Ex No:1

RESIDENTIAL HOUSE WIRING USING SWITCHES, FUSE, INDICATOR LAMP AND ENERGY METER

Aim:

To prepare and test the house wiring using switches, fuse, indicator and energy meter (single phase)

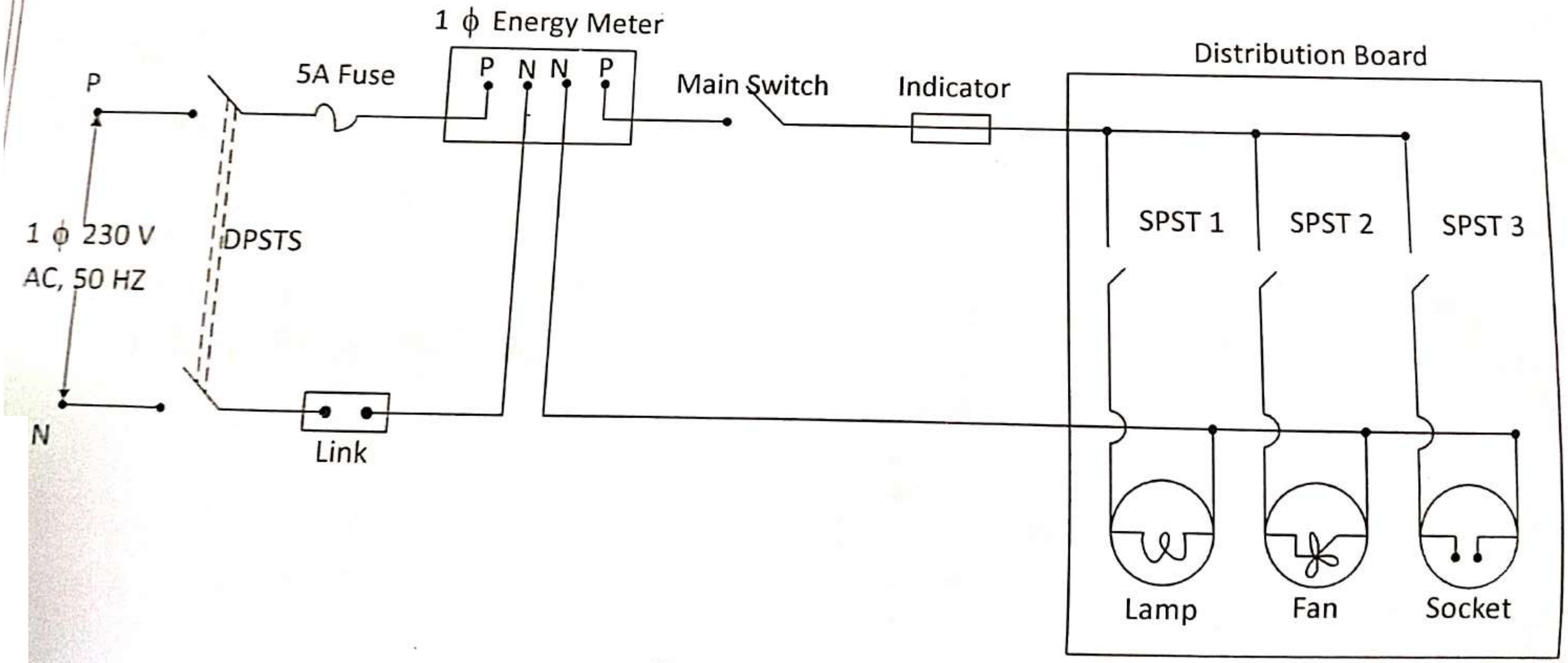
Tools required:

Screw driver, hammer, cutting plier, line tester.

Components required:

1 Energy meter (single phase)
2 Gang box
3 Indicating lamp
4 lamp with socket
5 wires
6 PVC pipe of required length
7 lamps
8 screws

Drawing:



Residential House Wiring

9. wires

10. switch board and wooden board.

Precautions:

* Ensure that there is no loose connection before switching on the supply. at any cost theconnecting wires should not be twisted
* Do not touch the connection wire when the supply is on.
* Insulation tube should be used in case of joined wires.
* check proper fuse rating

Theorey:

Wiring or what we call building wiring the produces of providing power to building and structures. Conductors, carry electricity and wiring makes their power available for public use. National and local regulations in a locality have to check on insulation of wiring producers In some countries single national body is in charge of electrical insulations and safety codes, which some countries, national technical standard body provides modest electrical code, which is then adopted.

The function of wiring safety codes is to give technigal performance and material standard wood alow proper use of electrical energy. Other preventions that are regulated are electric shocks, fire and explosion. Materials required for wiring a building depends on factors like rating of the circuit type of frequency, type of electrical system, National and local regulations and conditions in which the wiring must operate earlier methods of wiring were, signal clock, calculated copper conductors, running interior walls.

A branch circuit without remoting voltage for the whole segment some common tools are dinimains pliers, needle nose plier etc

Procedure:

* The wooden board of required length is taken.
* The PVC pipes are fixed on the board using clamps and screws.
* The bulb holder and switch board is also fixed on the board
* The connections are given as per the circuit diagram.
* Finally the circuit is tested using bulbs.

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Department of ECE			
S.No	Description	Mark Allotted	Mark Secured
1	Circ[illegible]		30
2.	Pro[illegible]		20
3.	Obser[illegible]		25
4.	Viva-Voce		5
	Total		80
Date	Signature [illegible]		

Result:

Thus, the house wiring using switches, fuse, indicating lamps and energy meter single phase was prepared.

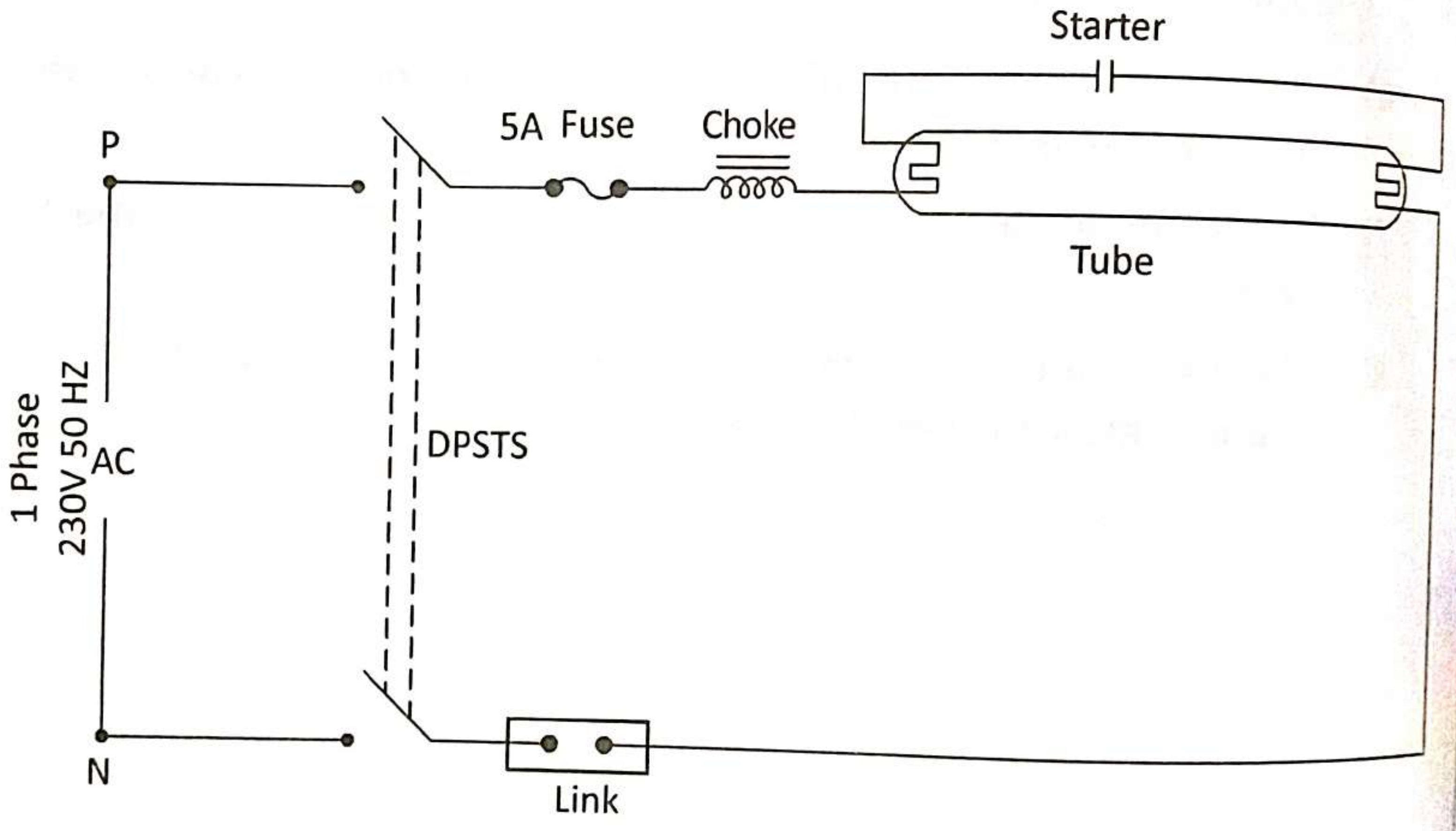
Ex No.2 FLUOROSCENT LAMP WIRING

Aim: To prepare and test the wiring for fluorescent

Tools required:
screw driver, hammer, cuttingplier, line tester.

Components required:
* Fluorescent lamp with fitting
* Joint lips
* Wires
* Screws
* Switch board
* Choke
* Switches

Theory:
Typical fluorescent lamp is filled with gas under small amount of mercury.



Fluorescent Lamp Wiring

Then the resultant without radiation strikes phosphorous coating for preheat and rapid start fixture designs.

Thirds more than a difference in appearance separting fluorseent and incandeseent lamps when electrical current passes through the tugster filaments. it heats to the point where it glows on, glows off a yellow to red light. Even the intense heat of the filament ensure a comparitively short and expensive lifespan.

Ultraviolet radiation produced at electron from the cathode knock mercury electrons out of from their natural orbit.

Procedure:

* Make the switch and table light location point and draw lines for wiring on the wooden board.
* place wires along the lines and fix them with the help of clips.
* The switch and the tube light in the marked positions
* Complete the wiring as per the wiring diagram
* Test the Working of the tube light by giving electric supply to the circuit

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S.No.	Description	Mark allotted	Mark Secured
1	Circ[illegible]		
2	Pr[illegible]		30
3	Obs[illegible]		25
4	Viva-voce		25
			5
	[illegible]		10

Result:

Thus the wiring for the fluorescent lamp was prepared and tested.

