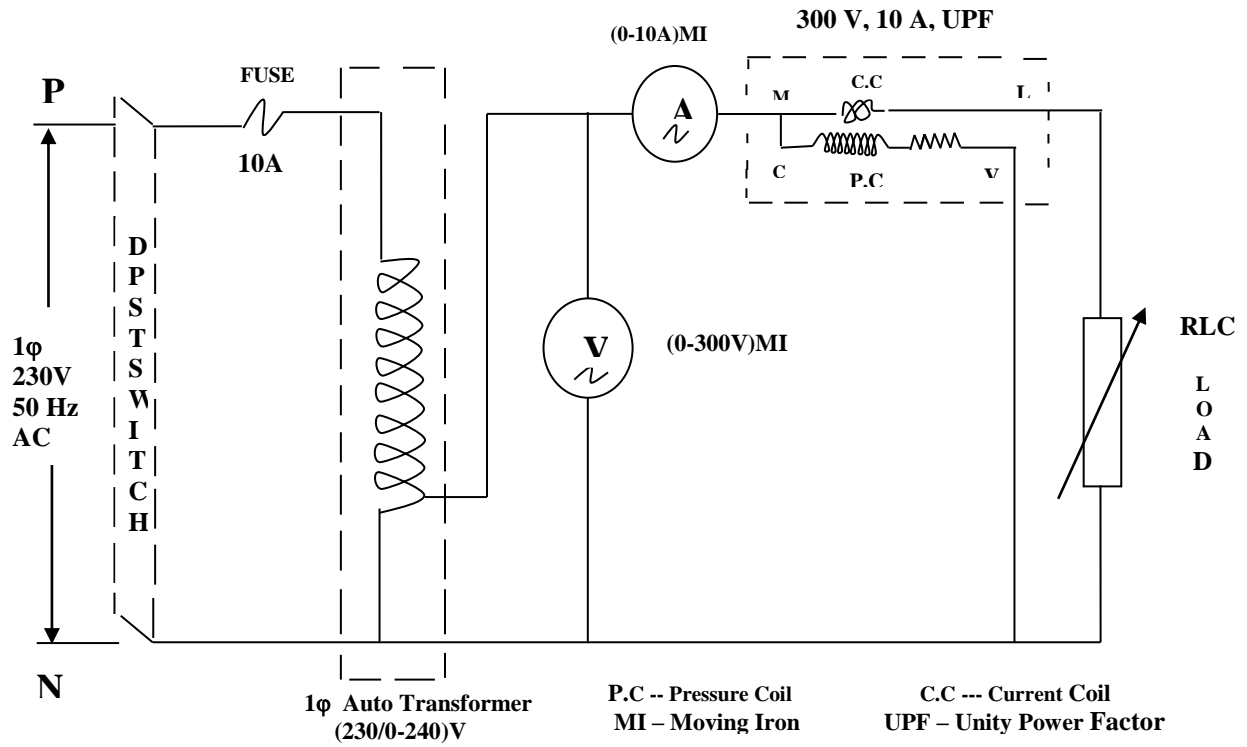
Power factor (Cos Φ) = Real Power / Apparent Power

Indicated Power = Observed reading X Multiplying factor

% Error = (Indicated Power – Actual Power) x100 / Actual Power

Actual Power = Voltmeter reading x Ammeter reading x Power factor

CIRCUIT DIAGRAM:



TABULAR COLUMN:

S.NO	Volt meter readings (Volts)	Ammeter readings (Amps)	Watt meter readings (Watts)		Power factor
			Observed reading	Indicated reading	
1.					
2.					
3.					
4.					
5.					

Procedure:

1. Connections are given as per the circuit diagram
2. Set the rated voltage by adjusting Auto transformer
3. Observe the meter readings for various loading conditions.
4. Calculate the error and plot the graph between %error and current value.

Result:

Thus electrical quantities like Voltage, Current, Power and Power factor Values Measured.

