Aim: Study of function Generator and CRO (Cathode Ray Oscilloscope).

Apparatus Required:
Function Generator, Cathode Ray Oscilloscope, Connecting probes, Regulated power supply.

Theory:

Function Generator:
A function generator is a test instrument that produces different waveforms such as sine, square, and triangular waves over a wide range of frequencies. It has controls for frequency, amplitude, and DC offset. It is mainly used to provide input signals to electronic circuits for testing and analysis.

Cathode Ray Oscilloscope (CRO):
A CRO is an instrument used to display and measure electrical signals. It uses a cathode Ray tube (CRT) where the input signal controls the vertical deflection (Amplitude) and the time base controls the horizontal deflection (time). This allows the

Function Generator		Cathode Ray Oscilloscope						
		Voltage			Timeperiod			Frequency
Input voltage	Input freq	Vertical Block	Volt/div	output volt	Horizontal Block	Time/div	Time period	(1/T)
0.1	2.09	2.5						
0.2	2.1	3						
0.3	1.7	1.7						

signal waveform to be observed, along with its amplitude, frequency, and phase.

Application:
In this experiment, the function generator provides test signals and the CRO displays them. helping in the study of waveform characteristics.

Result :-

- The waveforms (sine, square, and triangular) were obtained from the function generator.
- These waveforms were clearly displayed on the CRO screen.
- Amplitude was measured using the vertical scale (Volts/div).
- Time period (T) was measured using the Horizontal scale (Time/div.).
- The output frequency ($f = 1/T$) was calculated from the observation

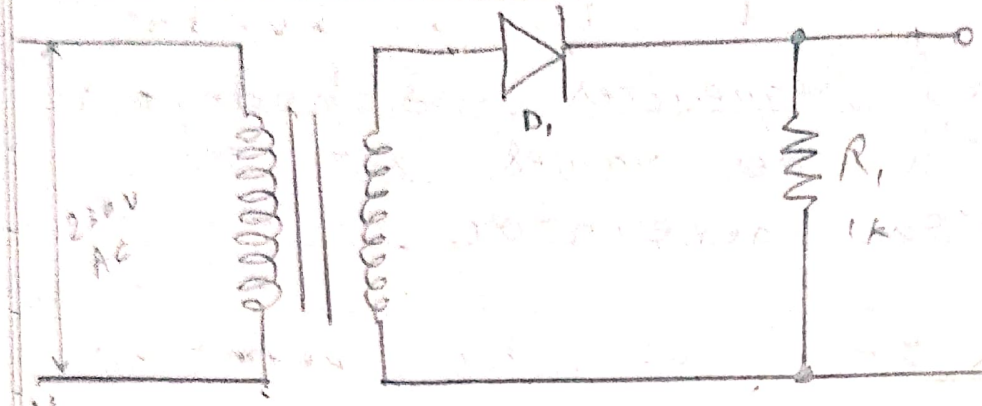
table.

- The measured frequencies matched closely with the values set on the function generator.

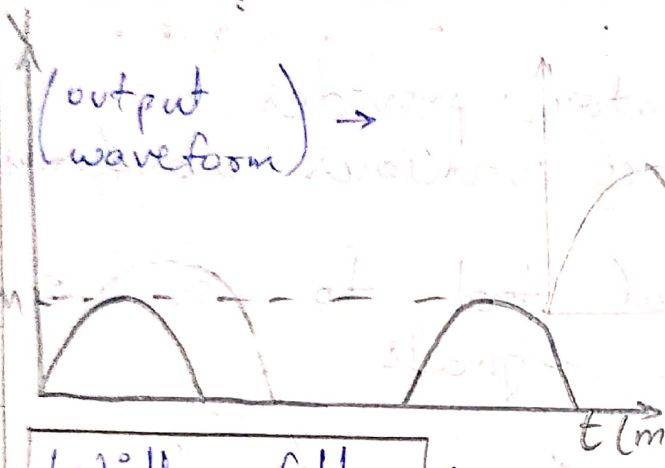
Conclusion :-

- The function generator provides standard signals of various waveforms
- The CRO is a useful tool to visualise and measure these signals.
- Important parameters like amplitude, time period, and frequency can be accurately determined.
- the experiment successfully verified the working and applications of both instruments.

Without filter :-

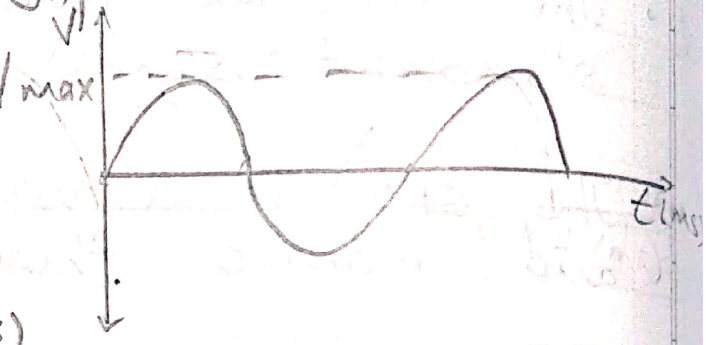


← (circuit diagram)