Ex No.3

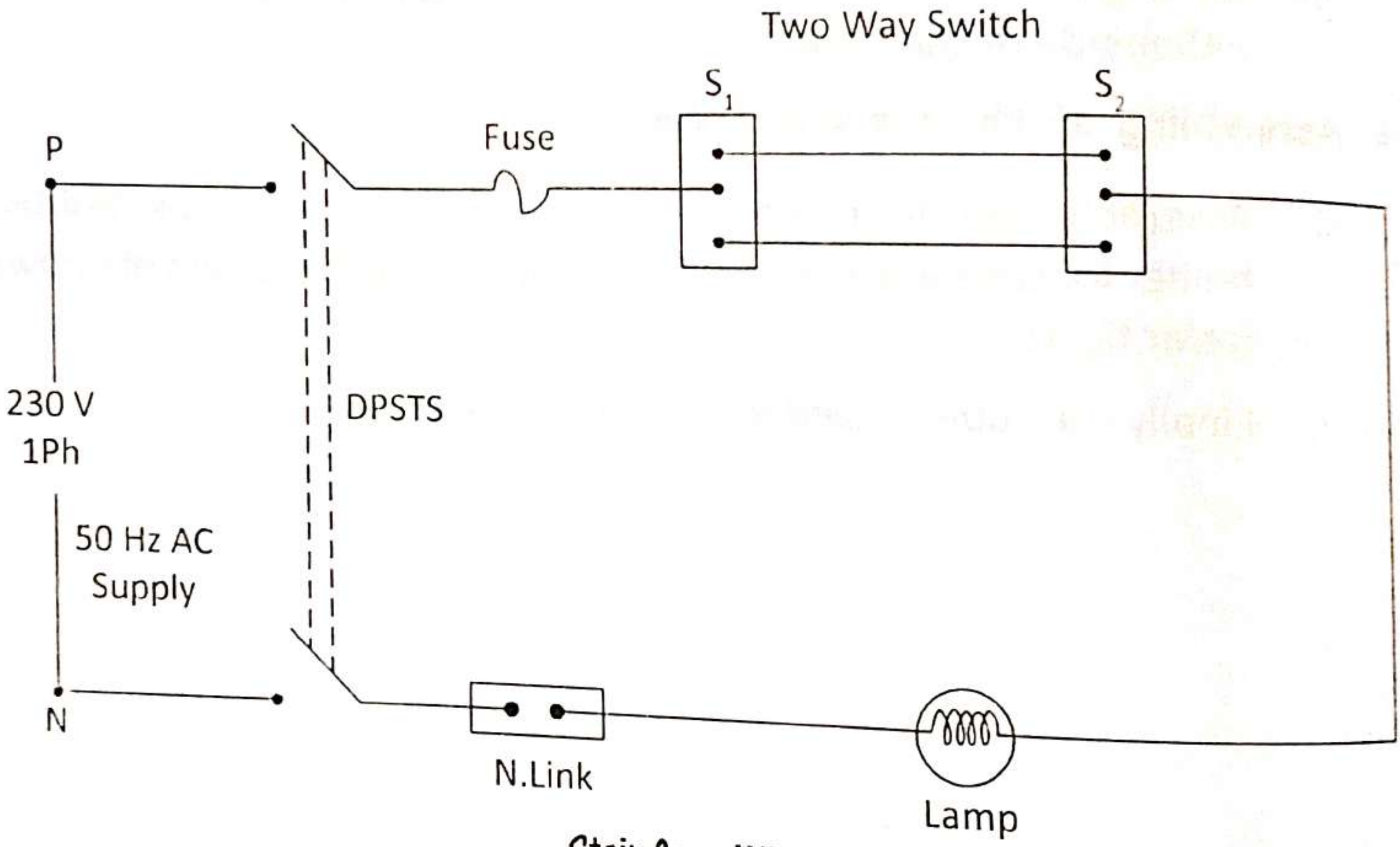
STAIRCASE WIRING

Aim: To prepare and test wiring for a staircase using two way switch.

Tools required: screw driver, hammer, cutting plier, line tester.

Components required: Two way switches, bulb holder, clamps, screens, switch board, connecting wires, PVC pipe (required length)

Theory: The three way switch allow the person to turn off and on a light from two different locations. for example you may have that two separate entrance, it is more efficiency to able to control lighting from two separate points the three way switch was developed



Stair Case Wiring

It is actually quite standard in most homes. The switches must create a complete circuit for current to flow to the bulb to light. When both the switch are up, the circuit is complete, when both switches are down, the circuit is complete. If one switch is up and one is down the current reaches and the bulb is off.

procedure:

* Mark the lines to wiring on the wooden board, ~~pb~~
* Place pipes on the board with the help of clamp using hammer.
* Then the bulb holder and two way switches in their respective positions
* Complete the wiring as per the circuit diagram.

Tabulation :

S1	S2	Lamp
1	1	ON
1	2	OFF
2	1	OFF
2	2	ON

* Test the circuit using bulb

<u>Result</u>:

Thus the staircase wiring was prepared and tested.

Ex No.4

Measurement of electrical Quantities voltage, current power and power factor in electrical circuit

Aim:

To measure electrical quantities for the given single phase circuit

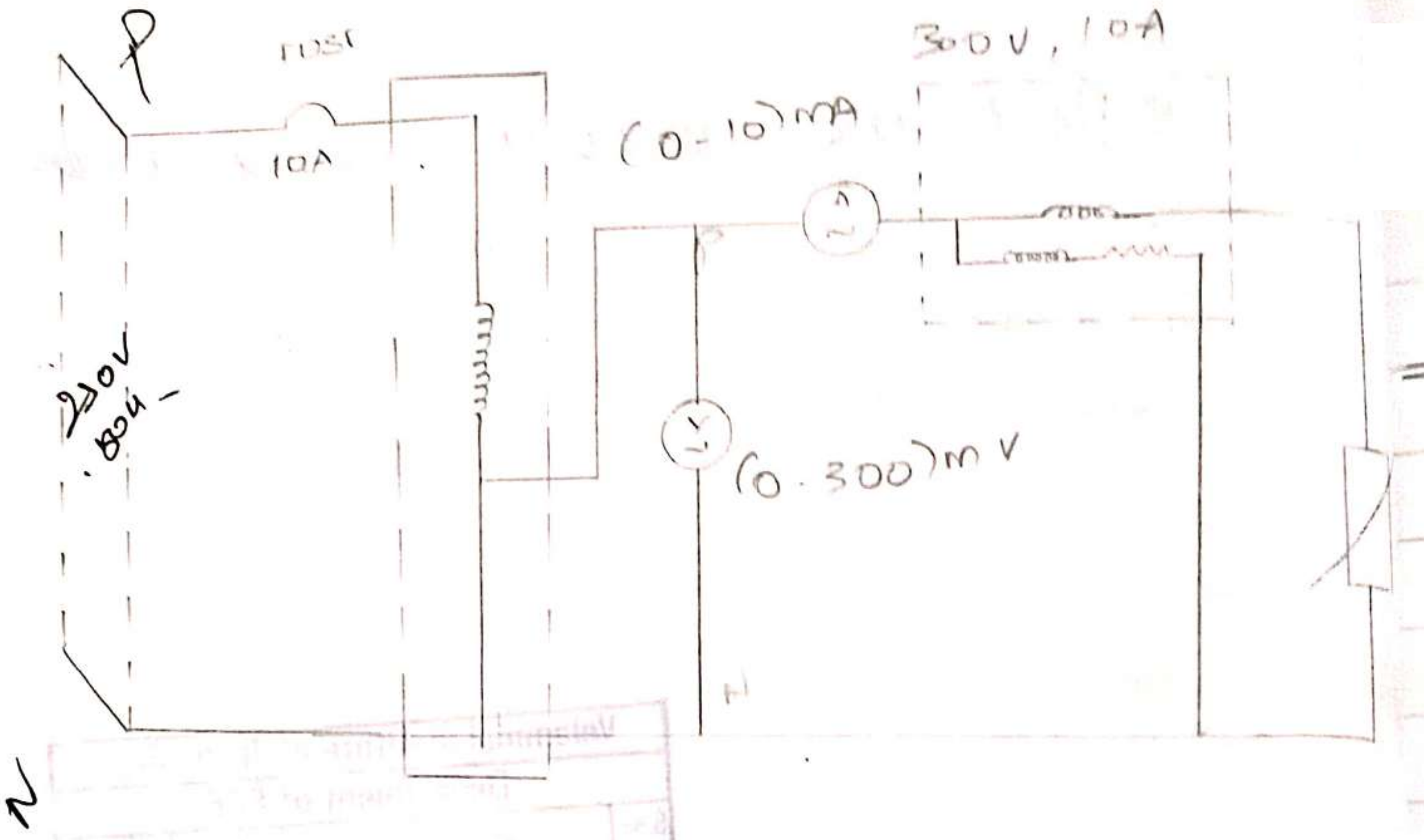
Apparatus

S.no	compound required	Range	Type	Quantity
1	Ammeter	(0-30)	MI	1
2	Load	Variable	RLC	1
3	Voltmeter	(0-300)V	MI	1
4	Watt meter	300V, 10A	UPF	1
5	Auto transformer	1KV 230-240A	1Φ	1

formula:

Apparent power = VI

= Voltmeter reading x Ammeter reading



R = 3kΩ

L = 60mH C = 4μF

S.NO	V VC (V)	I I_c (A)	Z Impedance Z(Ω)	Cosφ (C) 4	P=VI cosφ P(W)	Q=VI Sinφ Q(Var)
1	20	15	3.4	0.88	83	47.5
2	40	12	3.4	0.88	422.4	22.8
3	60	17	3.4	0.88	899.6	404.5
4	80	24	3.4	0.88	1689.6	912
5	100	150	3.4	0.88	2640	1425

$Z = \sqrt{R^2 + X^2}$

$X = (X_L - X_C)$

$X_L = 2\pi f_L$

$= 2 \times 3.14 \times 50 \times 60 \times 10^{-3}$

$X_L = 18.849$

$X_C = \dfrac{1}{2\pi f_C}$

$= \dfrac{1}{2 \times 3.14 \times 50 \times 2 \times 10^{-6}}$

$X_C = 1595.49$

$X = X_L - X_C$

$X = -1572.7$

$Z = \sqrt{R^2 + X^2}$

$= \sqrt{(3 \times 10^3)^2 + (1576.9)^2}$

$Z = 3.38 \times 10^3 \Omega$

$\cos\phi = R/Z$

$= \dfrac{3 \times 10^3}{3.4 \times 10^3}$

$\cos\phi = 0.88$

$\sin\phi = \sqrt{1 - \cos^2\phi}$

$= \sqrt{1 - (0.88)^2}$

$\sin\phi = 0.475$

$P_1 = 20 \times 5 \times 0.88$

$= 88$

$P_2 = 40 \times 12 \times 0.88$

$= 422.14$

$P_3 = 60 \times 17 \times 0.88$

$= 897.16$

$P_5 = 100 \times 30 \times 0.66$

$= 2640$

$P_4 = 80 \times 24 \times 0.88$

$= 1689.6$

$\phi_1 = 47.5$

$\phi_2 = 40 \times 12 \times 0.45$

$\phi_3 = 484.5$

$\phi_4 = 912$

Real power = VI cos θ (wattmeter reading)

power factor = cos θ (real power / apparent power)

Indicated power = observed reading × multiplying factor

percentage error = (Indicated power − actual power) × 100 / Actual power

procedure:

* connections are given as per the circuit diagram

* set the rated voltage by acturties for Various loading conditions.