EXP NO. 4**RESIDENTIAL HOUSE WIRING USING FUSE, SWITCH,
INDICATOR, LAMP AND ENERGY METER.****Aim:**

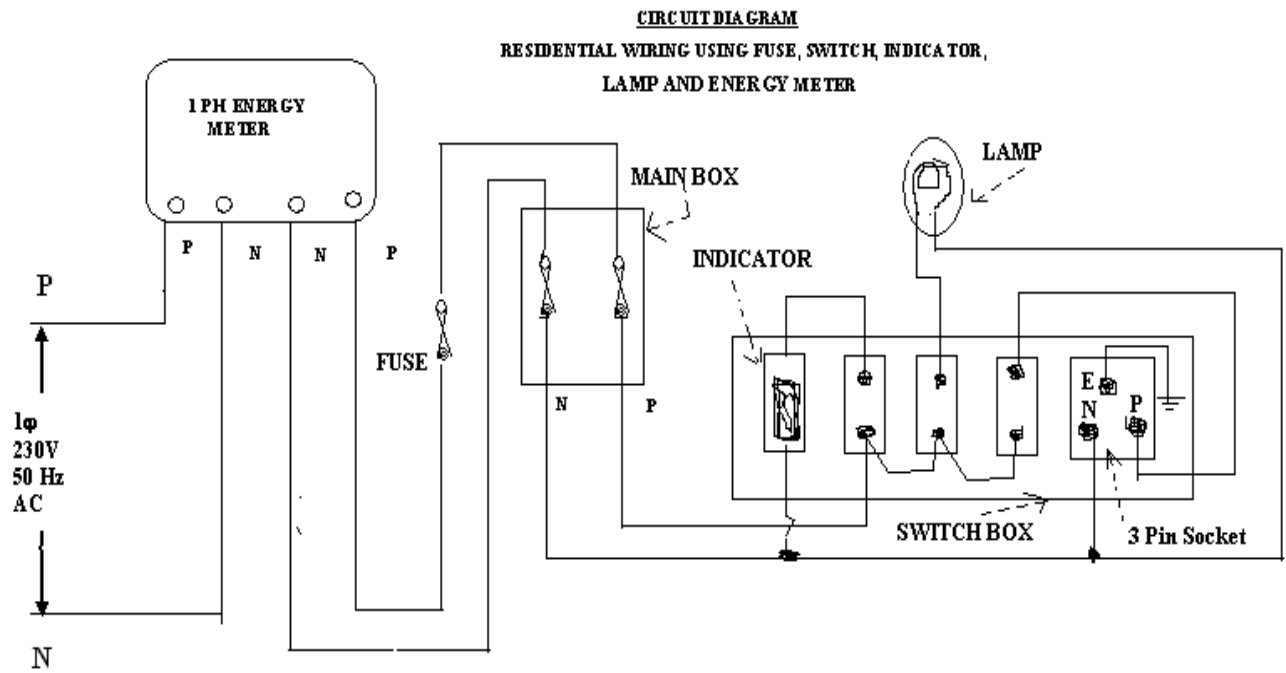
To prepare residential wiring using Fuse, Switch, Indicator, Lamp and Energy meter .

Apparatus Required:

SL.NO.	Components Required	Range	Quantity
1	One way Switch	----	1
2	Energy Meter	1 Ph	--
3	Indicator	-----	1
4	Lamp	----	1
5	Wires	----	Required amount

Procedure:

1. Connections are given as per the circuit diagram.
2. When the Switch is closed, the Lamp will glow and the metering is running.
3. The corresponding readings are noted from energy meter by observing number of cycles of the disc for a particular time period.



Result:

Thus the residential wiring is implemented and tested for its operation.

EXP NO: 5**MEASUREMENT OF ENERGY USING SINGLE PHASE ENERGY METER****Aim:**

To measure Energy consumed in a single phase circuit using Energy meter.

Apparatus required:

SL.NO.	Components Required	Range	Type	Quantity
1	Ammeter	(0-10)	MI	1
2	Load	-----	LAMP	--
3	Volt meter	(0-300)	MI	1
4	Energy Meter	1 Ph,300V, 10A	--	1
5	Autotransformer	1KVA 230/(0-240) V	1PH	1

Formula used:

$$1200 \text{ Rev} = 1 \text{ kWhr}$$

$$1 \text{ Rev} = 1 \times 1000 \times 3600 / 1200 = 3000 \text{ (Watt-sec)}$$

$$\text{For } N \text{ Rev Indicated energy } (E_i) = N \times 3000 \text{ (Watt-sec)}$$

