DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603203.

Title of Experiment	: **8. Wave shaping circuits (Half wave & Full Rectifiers, Clippers)**
Name of the candidate	:
Register Number	:
Date of Experiment	:

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
Total		**50**	

Staff Signature

PRE LAB QUESTIONS (Rectifiers)

1 What is the necessity of rectifier?

2 What is PIV of a diode in Full Wave Rectifier (FWR) and Half Wave Rectifier (HWR)?

3 What is ripple factor? Why it is required?

4 Why are filters connected at the output of rectifiers?

5 What are the types of filters used in rectifier? And which is better and why? Types of filters

Experiment No. 8 a) **Date :**	**SINGLE PHASE HALF WAVE RECTIFIER**

Aim

To construct a half wave rectifier using diode and to draw its performance characteristics.

Apparatus Required

S. No.	Name	Range	Qty
1	Transformer	230/(6-0-6)V	1
2	R.P.S	(0-30)V	2

Components Required

S. No.	Name	Range	Qty
1	Diode	IN4007	1
2	Resistor	1K Ω	1
3	Bread Board	-	1
4	Capacitor	100µf	1
5	CRO	-	1

Formulae

Without Filter

(i) $V_{rms} = V_m / 2$

(ii) $V_{dc} = V_m / \pi$

(iii) Ripple Factor = $\sqrt{\left(\frac{V_{rms}}{V_{dc}}\right)^2 - 1}$

(iv) Efficiency = $(V_{dc} / V_{rms})^2 \times 100$

With Filter

(i) $V_{rrms} = \sqrt{V_{rms}^2 - V_{dc}^2}$

(ii) $V_{rms} = V_{rpp} / (\sqrt{3} \times 2)$, where V_{rpp} is peak to peak value of ripple voltage

(iii) $V_{dc} = V_{m} - 0.5 * V_{rpp}$

(iv) Ripple Factor = V_{rms} / V_{dc}

Procedure

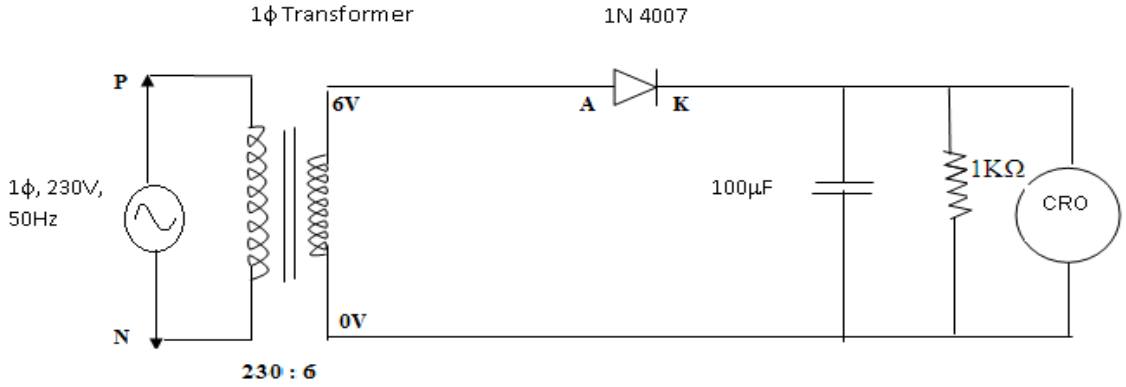
Without Filter

1. Give the connections as per the circuit diagram.
2. A 230 V, 50 Hz AC input given to primary side of the transformer where phase end of the secondary is connected to anode terminal of the diode.
3. Observe the output across the 1 K ohm load with use of CRO.
4. Plot its performance graph.

With Filter

1. Connections made as per the circuit diagram.
2. A 230 V, 50 Hz AC input given to primary side of the transformer where phase end of the secondary is connected to anode terminal of the diode.
3. Connect the Capacitor across the 1 K Ohm load
4. Observe the output across the 1 K Ohm load with use of CRO.
5. Plot its performance graph.