* observe the meter readings for Various loading conditions

* calculate the error and plot and graph between % error and Current value.

Theory:

Tuned circuit have many applications particularly oscillating circuit and in ratio· and communication engineering. They can be used to select their frequency the total spectrum of ambient loads for example AM/FM radio with typically on the RLC circuit to time a radio frequency.

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S.No.	Description	Mark Allotted	Mark Secured
1.	Circu	[illegible]	30
2.	Pro		25
3	Obse		25
4	Viva-Voce		0
	To		10

Date

Result:

Thus electrical quantities like voltage, current, power and factor values are measured.

Ex No.5 Measurement of energy using single phase energy meter

Aim:

To measure the energy consumption in the given circuit by using single phase energy meter

Component required

Energy meter (single phase) 230V, 5A, Auto transistor (single phase), Ammeter (0-10) A·MI, Voltmeter (0-300)V, MI. positive loading with switches, double pole single throw switch, Connecting wires

formula:

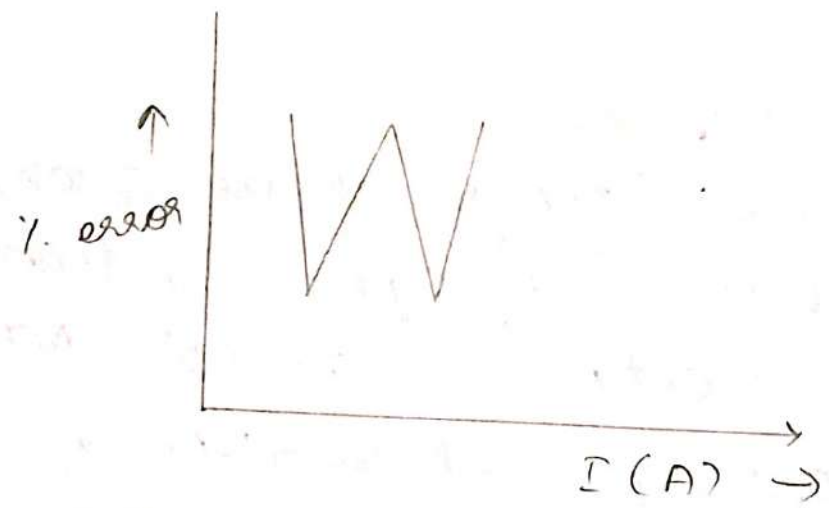
Actual energy = nK_t in KWhr

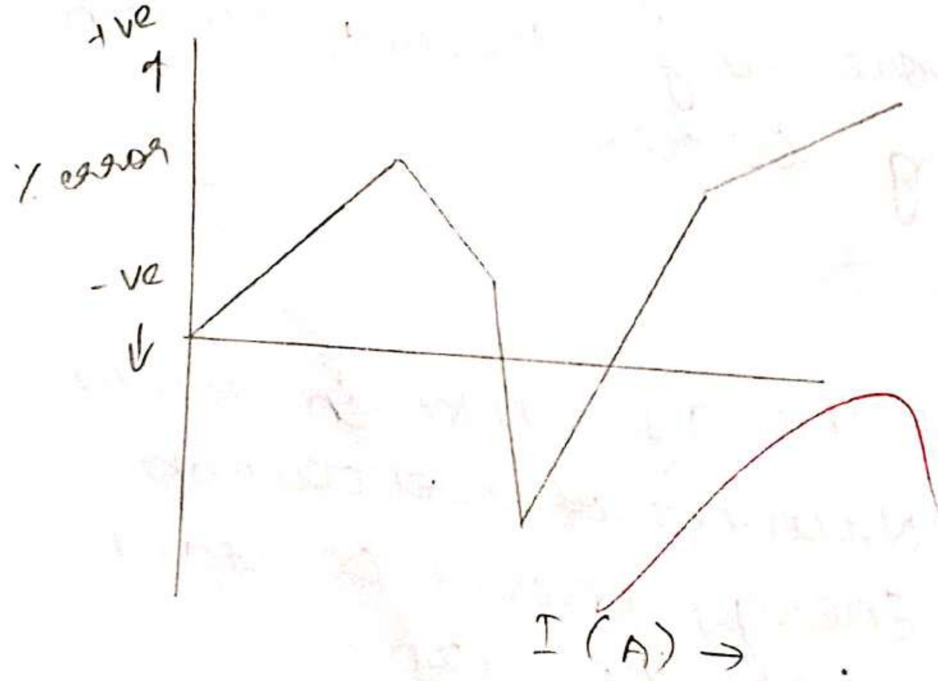
n = Number of revolution

K_1 = Energy meter constant

take $K_t = 1200$

S.NO	VOLTAGE	CURRENT	TIME TAKEN FOR 'N' REVOLUTIONS	ACTUAL ENERGY	MEASURED ENERGY	%
	V	A	S	KW		
1.	220	1	69	000.25	0.0042	-68
2.	220	1.5	38	0.0025	0.0038	-52
3.	220	2.2	23	0.0025	0.0030	-20
4.	220	3	18	0.0025	0.0033	-32





2. Measured energy = $(VI\cos\phi\, t)/3600$ (and in KWhr)

V = Voltmeter reading

I = Ammeter reading

t = time taken for 'n' revolution

3. % of error = [(Actual energy = Measured energy) - Actual energy] * 100

procedure:

Connections are given as per the circuit diagram.

.Set the rated voltage say 230 V by using auto transformer

Record the values in ammeter voltmeter and number of revolution on the energy meter disc during no load.

.Now apply the load by switching on the resistive loading

Record the values in ammeter, voltmeter and number of revolutions

Record the values in ammeter, Voltmeter and number of revolutions
Switch off the power supply
Calculate power and various loading condition also calculate the % of error.

<u>Theory</u>:

An electric meter or energy meter is a device at measures the amount of electrical energy produced by a residence, business or machine

The most common type is more properly known as a kilowatt hour meter or a joulemeter the most common unit of measurement on the electric meter is kilowatt hour.

The metallic disc is cutted upon by two coils. One coil is connected in such a way that it produced magnetic flux in proportion to the current

The amount of energy represented by one revolution of the disc is denoted by the symbol which is given in units of watt-hours.

The starter circuit opens and makes the choke induce a momentary high voltage source the two filaments. Ionisation takes place through bright light.

Result:

The wiring of the tube light is completed and tested

Ex No.6

Study of Resistor, colour, coading measurement of A.C signal parameter (Peak, RMS, period, frequency) using CRO

Aim:

To study resistor, colour, coading, measurement of AC signal parameter (peak, RMS period, frequency) using CRO.

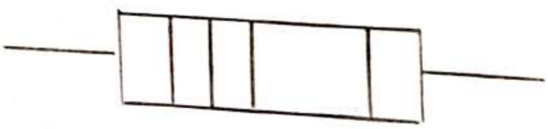
Equipments required

* Resistors
* Function generator
* CRO
* Probe.

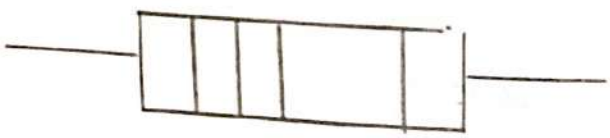
Resistor:

Resistor is an electrical component that reduces the electric current. The resistor ability to reduce the current is called resistance and is measure in units of ohm (symbol: Ω) colour code table

order of band colour	1st order digit	2nd order digit	3rd order multiplier	4th order tolerence
Black	0	0	1	-
Brown	1	1	10	± 10%
Red	2	2	10^2	± 2%
Orange	3	3	10^3	
yellow	4	4	10^4	
Green	5	5	10^5	± 0.5%
Blue	6	6	10^6	± 0.25%
Violet	7	7	10^7	± 0.1%
Grey	8	8	10^8	± 0.05%
White	9	9	10^9	
Gold				± 5%
Silver				± 10%