$$\% \text{ Error} = (E_i - E_a) \times 100 / E_i$$

$$\text{Calculated energy } E_a = (V_L \times I_L) \times T \text{ (Watt-sec)}$$

Where

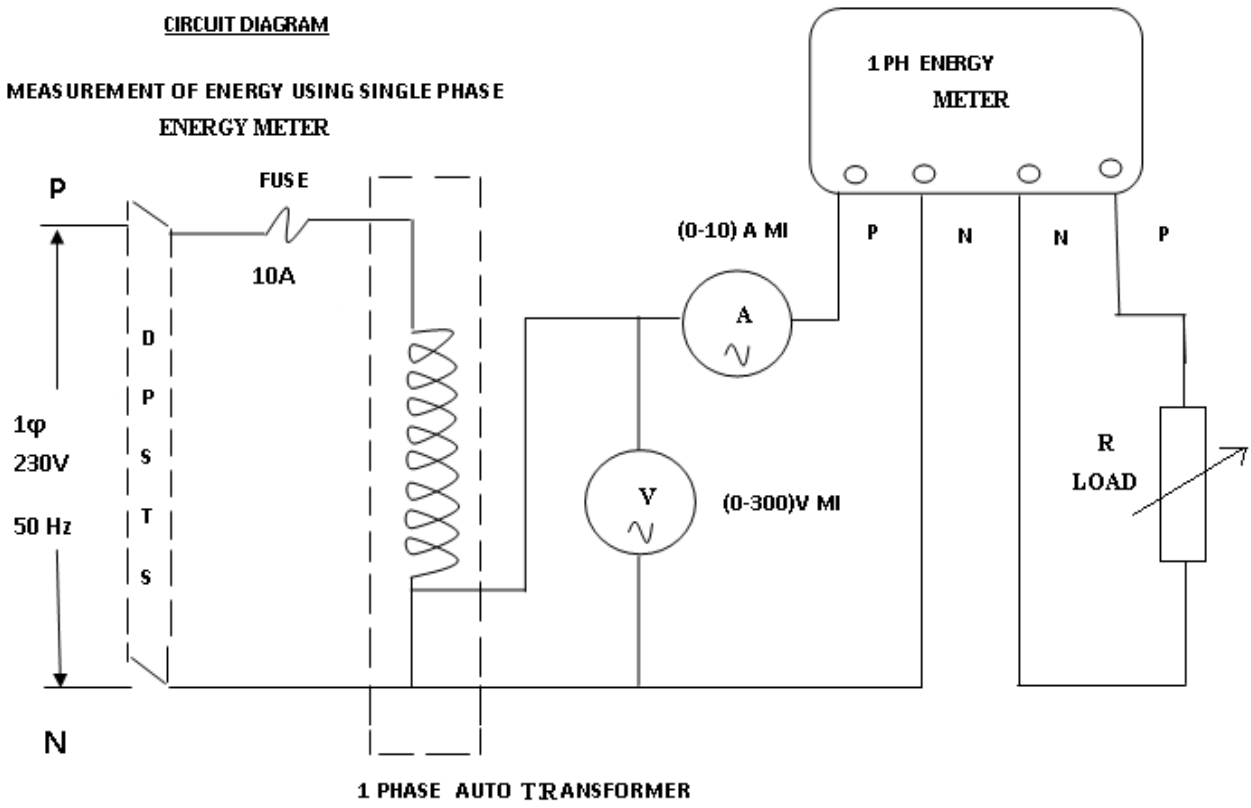
V_L –Load voltage

I_L –Load current

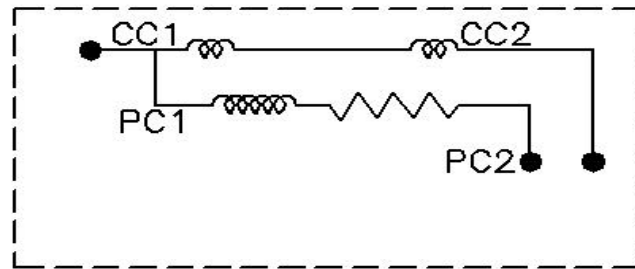
$$\text{Energy meter constant} = \text{-----} \text{ (Rev/sec)}$$

CIRCUIT DIAGRAM

MEASUREMENT OF ENERGY USING SINGLE PHASE ENERGY METER



ENERGY METER INTERNAL CONNECTION



TABULATION:

S.NO	Volt meter readings (Volts)	Ammeter readings (Amps)	Time taken for 5 Rev(Sec)	Calculated Energy (E_a)	Indicated Energy (E_i)
1.					
2.					
3.					
4.					
5.					