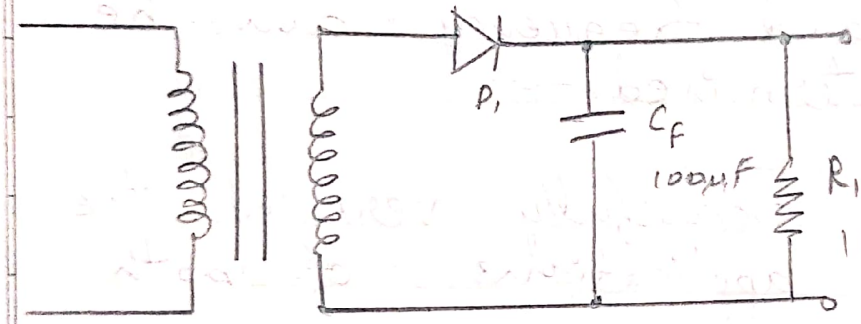


(output waveform) →

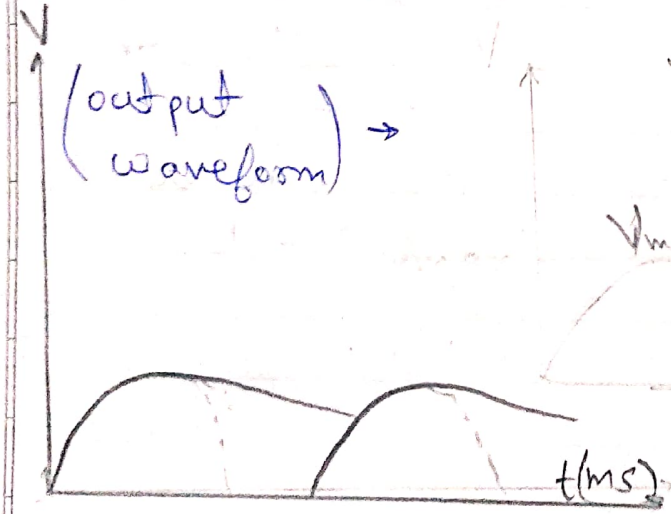
Input waveform :-



With filter :-

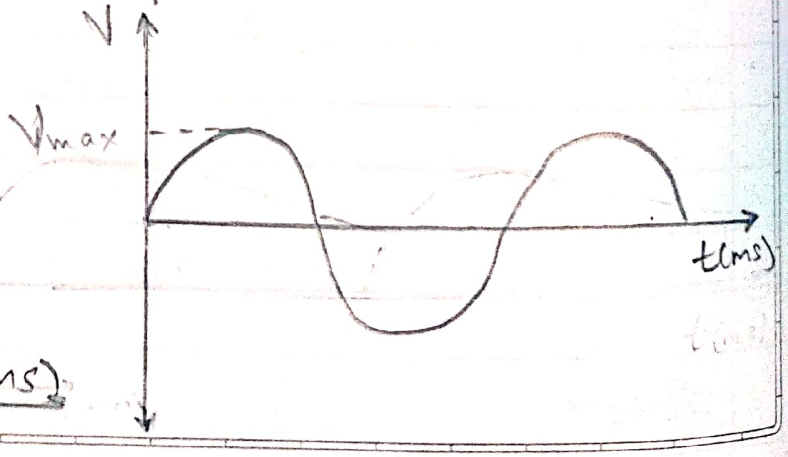


← (circuit Diagram)



(output waveform) →

Input waveform :-



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Aim: Study of Half wave rectifier without and with filter.

Apparatus required:

Step-down Transformer, Diode, Capacitor, Resistor, Cathode Ray Oscilloscope (CRO), Function Generator, Connecting wires and Breadboard.

Theory:

- A rectifier converts alternating current (AC) into direct current (DC).
- In a half-wave rectifier, only one half cycle (positive or negative) of the input AC signal is passed, while the other half is blocked using a diode.
- Without filter: The output is a pulsating DC with large Ripples.
- With capacitor filter: A capacitor connected across the load smooths out the ripples by charging during the peak and discharging when the input falls, resulting in a

AJAYA

Teacher's Signature

Observation Table :-

	Nature	V_{AC}	V_{DC}	Ripple factor
without filter	Pulsating DC	10.36	8.54	1.21 (High)
with filter	Smoother DC	6.50	15.6	0.41 (Very Small)

Calculation for Ripple factor :-

without filter : $V_{AC} = 10.36$

$V_{DC} = 8.54$

Ripple factor (γ) $\gamma = \frac{V_{AC}}{V_{DC}} = \frac{10.36}{8.54} = \boxed{1.21}$

with filter : $V_{AC} = 6.50$

$V_{DC} = 15.6$

$\gamma = \frac{6.5}{15.6} = \boxed{0.41}$

more steady DC output.

Key points: Ripple factor (without filter) is high.

Ripple factor (with ~~factor~~ filter) decre-ases, making output closer to pure DC.

$$\text{Ripple factor } (\gamma) = \frac{V_{AC}}{V_{DC}}$$

Result:

- The half-wave rectifier circuit was successfully designed and tested.
- The output waveform without filter showed pulsating DC with high ripples.
- With the addition of a capacitor filter, the ripples ~~was~~ were reduced, and the output was smoother DC.

Conclusion:

- A half-wave rectifier converts AC to DC but produces ripples.
- Adding a capacitor filter significantly reduces ripples, improving the quality of DC output.