5·1 kΩ ± 5%



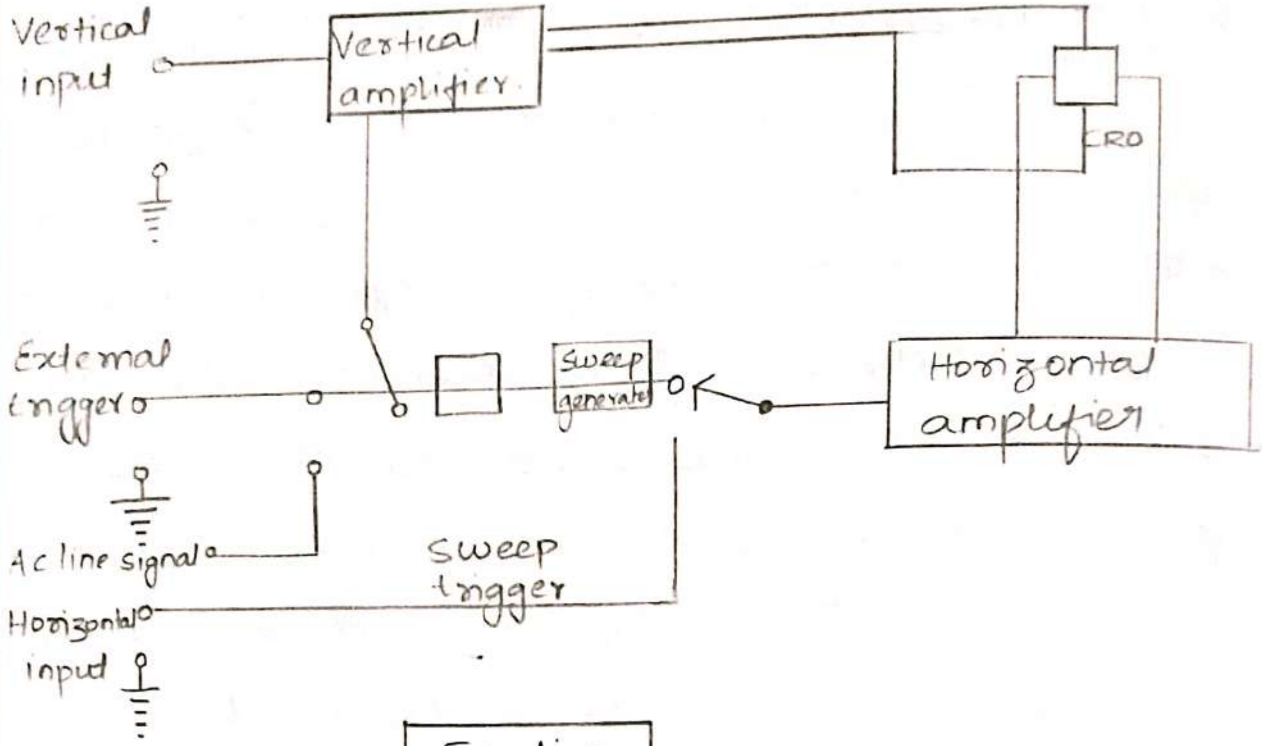
100 Ω ± 5%

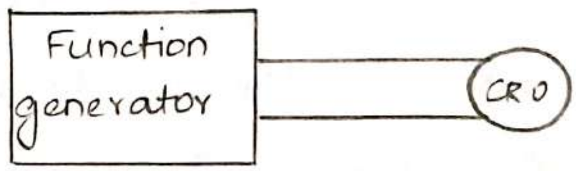
3·6 kΩ ± 5%

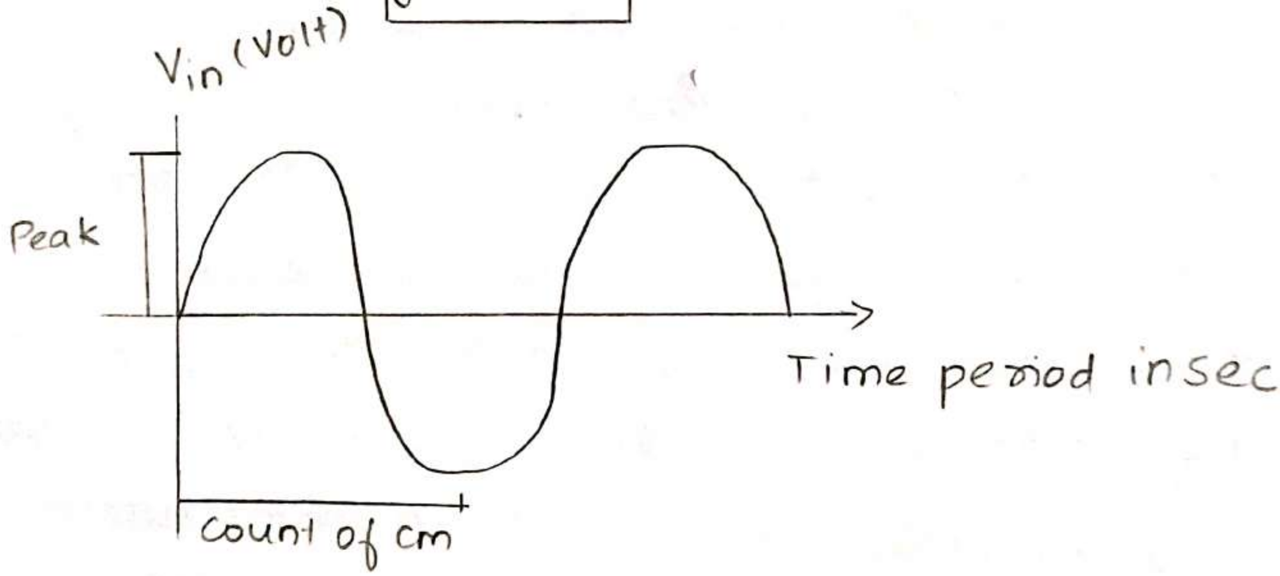
4~~7~~0 Ω ± 5%

CRO operation:

A simplified block diagram of a typical oscilloscope is shown. In general the instruments is operated in the following manner. The signal to be displayed is amplified by the vertical amplifier and applied to the vertical deflection plates of the CRO. A position of the signal in the vertical amplifier and applied to the vertical deflection plates of the CRO. Thus pulse turns on the sweep generator initiating the sawtooth wave form. The sawtooth wave is amplified by the horizontal amplifier and applied by the horizontal deflection plates. Also the sweep generator may be bypassed and an external signal applied directly to the horizontal amplifier







Measurement of AC source

S.no	Practical gain (V/cm)	Peak (m)	Amplitude of signal (V)	Time base (ms/cm)	Count (cm)	Time period (sec)	Frequency (Hz)
1	2	3.8	7.6	0.5ms	1.8	0.9ms	1.111 KHz
2	2	3.8	7.6	1 ms	1.5	1.5 ms	0.666KHz

To measure the frequency of the given signal.

* Count the CRO with the vertical input from the unknown source and the horizontal input from standard source. switch on the supply Set the gain controls to spread the pattern over ~~as~~ screen as desired.

* Adjust the standard frequency signal until pattern standard signal is at the same frequency as the unknown frequency.

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S.No.	Description	[illegible]	Mark [illegible]
1	Circ[illegible]	[illegible]	20
2.	Pro[illegible]		25
3.	Obse[illegible]		20
4	Viva-Voce		5
			[illegible]

Result:

Thus the resistor colour coding is measured and AC signal using CRO is verified

Ex No.7

study of logic gates

Aim:

To study and verify the truth table of digital logic gates (AND, OR, EXOR, NOT)

Equipments required:

* IC trainer kit
* connecting wires

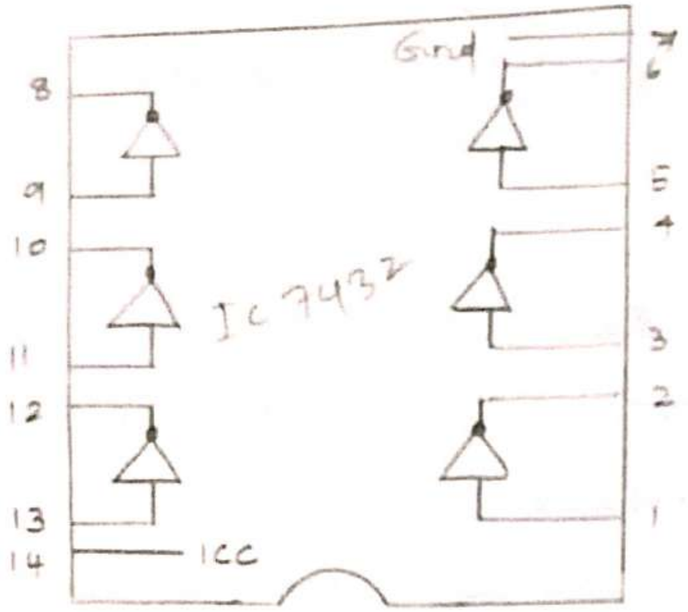
S.no	component name	Quantity required
1	IC 7404 (NOT)	1
2	IC 7408 (AND)	1
3	IC 7432 (OR)	1
4	IC 7486 (EXOR)	1

procedures:

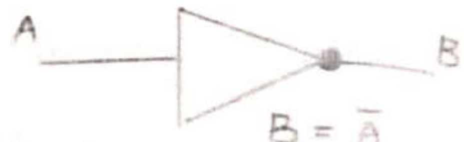
connect the circuit as per the diagram.

Ground the gate input for low level input 25 V supply for high level input observe the LED if LED glows