Procedure:

1. Connections are made as per circuit diagram.
2. Supply is switched on and load is applied and Ammeter, Voltmeter readings and Time taken by the discs for particular number of revolution are noted using stop Watch.
3. Step 2 is repeated for various load conditions.
4. % Error is calculated

RESULT:

Thus energy consumed in a single phase circuit is measured.

**EXP NO: 6 MEASUREMENT OF RESISTANCE TO EARTH OF AN
ELECTRICAL EQUIPMENT**

Aim:

To measure the Earth Resistance of given Electrical Components

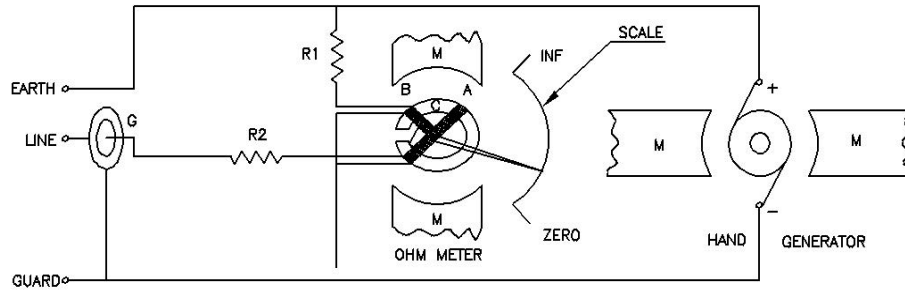
Apparatus Required:

S.NO.	Components Required	Range	Quantity
1.	Insulation Tester (Megger)	1000V,(0-200)MW	1
2.	Any Electrical equipment (Transformer, Cables)	-----	-----

Procedure:

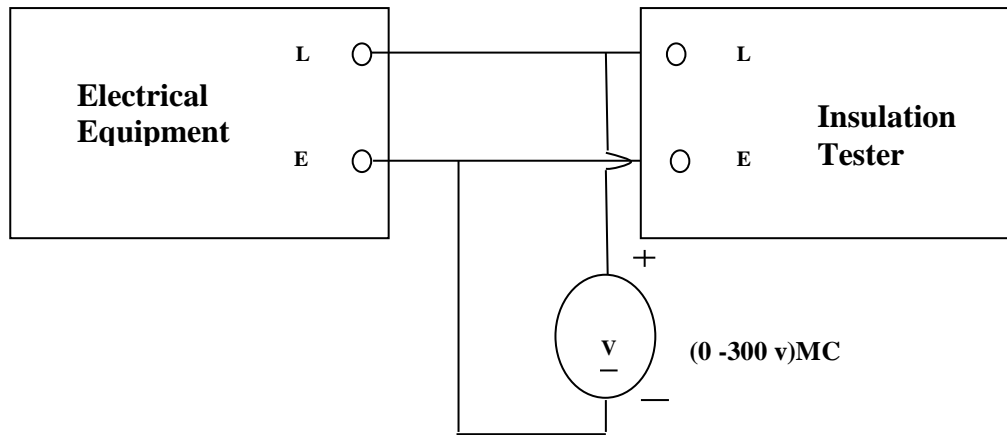
1. Connections are given as per the circuit diagram.
2. The required Voltage is generated with the help of Hand driven Generator (Megger).
3. The insulation resistance of the given equipment is directly read from the display of Megger.

CIRCUIT DIAGRAM FOR MEGGER



R1,R2 - Resistors
 M - Magnet
 A,B,C - Position of the Coils

L- LINE E- EARTH



Result:

Thus the insulation Resistance of the given Electrical Equipment was measured using Insulation tester.

ELECTRONICS

Expt. No. 1 a) STUDY OF ELECTRONIC COMPONENTS AND EQUIPMENTS

MEASUREMENT OF RESISTOR USING COLOR CODING

AIM:

To measure the value of resistor using color coding and check the value using digital multimeter.