Circuit Diagram



Tabular Column

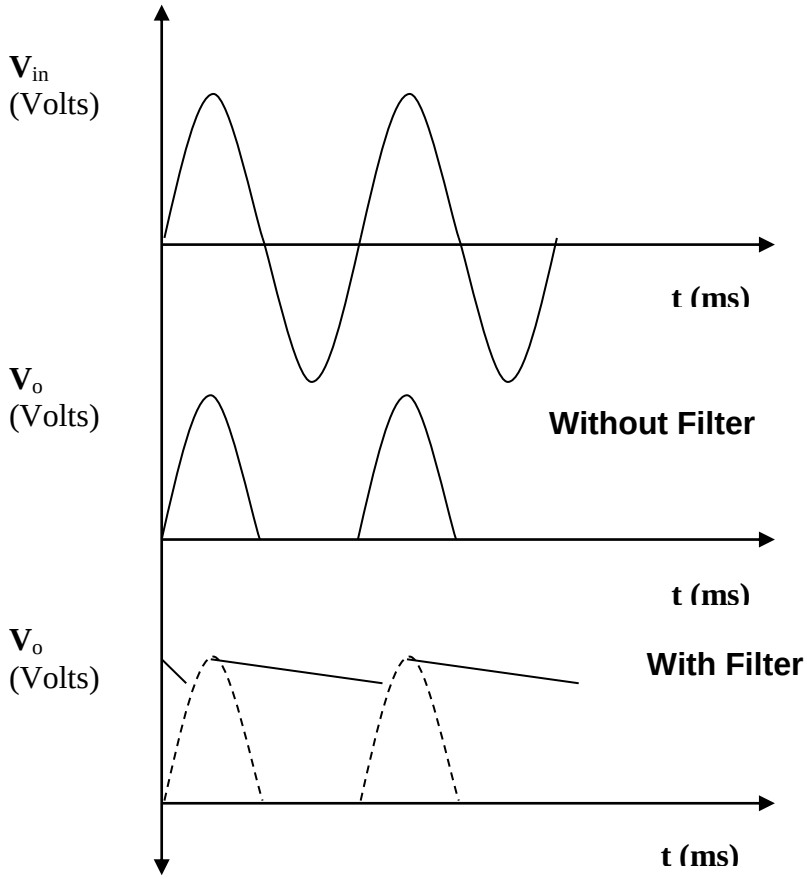
Without Filter

V_m (V)	V_{rms} (V)	V_{dc} (V)	Ripple factor	Efficiency

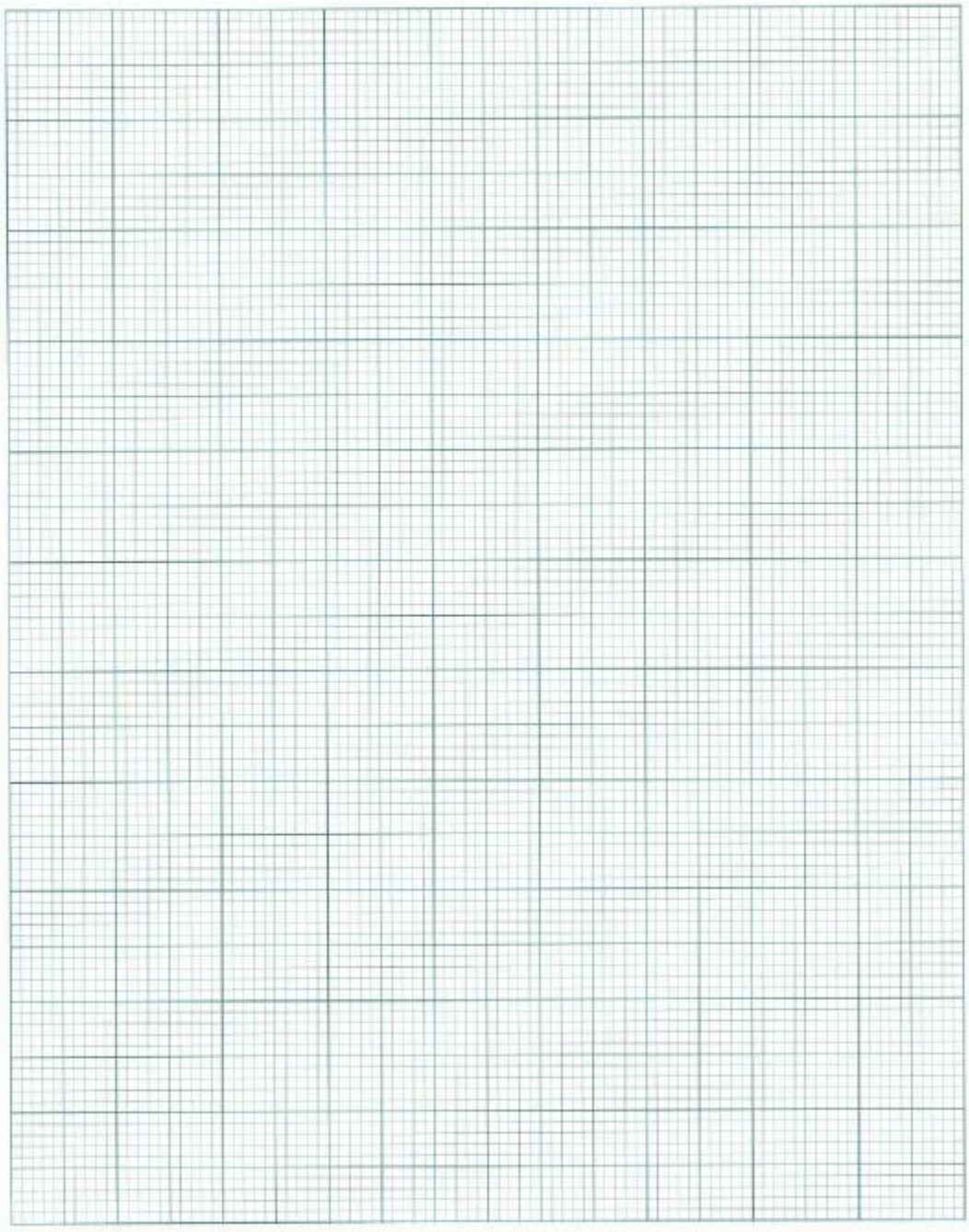
With Filter

V_{rpp} (V)	V_{rms} (V)	V_{dc} (V)	Ripple factor

Model Graph


V_{in}
(Volts)
t (ms)
V_o
(Volts)
Without Filter
t (ms)
V_o
(Volts)
With Filter
t (ms)

GRAPH:



Result

Experiment No. 8 b) **Date :**	**SINGLE PHASE FULL WAVE RECTIFIER**

Aim

To construct a single phase full-wave rectifier using diode and draw its performance characteristics.

Apparatus Required

S. No.	Name	Range	Qty
1	Transformer	230/(6-0-6)V	1
2	R.P.S	(0-30)V	2

Components Required

S. No.	Name	Range	Qty
1	Diode	IN4007	2
2	Resistor	1K Ω	1
3	Bread Board	-	1
4	Capacitor	100µf	1
5	CRO	1Hz-20MHz	1
6	Connecting wires	-	Req

