

## Exp.3: Full Wave Rectifier

### 1-Objectives:

- To calculate and draw the DC output voltages of Full-wave rectifiers.
- Without smoothing capacitor and with smoothing capacitor.

### 2-Circuit elements:

#### Instruments

- AC power supply or Function Generator
- 2 Voltmeters
- Oscilloscope

#### Components

- Diode: Silicon 4×(D1N4007) or Silicon Bridge rectifier
- Resistors: 10 k $\Omega$ ,
- Capacitor : ( 0.47  $\mu$ F)
- Capacitor : ( 4.7  $\mu$ F)
- Electrolytic Capacitor : ( 100  $\mu$ F)

### 3-Circuit Diagram:

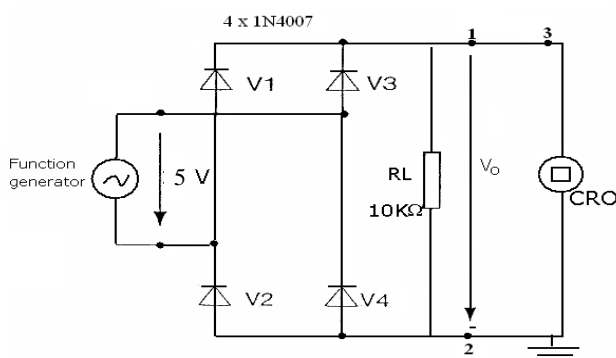


Fig.1

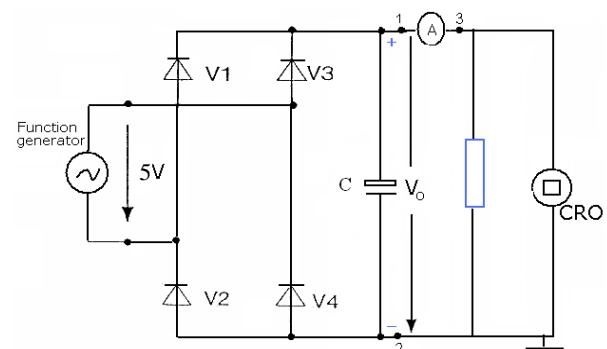


Fig.2

#### **4-Procedure:**

1. Connect the circuit as shown in Fig.1, adjust the power supply at 5 V.
2. Measure the input voltage  $V_1$  and the output voltage  $V_2$  using both the voltmeter and the oscilloscope.

	V (input) (Volt)	V (output) (Volt)
With voltmeter	5 V <sub>a.c</sub>	V <sub>d.c</sub>
With oscilloscope	V <sub>p-p</sub>	V <sub>P-P</sub>

3. Draw the input waveform,  $V_i$ , and the output waveform,  $V_o$ .
4. Calculate: 1) Maximum voltage of the input signal

$$V = \frac{V_{P-P}}{2}$$

- 2) the effective value of the input voltage

$$V = \frac{V_m}{\sqrt{2}}$$

- 3) the average value of the output voltage

$$V_{av} = V_{dc} = 0.636V_m$$

5. Comment on the results you obtained.

#### **Smoothing and filtering**

6. Connect the circuit as shown in Fig.2.
7. Measure  $V_{out}$  with voltmeter as a function of the capacitance value of the smoothing capacitor  $C_L = 0.47\mu F, 4.7\mu F, 100\mu F$  and at the same time measure the ripple voltage  $V_{P-P}$  using C.R.O.

$C_L$ ( $\mu F$ )	$V_o$ (voltmeter) ( Volts )	$V_{p-p}$ (CRO) (Volts )	T (m sec)	$F = 1/T$ (Hz)
0.47				
4.7				
100				

8. Draw the output signal voltage each time of  $C_L$  values with true scale.

9. Calculate : a) The ripple voltage using the following equation

$$V_{r(rms)} = \frac{I_{dc}}{4\sqrt{3} f C} = \frac{2.4I_{dc}}{C} = \frac{2.4V_{dc}}{R_L C}.$$

b) The ripple factor  $r$  using the following equation

$$r = \frac{1}{2\sqrt{3}} \left( \frac{1}{F R_L C_L} \right)$$

10. Comment on the results you obtained.