APPARATUS REQUIRED:

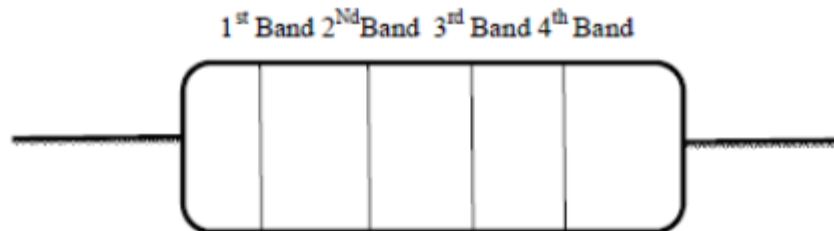
- I) Resistors
- II) Digital Multimeter

PROCEDURE:

- 1) Given resistor of different color bands are taken
- 2) Using the color band table the value of resistor is calculated and denoted as R1.
- 3) The tolerance value of higher range and lower range is found out.
- 4) Multimeter is taken and using connecting wires the value of resistor is found and denoted as R2.
- 5) Error is calculated as
$$\text{err} = (R1 - R2)$$
- 6) The error percentage is calculated as
$$\% \text{ err} = (R1 - R2) / R_T * 100$$

Where $R_T = R1 + R2$

Figure Indicating Bands of Resistor:



COLOR CODING TABLE:

COLOR	BAND 1	BAND 2	BAND 3	BAND 4
				TOLERANCE
BLACK	0	0	10^0	-
BROWN	1	1	10^1	-
RED	2	2	10^2	$\pm 2\%$
ORANGE	3	3	10^3	$\pm 3\%$
YELLOW	4	4	10^4	$\pm 4\%$
GREEN	5	5	10^5	-
BLUE	6	6	10^6	-
VIOLET	7	7	10^7	-
GREY	8	8	10^8	-
WHITE	9	9	10^9	-
GOLD	-	-	10^{-1}	$\pm 5\%$
SILVER	-	-	10^{-2}	$\pm 10\%$
NO COLOR	-	-	-	$\pm 20\%$

PRACTICAL VALUES:

	R1	R2	$R_T=(R1+R2)$	$E_T= (R1-R2)$	% err
Resistor 1					
Resistor 2					
Resistor 3					

RESULT: Thus the values of given resistors are calculated using color coding and verified by using digital multimeter.

Expt. No 1 b) ASSEMBLING ELECTRONIC COMPONENTS ON BREAD BOARD

AIM: To assembling electronic components as per given circuit diagram on Bread Board.

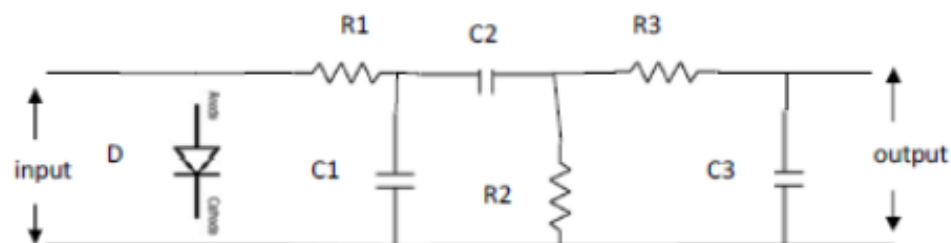
APPARATUS REQUIRED:

- 1) Bread Board - 1
- 2) Resistors - 3
- 3) Capacitors - 3
- 4) Diode (AL100) - 1
- 5) Connecting wires

PROCEDURE:

- 1) Study the given electronic circuit.
- 2) Study the Bread Board internal connections.
- 3) As per given circuit diagram, the components are assembled on the bread board as shown in figure.
- 4) Check all the connections are made.

CIRCUIT DIAGRAM:



BREADBOARD CONNECTION:



RESULT: Thus the electronic components are assembled on Bread Board as per given circuit diagram.

**Expt. No 2 MEASUREMENT OF AC SIGNAL PARAMETERS USING
CATHRODE RAY OSCILLOSCOPE**

AIM: To measure the AC signal parameters using CRO

- i) Voltage
- ii) Time period
- iii) Frequency

APPARATUS REQUIRED:

- 1) CRO
- 2) Function Generator (3MHz)
- 3) Probes

THEORY OF CRO:

Typical CRO consist of the following control knobs

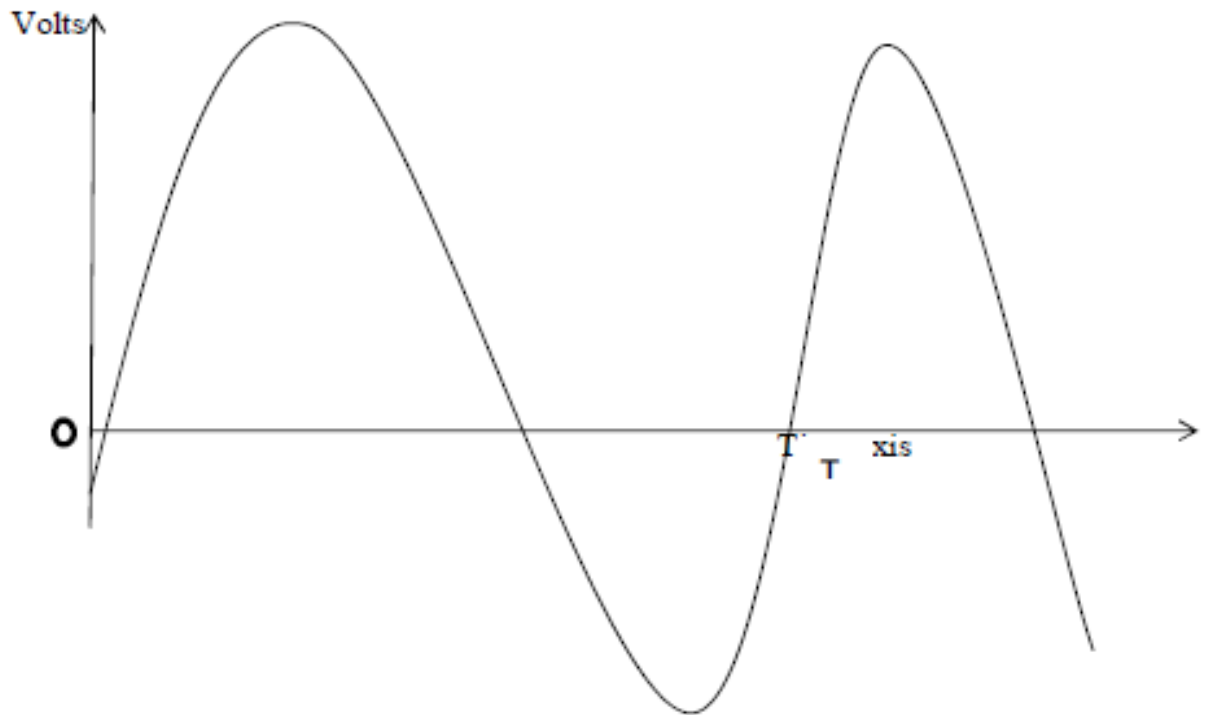
- i) Intensity Knob : It control the brightness of the track.
- ii) DC/AC Switch : DC position provides direct coupling to the amplifier
: AC provides capacitor in series with input to block the DC component.
- iii) ON-OFF Switch : Power ON/OFF switch
- iv) Focus knob : It provides voltage control to the sharpness of trace.
- v) Volt/cm knob : It provides voltage range from low to high.
It is a voltage amplifier.
- vi) Time/cm : This provides time base adjustment. It is a time multiplier.
- vii) Horizontal Position knob : It moves the horizontal on the CRT (X-axis).
- viii) Vertical Position knob : It moves the trace vertically (Y-axis).

PROCEDURE:

Measurement of voltage and frequency

- 1. Apply a sinusoidal wave to input terminal of CRO.
- 2. Put AC/DC switch in AC position.
- 3. Adjust volts/cm knob and time to readable display.
- 4. By adjusting the voltage for sinusoidal signal and note the peak to peak voltage as 2V.
- 5. By adjusting the time knob note the frequency to the fixed voltage.
- 6. Tabulate the readings.

PLOT OF AC SIGNAL:



PRACTICAL VALUES:

S.NO	Time Period (T)	Frequency ($f=1/T$)	Peak to Peak Voltage	Amplitude or Voltage

RESULT: Parameters of given AC signal are calculated by using CRO.

Expt. No 3. SOLDERING AND DESOLDERING PRACTICE

AIM: To practice soldering and desoldering for the given electronic circuit in a general purpose printed circuit board (PCB).