Formulae

Without Filter

(i) $V_{rms} = V_m / \sqrt{2}$

(ii) $V_{dc} = 2V_m / \pi$

(iii) Ripple Factor = $\sqrt{\left(\frac{V_{rms}}{V_{dc}}\right)^2 - 1}$

(iv) Efficiency = $(V_{dc} / V_{rms})^2 \times 100$

With Filter

(i) $V_{rms} = V_{rpp} /(2*\sqrt{3})$

(ii) $V_{dc} = V_{m} - V_{rpp}$

(iv) Ripple Factor = $V_{rms'} / V_{dc}$

Procedure

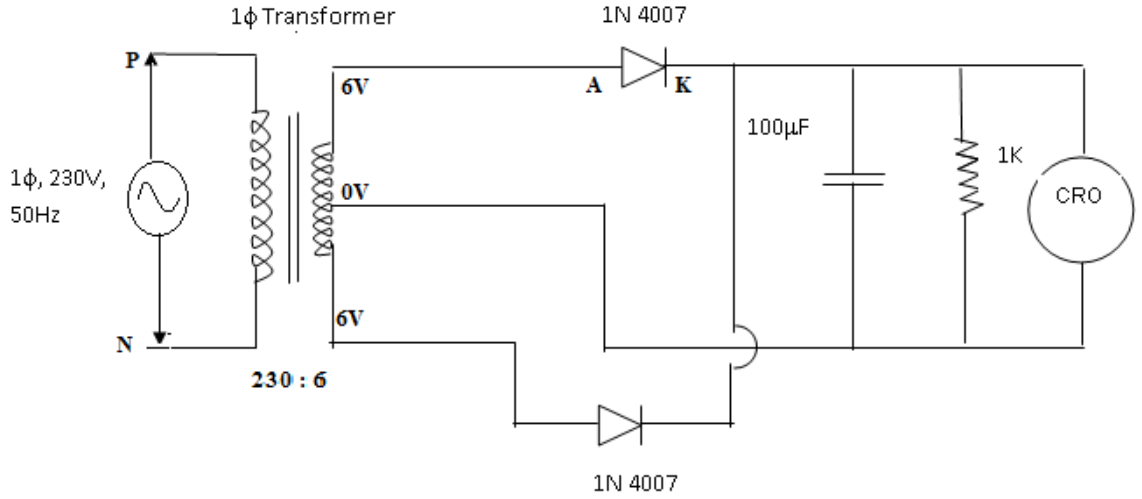
Without Filter

1. Give the connections as per the circuit diagram.
2. A 230 V, 50 Hz AC input given to primary side of the transformer where the phases end of the secondary is connected to anode terminal of the diode.
3. Observe the output across the 1 K ohm load with use of CRO.
4. Plot its performance graph.

With Filter

1. Give the connections as per the circuit diagram.
2. A 230 V, 50 Hz AC input given to primary side of the transformer where the phases end of the secondary is connected to anode terminal of the diode.
3. Connect the Capacitor across the load.
4. Observe the output across the 1 K ohm load with use of CRO.
5. Plot its performance graph.