NOT



Symbol & truth table

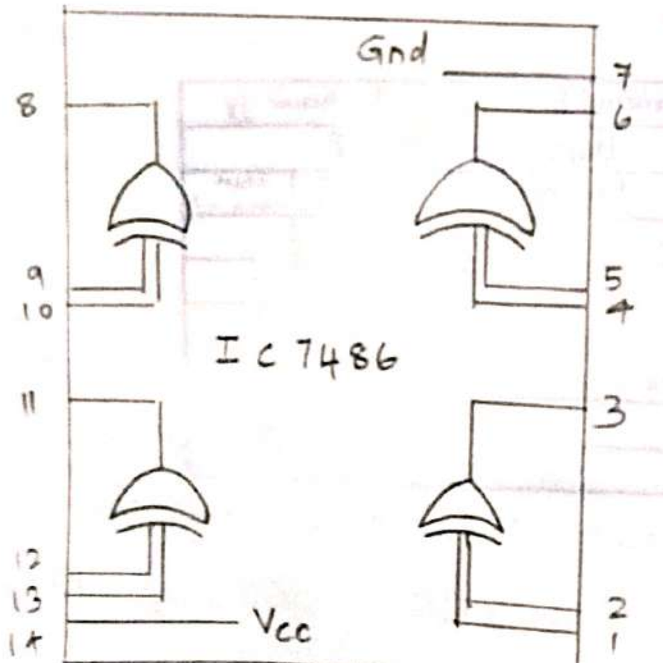


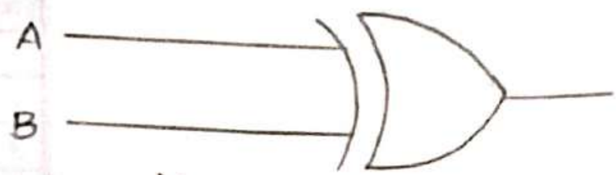
$B = \overline{A}$

Input	Output
A	B
0	1
1	0

EXOR

Symbol & truth table



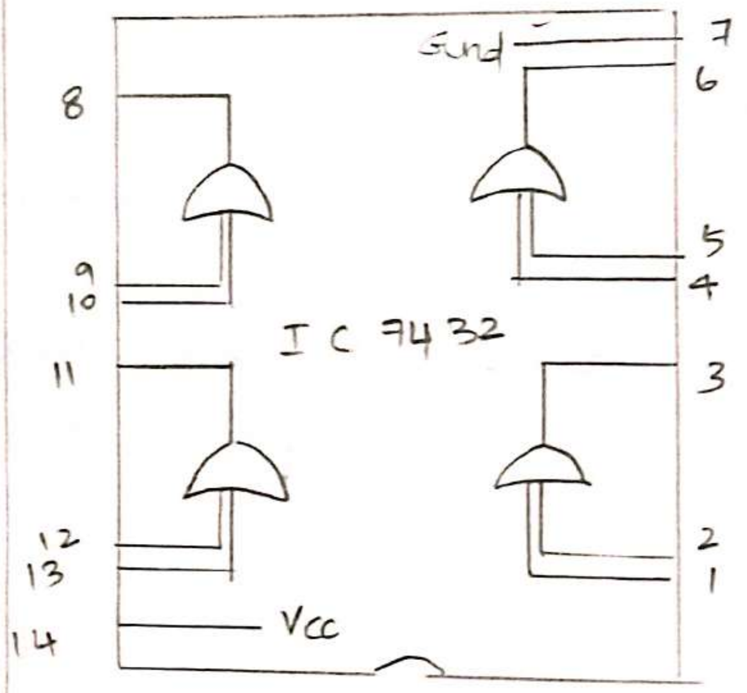


$Y = A \oplus B$

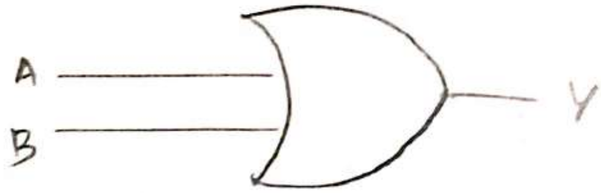
$Y = A\overline{B} + \overline{B}A$

Input		Output
A	B	V
0	0	0
0	1	1
1	0	1
1	1	0

OR GATE



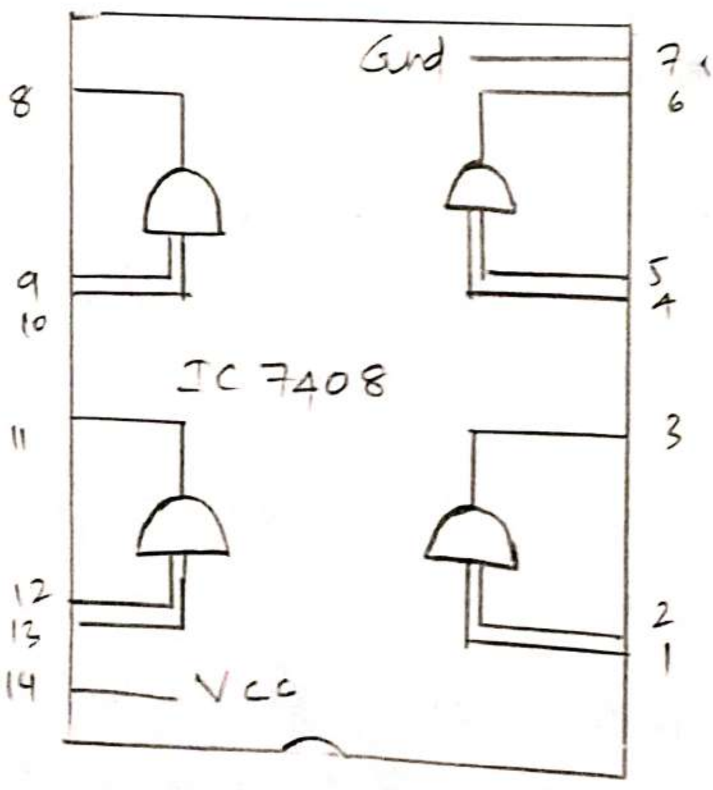
Symbol & Truth table

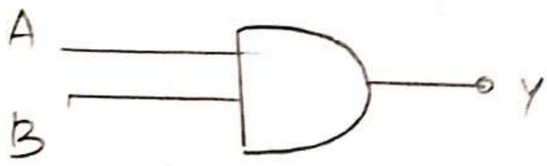


$Y = A + B$

INPUT		OUTPUT
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

AND GATE





$Y = A \cdot B$

Input		Output
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

It represents light logic 1. otherwise logic 0

Verify the truth table for each gate.

OR GATE

$$Y = A + B$$

AND GATE

$$Y = A \cdot B$$

NOT GATE

$$B = \bar{A}$$

EXOR GATE

$$Y = A \oplus B$$

$$= A\bar{B} + \bar{A}B$$

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S.No.	Description	Mark	Mark
1.	Circuit [illegible]	[illegible]	30
2.	Proce[illegible]		25
3.	Observation [illegible]		22
4	Viva-[illegible]	[illegible]	3
	TOTAL	[illegible]	80

Result:

Thus the truth table of logic gates AND, OR, NOT, EXOR are verified.

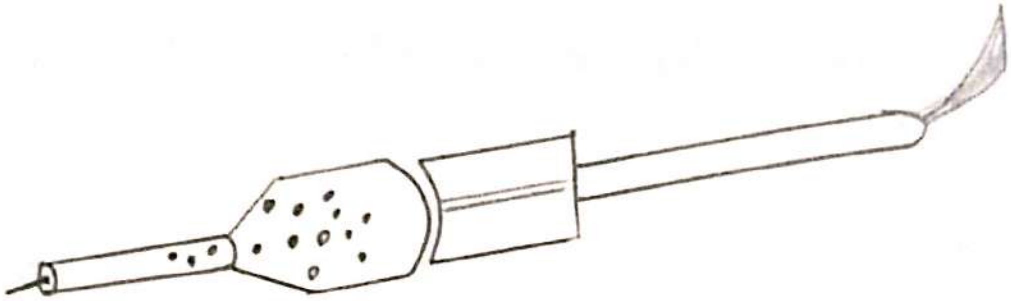
Ex No.8

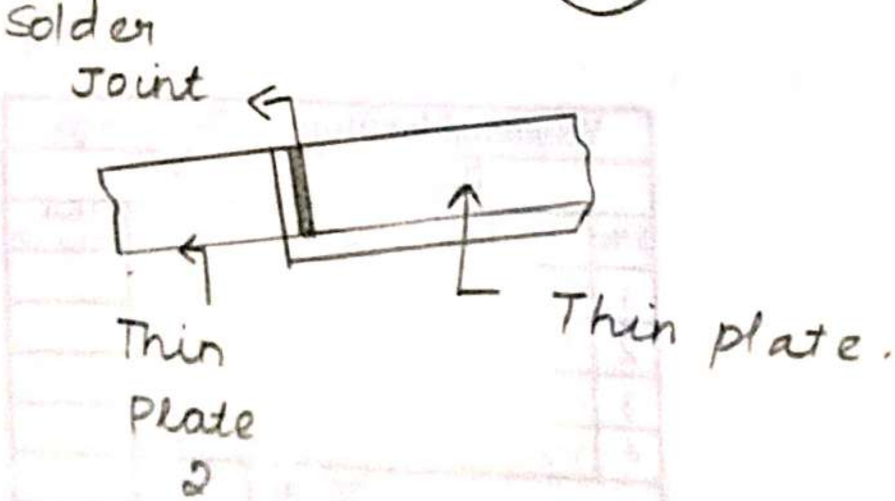
Soldering and Desoldering practice on PCB.

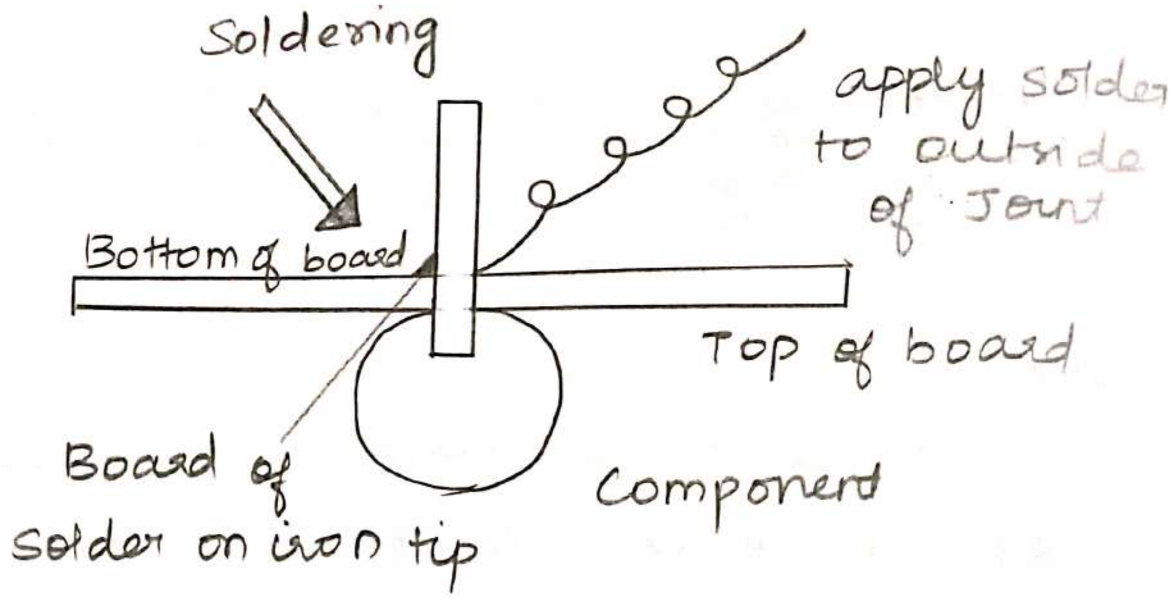
Aim:

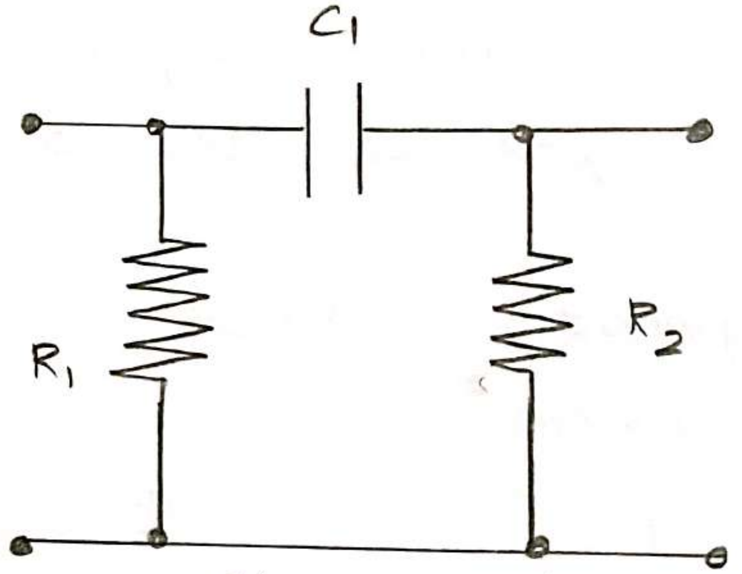
To practice soldering and desoldering for the given electronic circuit by assembling and disassembling the resistance R_1 and R_2 capacitor C_1 in the given printed circuit board (PCB)

