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Expt. No. 5

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AIM: To study Full-wave Rectifier

REQUIREMENTS:

Diodes, Resistor, CRO Tube, Connecting wires, Step-down Transformer, Capacitor.

THEORY:

The conversion of Ac to Dc is called 'rectification'. In a full wave rectification process, when A.C is supplied at the input, both the half cycle current flows through the load in the same direction. The following two circuits are commonly employed.

1. Centre Tap Full Wave Rectification: In this rectifier, two diodes and a centre tap transfor is used. During positive half cycle, the diode D1 is forward biased and diode D2 is reverse biased, hence output will be obtained across load resistor R. During negative half cycle D1 is reverse biased and D2 is forward biased, thus output will be obtained across load resistor R and direction of output is the same. Hence, DC output is obtained.

2. Bridge Rectifier: This circuit contains four diodes connected to form a bridge. In this, an ordinary transformer is used. During the half cycle of secondary voltage, D1 and D3 are forward Biased and D2 and D4 are Reverse Biased, and vice versa.

BAID

Teacher's Signature : _____

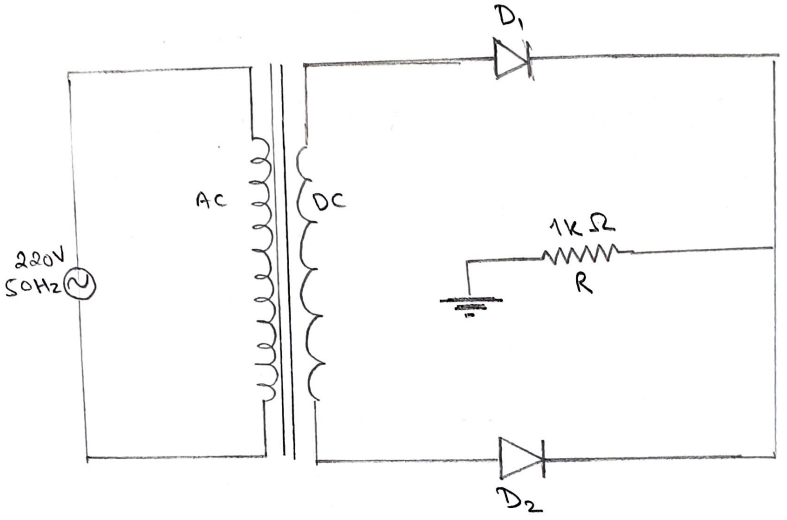

fig.: Full wave Rectifier Circuit without capacitor

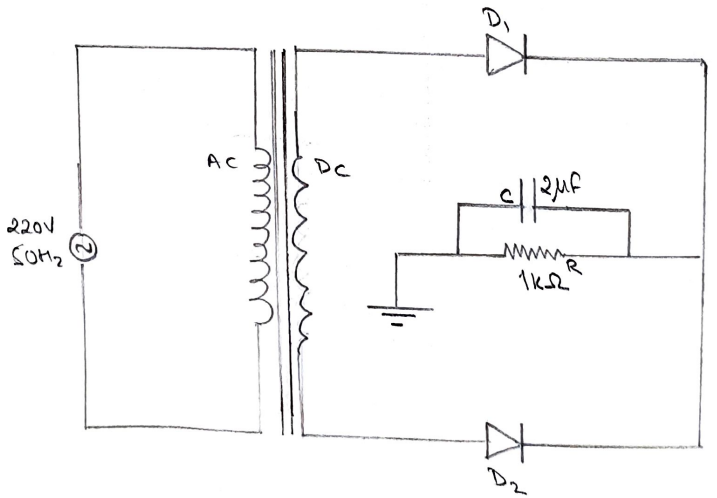

fig.: Full wave Rectifier with filter capacitor

PROCEDURE:

1. The connections were made as per the circuit diagram.
2. The power supply was switched on.
3. The AC signal was supplied to the circuit.
4. The output signal obtained on CRO which showed DC signal was traced.
5. The values were noted and the graph of the waveform was plotted.
6. The filter capacitor was connected as per the circuit diagram and the processes (2) to (5) were repeated.

OBSERVATIONS (without capacitor)

AC input peak voltage, $V_m = 38$ V
Period of one complete cycle, $T_0 = 20$ ms
and, Frequency, $f = 50$ Hz

OBSERVATIONS (with filter capacitor)

AC input peak voltage, (V_m) = 36 V
Period of one complete cycle, $T_0 = 20$ ms
and, Frequency, $f = 50$ Hz

for output,
Time Period of one complete cycle = 10 ms
and, Frequency = 100 Hz

CALCULATIONS:

for the values of voltages on 'without capacitor' circuit:

$$V_{DC} = \frac{2V_m}{\pi} = \frac{2 \times 38}{3.14} = 24.19 \text{ V}$$

$$V_{RMS} = \frac{V_m}{\sqrt{2}} = \frac{38}{1.41} = 26.87 \text{ V}$$

$$\text{Ripple factor, } \gamma = \sqrt{\left(\frac{V_{RMS}}{V_{DC}}\right)^2 - 1} = \sqrt{\left(\frac{26.87}{24.19}\right)^2 - 1} = 0.48$$

CONCLUSION:

The DC Voltage, RMS Voltage and Ripple factor for full wave rectifier were studied.