APPARATUS REQUIRED:

1. PCB board for given circuit - 1
2. Soldering iron (10W or 35W) - 1
3. Solder (60/40 grade) - 1
4. Copper plate - 1
5. Flux - 1
6. Connecting wires
7. Lead
8. Nose plier

PROCEDURE:

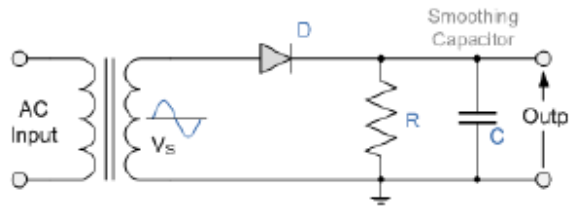
SOLDERING:

1. Clean the given PCB board.
2. Clean the tip of the soldering iron before heating and also clean the components which are to be soldered.
3. Heat the soldering iron and apply solder to the tip as soon as it is hot to melt on it.
4. Considering given circuit and the components are to be soldered in their respective places by applying hot tip to the joints.
5. Trim excess component lead with side cutter.
6. The equivalent etching diagram is taken and impressions are marked. When the component like diode is to be soldered or connected in reverse, the cathode in place of anode and anode in place of cathode are interchange and soldered.
7. If the mirror image alone is considered, then the copper plate is ready to be drilled and a considered component for the circuit is taken.
8. The same prior can be done for a fine circuit and the equivalent etching diagram is shown later.

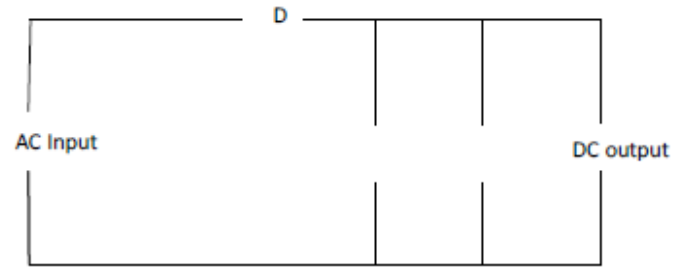
DESOLDERING:

1. Hold the component to be unsoldered by a nose plier.
2. Place the tip of the soldering iron on the joint until the solder is melt.
3. When the solder is melted, remove the component with a tweezer and brush away the molten solder.
4. Clean the components so that they can be used to make other circuits.

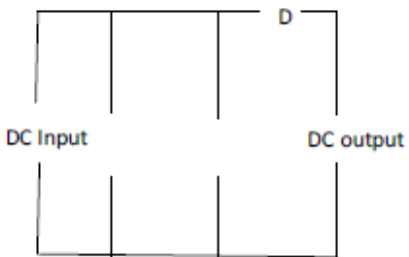
GIVEN CIRCUIT:



EQUIVALENT DIAGRAM:



MIRROR IMAGE:



RESULT: Thus the soldering and desoldering practice is done for the given electronic circuit successfully.

Expt. No 4 (a) VERIFICATION OF LOGIC OR GATE

AIM: To construct a OR gate and verify its truth table.

APPARATUS REQUIRED:

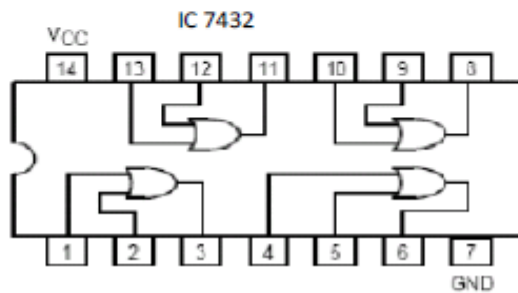
1. OR gate (IC-7432) - 1
2. Trainer kit - 1
3. RPS (0 – 30 V) - 1
4. LED - 1
5. Connecting wires

THEORY:

PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF OR GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	B	Y = A+B
0	0	0
0	1	1
1	0	1
1	1	1

RESULT: Thus the OR gate is tested and truth table has been verified.

4(b) VERIFICATION OF LOGIC AND GATE

AIM: To construct a AND gate and verify its truth table.

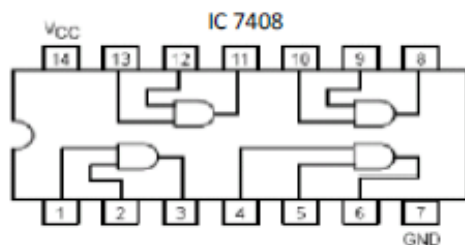
APPARATUS REQUIRED:

AND gate (IC-7408)	- 1
Trainer kit	- 1
RPS (0 – 30 V)	- 1
LED	- 1
Connecting wires	

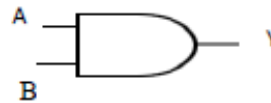
PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF AND GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	B	Y = AB
0	0	0
0	1	0
1	0	0
1	1	1

RESULT: Thus the AND gate is tested and truth table has been verified.

4 (c) VERIFICATION OF LOGIC NOT GATE

AIM: To construct a NOT gate and verify its truth table.