S.no	Component name	Range	Quantity required
1	Soldering iron	10W(or) 30W	1
2	Solder	60/40 grade	1
3	Flux	-	1
4	General PCB	-	1
5	Resistors	100 K Ω	2
6	Capacitors	0.01 μs	1
7	Nose piles	-	1
8	Electricians knife		1

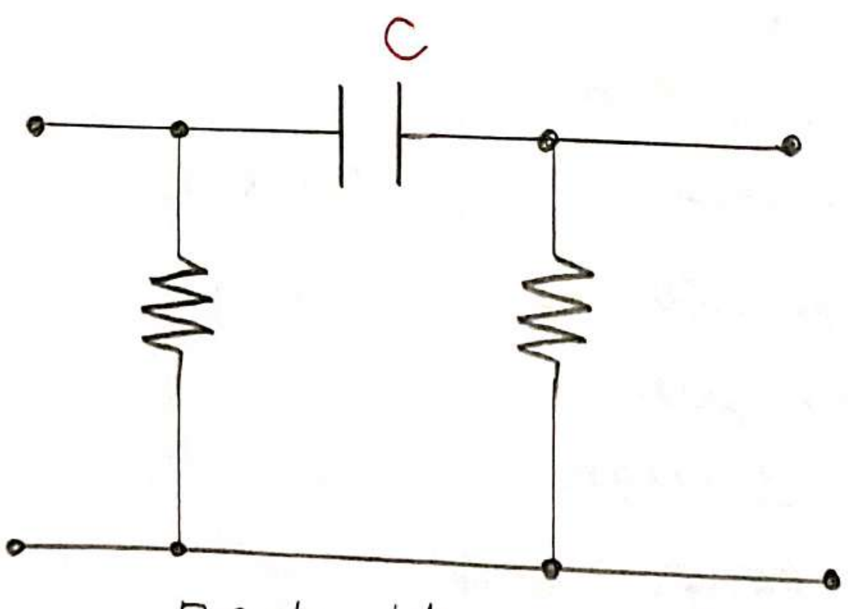



Solder Joint
Thin plate.
Thin Plate 2





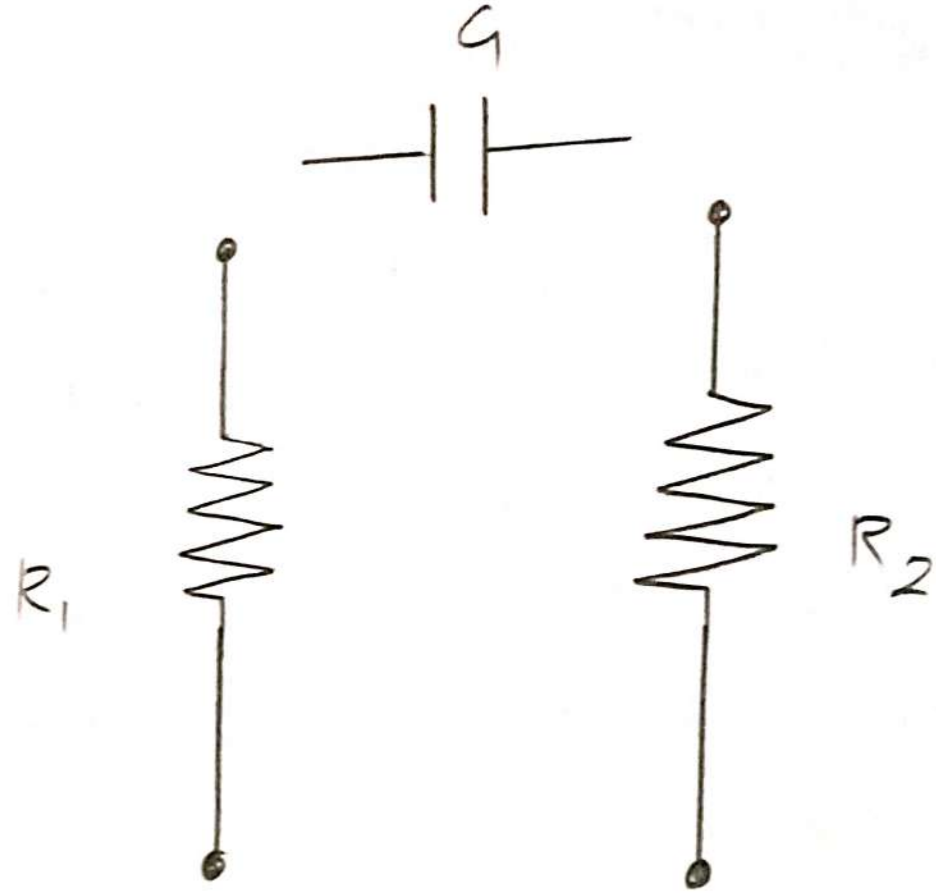
Given circuit



Back side of the PCB board

Soldering procedure:

* clean the PCB board, clean the tip of the iron before heating and also clean the resistors, capacitors which are to be soldered
* Heat the soldering iron and apply solder to the tip as soon as it is hot to melt on it
* Bend the soldering resistor loads to fit into the holes on the band insert the resistor as per the circuit.
* Apply the hot tip to the joints and apply solder
* Remove the soldering tip and hold the resistor tightly until the solder has cooled and set.
* Trim excess component load with side cutter.



Front side of the PCB Board

Desoldering procedure:

*Hold the resistor R_1, that is to be unsoldered by a nose plier

*place the tip of the soldering iron joint, until the solder is melt.

*When the tip of the solder is melted remove the resistor R and a tweeter and brush away the molten solder.

* Repeat the above steps to remove resistor R_1 and capacitor C_1.

*clean the resistor and capacitors so that they can be used to make other circuits

Result:

Thus soldering and desoldering Component on a PCB circuit board is done.

Ex No.9 Generation of clock signal.

Aim:

To generate a clock signal using 555 timer IC

components required

S.no	Component name	Range	Quantity required
1	IC 555		1
2	Resistor	$1K\Omega$, $2.2K\Omega$	Each one
3	capacitor	$0.1\mu F$, $0.01\mu F$	Each one
4	CRO	30 MHz	1
5	RPSU	12 V	1
6	Bread board	-	1

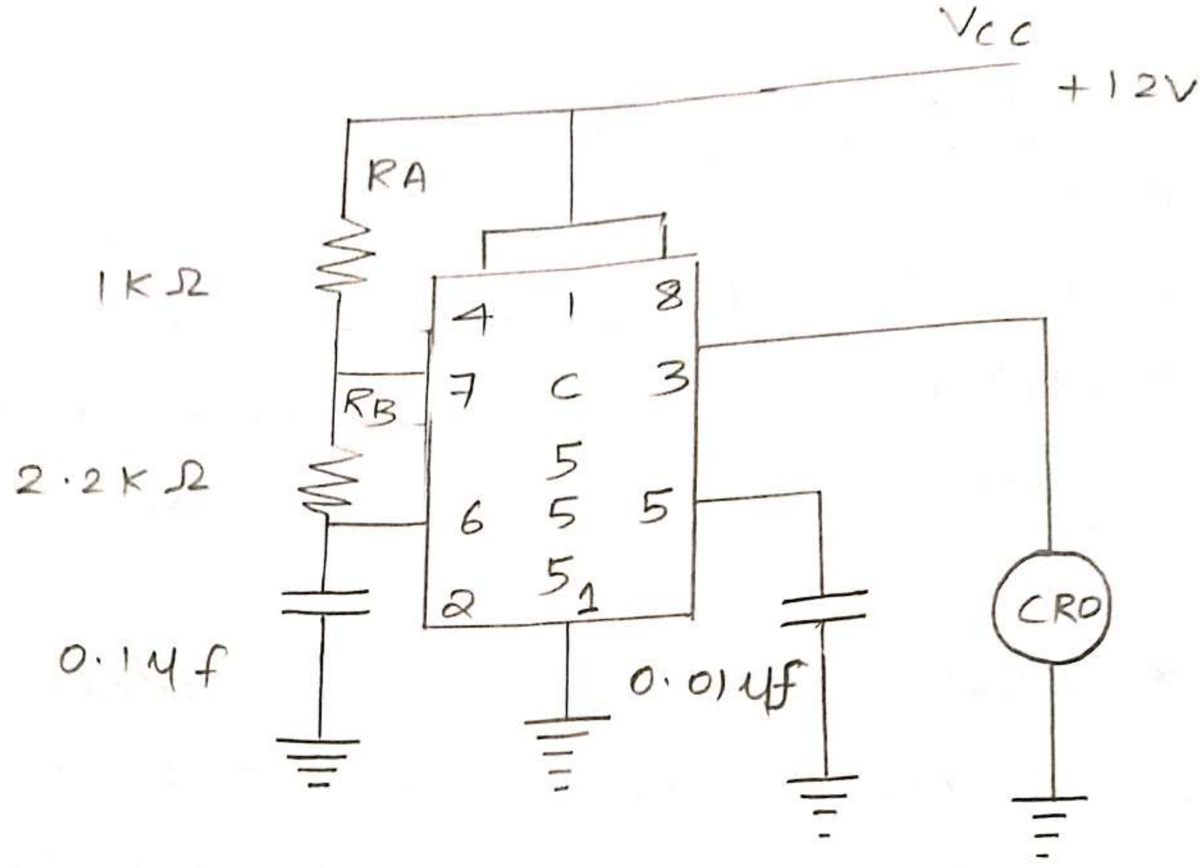
Formula used:

$$T_{on} = 0.69 (R_A + R_B) C$$

$$T_{off} = 0.69 R_B C$$

$$T = T_{on} + T_{off}$$

$$T = 0.69 (R_A + 2R_B) C.$$


Vcc
+12V
RA
1KΩ
RB
2.2KΩ
0.1μf
4
1
8
7
C
3
5
6
5
5
5
2
1
0.01μf
CRO

Model graph


Y
o/p
voltage
0.17ms
0.13ms
Time in ms
X

output waveform

x-axis			y-axis		
div	t/div	t	div	V/div	V
3	0.1 ms	0.3ms	2.4	2	4.8

procedure:

1) The connections are made as per the circuit diagram
2) using RPSU set the constant voltage
3) The waveform details are noted for the signal by using CRO
4) The graph should be drawn for above reading

Theoretical frequency

$C = 0.1\,\mu f$, $RA = 1K\Omega$

$RB = 2.2K\Omega$

time $(T) = 0.69(RA + 2RBC)C$

$= 0.69[(1\times10^3) + 2(2.2\times10^3)]\times 0.1\times10^{-6}$

$T = 3.72627\times10^{-4}$ sec.

frequency $(F) = 1/T$

$$F = \frac{1}{3.726\times10^{-4}\,sec}$$

$F = 2683.84\,HZ$.