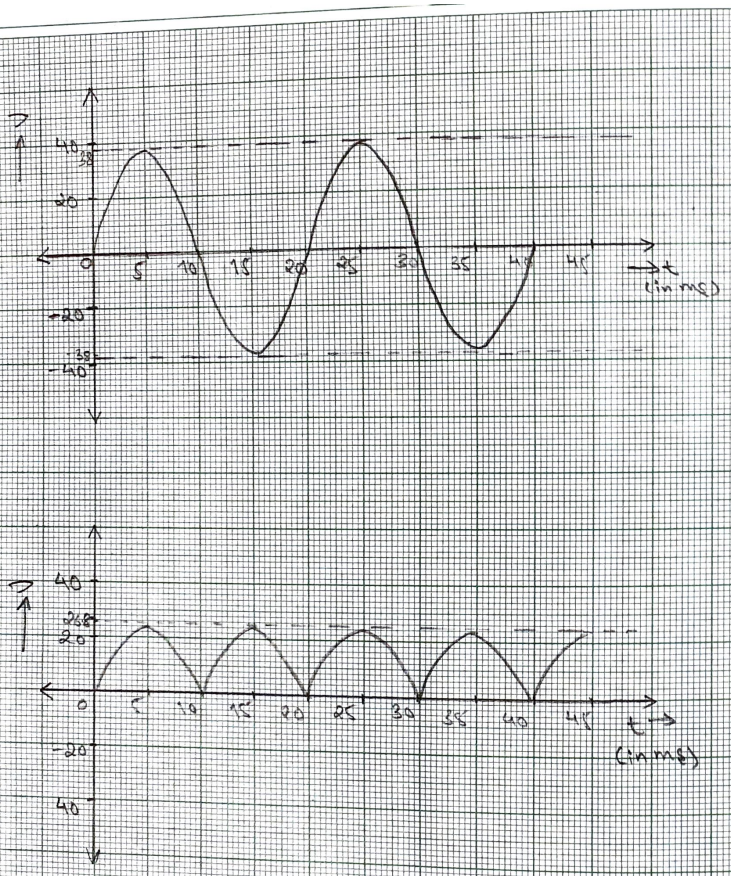

fig.: Graph for Full Wave Rectifier without capacitor

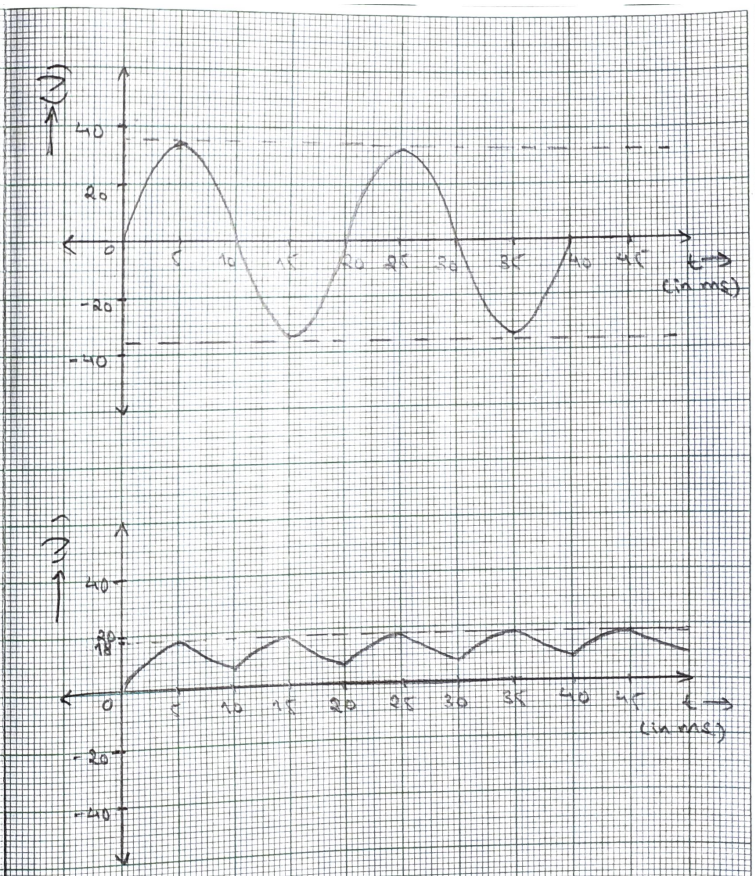

fig.: Graph for Full Wave Rectifier with filter capacitor