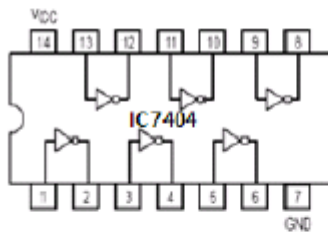
APPARATUS REQUIRED:

NOT gate (IC-7404) - 1
Trainer kit - 1
RPS (0 – 30 V) - 1
LED - 1
Connecting wires

PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF NOT GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	Y
0	1
1	0

RESULT: Thus the NOT gate is tested and truth table has been verified.

4 (d) VERIFICATION OF LOGIC NAND GATE

AIM: To construct a NAND gate and verify its truth table.

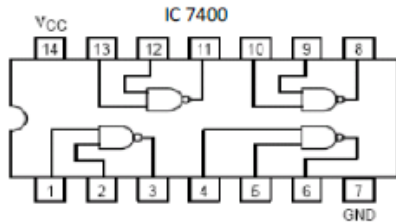
APPARATUS REQUIRED:

NAND gate (IC-7400) - 1
Trainer kit - 1
RPS (0 – 30 V) - 1
LED - 1
Connecting wires

PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF NAND GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	B	$Y = \overline{AB}$
0	0	1
0	1	1
1	0	1
1	1	0

RESULT: Thus the NAND gate is tested and truth table has been verified.

4(e) VERIFICATION OF LOGIC NOR GATE

AIM: To construct a NOR gate and verify its truth table.

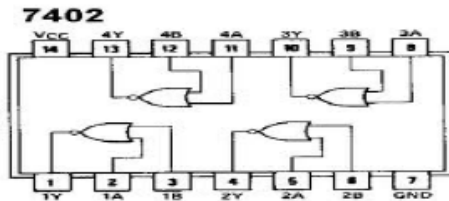
APPARATUS REQUIRED:

NOR gate (IC-7402)	- 1
Trainer kit	- 1
RPS (0 – 30 V)	- 1
LED	- 1
Connecting wires	

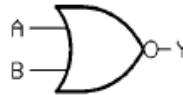
PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF NOR GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	B	$Y = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

RESULT: Thus the NOR gate is tested and truth table has been verified.

4 (f) VERIFICATION OF LOGIC EX-OR GATE

AIM: To construct a EX-OR gate and verify its truth table.

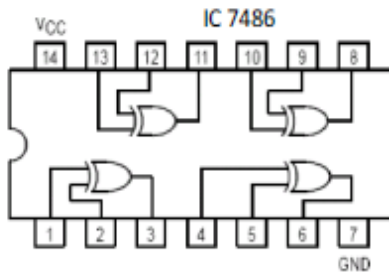
APPARATUS REQUIRED:

EX-OR gate (IC-7486) - 1
Trainer kit - 1
RPS (0 – 30 V) - 1
LED - 1
Connecting wires

PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given and the corresponding output Y noted.
3. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
4. The truth table is verified from the given data.

IC PIN DIAGRAM OF EX-OR GATE:



LOGIC DIAGRAM:



TRUTH TABLE:

A	B	Y = A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

RESULT: Thus the EX-OR gate is tested and truth table has been verified.

Expt. No: 5 IMPLEMENTATION OF HALF-ADDER CIRCUIT USING LOGIC GATES

AIM: To implement the Half-Adder circuit using logic gates.

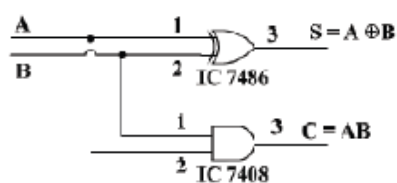
APPARATUS REQUIRED:

NAND gate(IC-7400)	- 1
EX-OR gate(IC-7486)	- 1
Trainer kit	- 1
RPS (0 – 30 V)	- 1
LED	- 2
Connecting wires	

PROCEDURE:

1. Connections are given as per the diagram.
2. The inputs A,B are given.
3. The output of NAND is noted as SUM and the Carry is noted at the output of EX-OR gate.
4. Observe the LED condition for the output, if LED glows it represents logic 1, otherwise logic 0.
5. The truth table is verified from the given data.

CIRCUIT DIAGRAM:



TRUTH TABLE:

A	B	S = A ⊕ B	C = AB
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

RESULT: Thus the Half-Adder is implemented by using logic gates and the truth table has been verified.