Circuit Diagram



Tabular Column

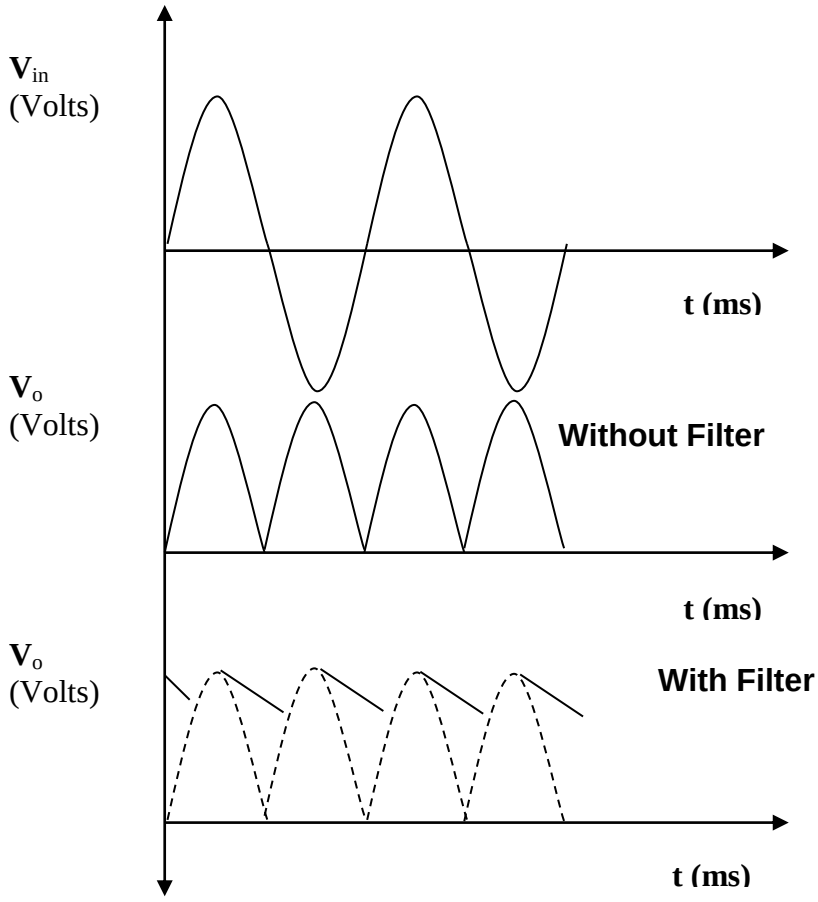
Without Filter

V_m	V_{rms}	V_{dc}	Ripple factor	Efficiency

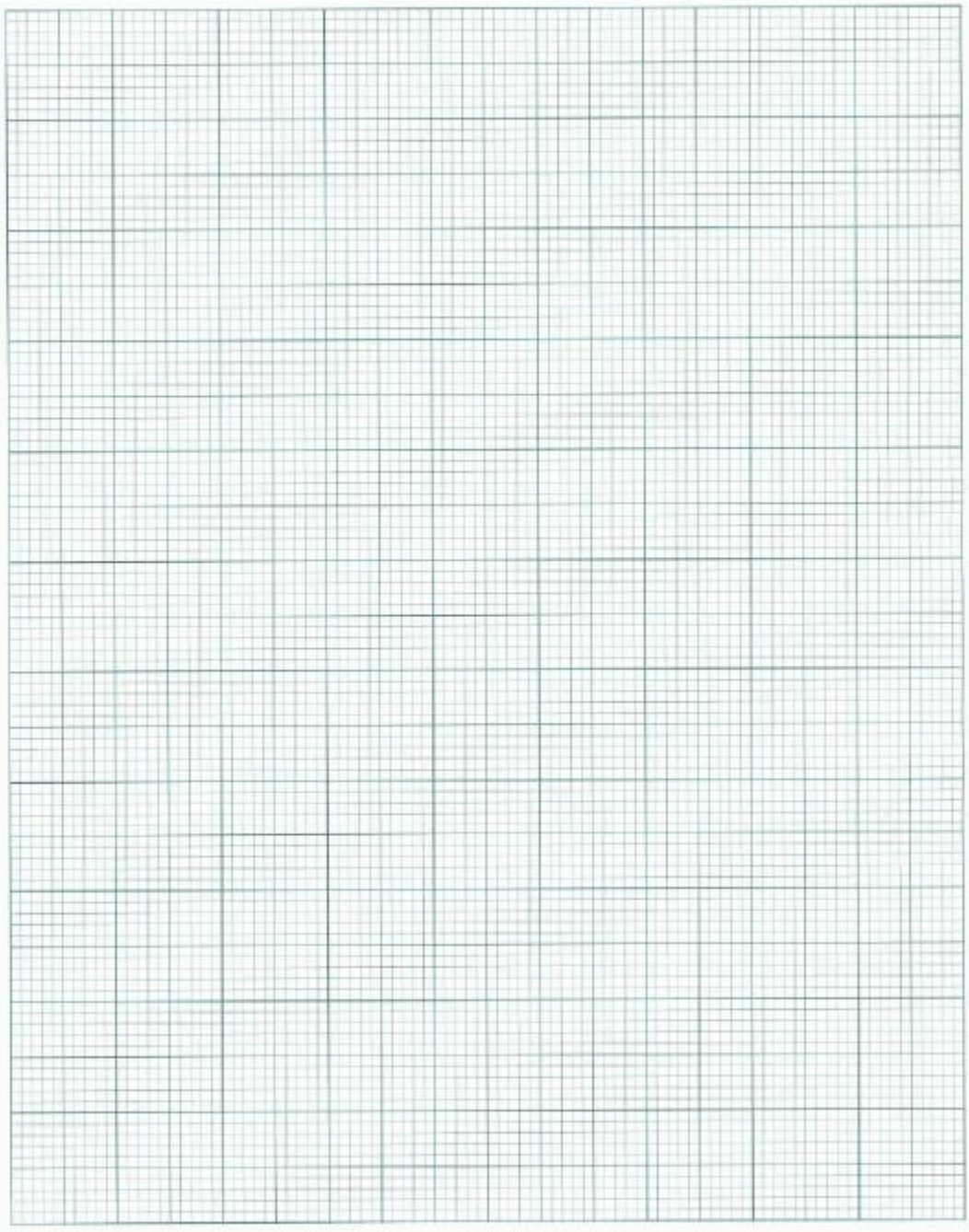
With Filter

V_{rms}	V_{rpp}	V_{dc}	Ripple factor

Model Graph



GRAPH:



Result

POST LAB QUESTIONS

1. **What is Transformer Utilization Factor (TUF)?**

2. **Mention the value of ripple factor for HWR, FWR & rectifier with centre tapped transformer.**

3. **What is the difference between uncontrolled rectifier and controlled rectifier? Which is advantageous and why?**

4. **State the average and peak value of output voltage and current for full wave rectifier and half wave rectifier.**

5. **What is PIV of a diode in half wave and full wave rectifier?**