Result :

Thus the clock signal generated by using 555 timer IC.

Ex No.10 Measurement of Ripple in Half wave and full wave rectifier

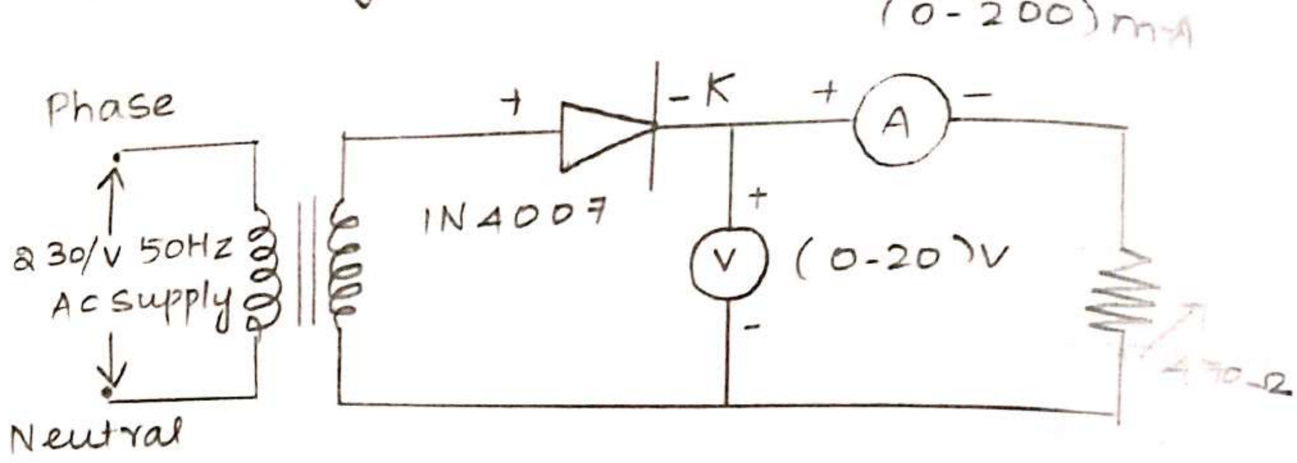
Aim: To measure the ripple factor of the half wave and full wave rectifier circuits.

Components required:

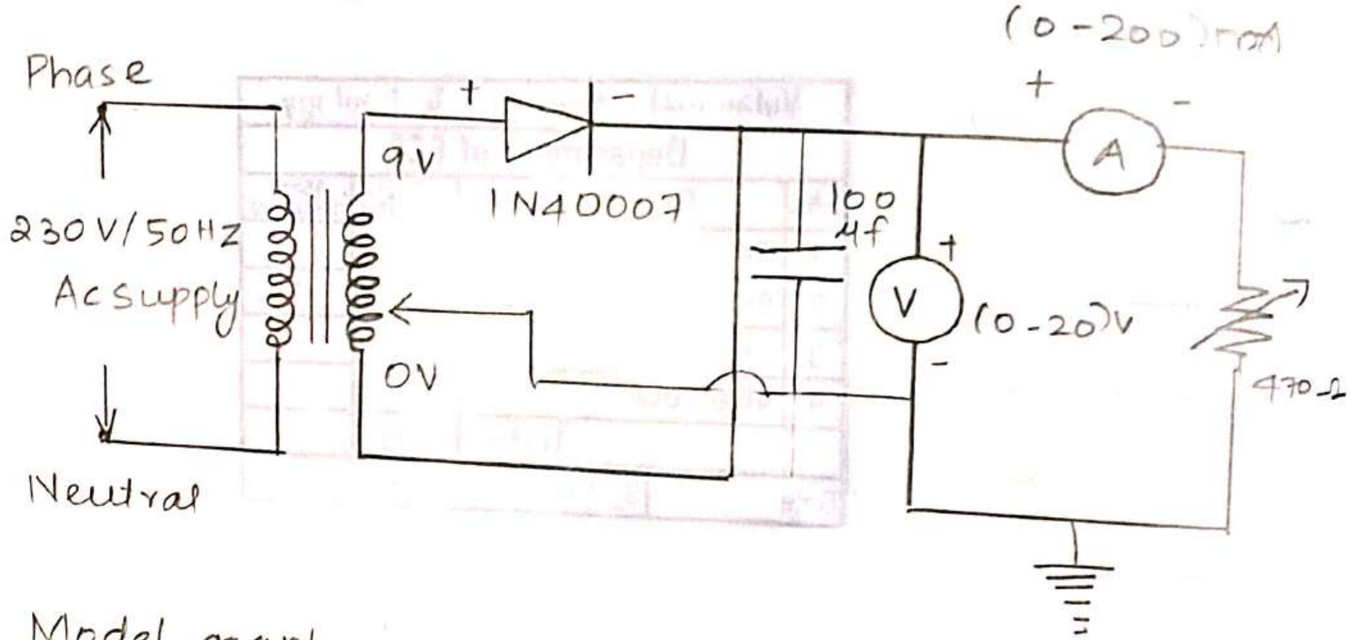
S.no	Component Name	Range	Quantity
1	Transformer	(9-0-9)V	1
2	Ammeter	(0-200)mA	1
3	Voltmeter	(0-20)V	1
4	PN Junction diode	IN 4007	1
5	Resistor	470Ω	1
6	capacitor	10μF, 100μF	1
7	DRB	-	1
8	CRO	-	1
9	Bread board	-	1
10	Connecting wires	-	As required

Drawings: Half-Wave Rectifier

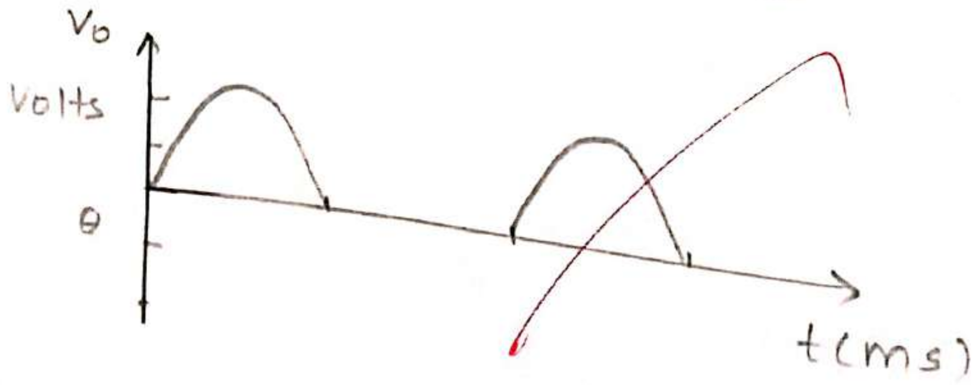
Circuit Diagram (without filter)



Circuit Diagram (with filter)

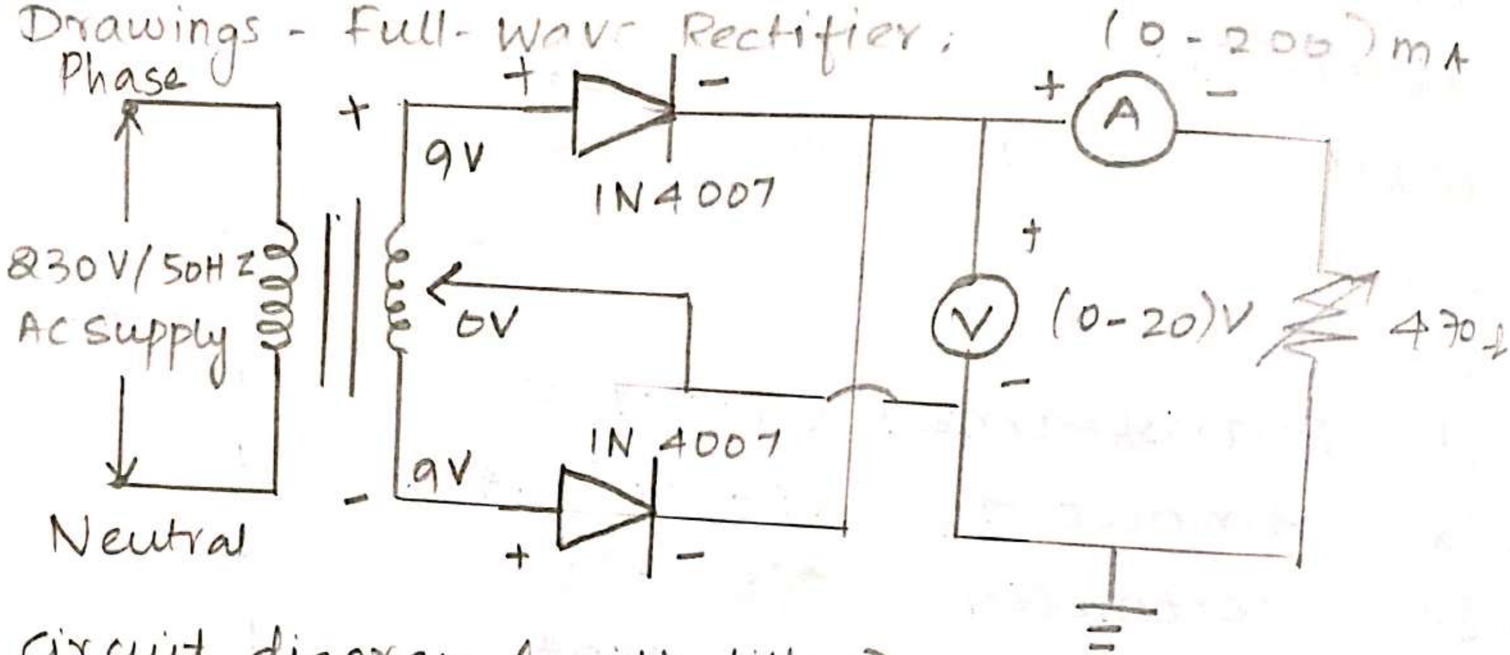


Model graph:

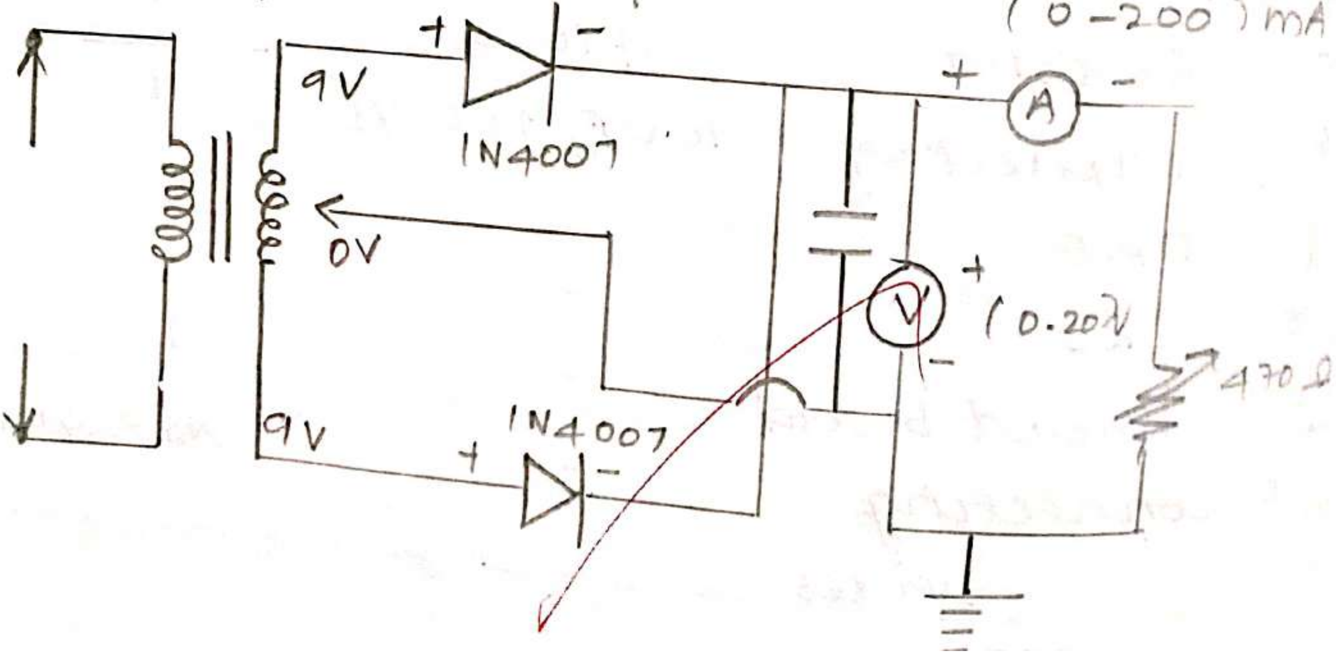


V_{NL} =		V_{FL} =		Ripple factor (γ)
V_{DC}(V)	I_{DC}(mA)	V_{DC}(V)	I_{DC}(mA)	
15	7.5	4.77	20	$\gamma = 1.210$

Drawings - Full-wave Rectifier:



Circuit diagram (with filter)



Theory:

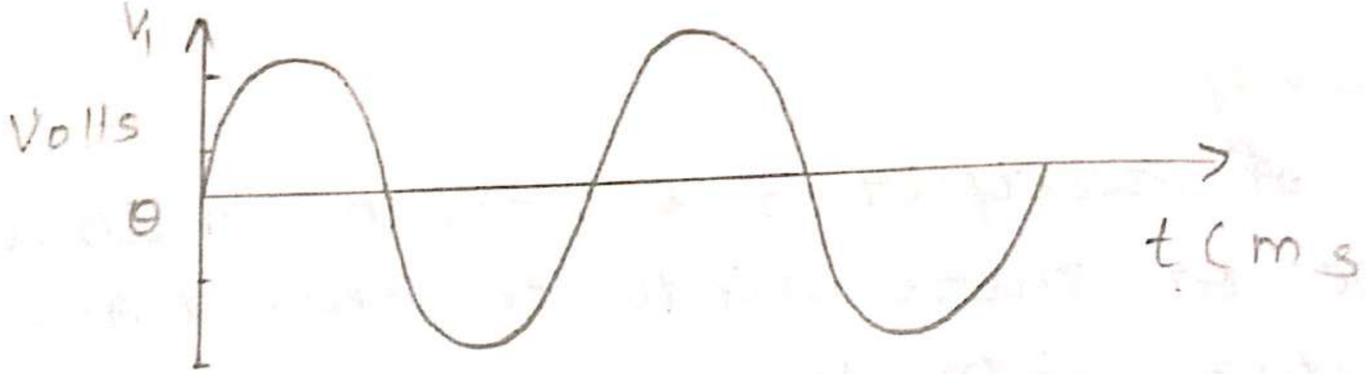
A rectifier is a circuit, which uses one or more diode to convert A.C. voltage into input pulsating D.C voltage. It may be broadly categorized into two types.

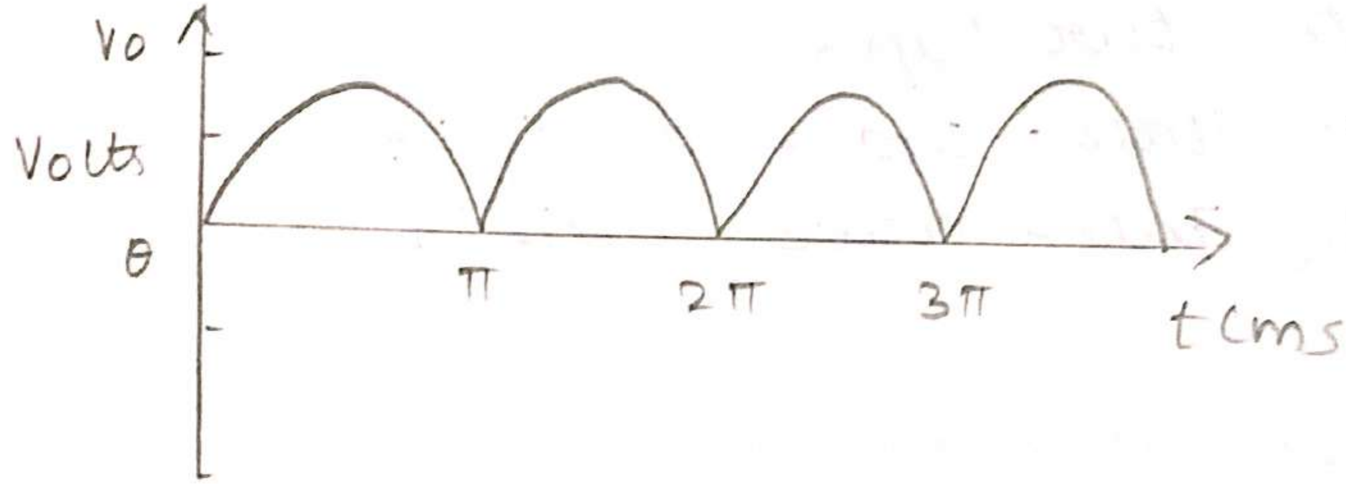
1) Half-wave rectifier
2) Full-wave rectifier

Half-wave rectifier:

It consists of a single diode in series with a load resistor. During the positive half cycle of the input signal the anode of the diode becomes positives with respect to the cathode and hence the diode (D) conducts. So the whole input voltage will appear across the load resistor R_L.

During the negative half cycle of the input signal the anode of the diode becomes negative with respect to the cathode and hence the diode





V_{NL} =		V_{FL} =		Ripple Factor (γ)
V_{DC} (V)	I_{DC} (mA)	V_{DC} (V)	I_{DC} (mA)	
15	10.60	9.55	20	0.420

Ripple Factor = $\sqrt{(V_{rms}/V_{dc}^2)-1}$

$$\frac{V_{rms}}{V_{dc}} = \frac{V_m}{\pi}.$$

Full- wave rectifier:

In full wave rectification, current flows through the load in the same direction for both cycle of the AC voltage; this can be achieved with two diodes working alternatively, one during the positively half cycles of the input and other during the negative half. so that the current always flows in the same direction.

The following two circuit are commonly used for full wave rectification:

i) center - tap full wave rectifier
ii) full wave bride rectifier

Half wave - rectifier

$V_{rms} = \frac{15}{2} = 7.5$

$V_{dc} = \frac{5}{3.14} = 4.77$

$r = \sqrt{(V_{rms}/V_{dc})^2 - 1}$

$= \sqrt{(7.5/4.77)^2 - 1}$

$= 1.210$

Full wave - rectifier

$V_{rms} = \frac{15}{\sqrt{2}} = 10.60$

$V_{d} = \frac{2.15}{3.14} = 9.55$

$r = \sqrt{(V_{rms}/V_{d})^2 - 1}$

$= \sqrt{(1060/9.55)^2 - 1}$

$= 0.98$

Ripple factor:

The ratio of the rms value of AC component to the DC component in the output is known as ripple factor

$\gamma = V_{rms} / V_{dc}$.

without filter:

$V_{rms} = V_m/\sqrt{2}$, $V_{dc} = 2V_m/\pi$.

Ripple factor $= \sqrt{(V_{rms})/(V_{dc})^2 - 1}$

with filter:

$V_{rms} = V_m/\sqrt{2}$, $V_{dc} = 2V_m/\pi$.

Ripple Factor $= \sqrt{(V_{rms})/(V_{dc})^2 - 1}$

procedure:

Make the connections

Vary the DRB in small steps, measure and record the corresponding current Idc and voltage Vdc readings.

plot the graph by taking Idc along X-axis and Vdc along Y-axis.

Measure the no-load and full-load voltage

calculate the ripple factor and

percentage of regulation
Make the connections
Repeat the steps from 2 to 6.

Result: Thus the halfwave and full wave rectifier with and without filter is constructed and tested.

1) Ripple factor with filter for halfwave rectifier = 1.34

2) Ripple factor without filter for halfwave rectifier = 1.210

3) Ripple factor with filter for full wave rectifier = 1.216

4) Ripple factor without filter for full wave rectifier = 0.48

5) Ripple factor for wave rectifier = 0.48