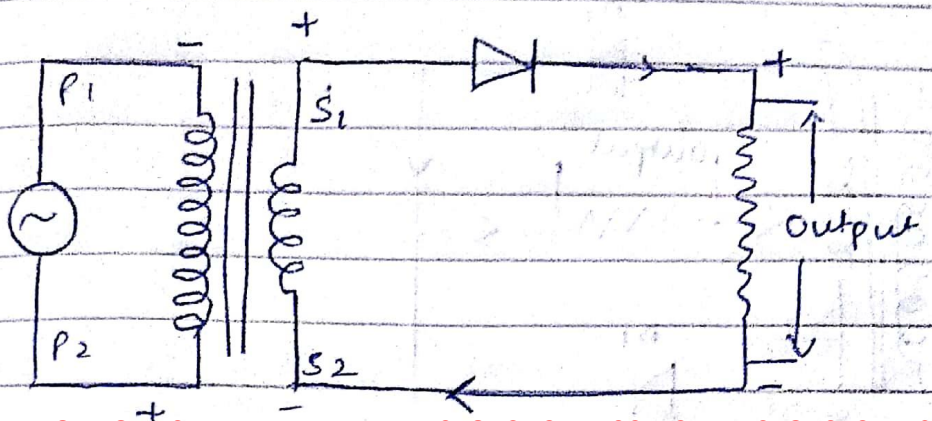
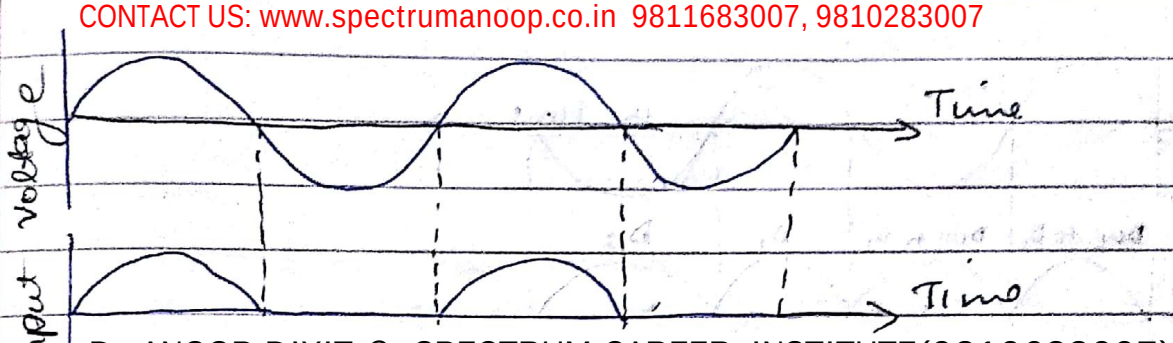
SEMICONDUCTOR LECTURE-57

P-N Junction as Half Wave Rectifier





⇒ Working and Theory :

When AC input is applied through a step down transformer and positive half cycle is fed through secondary coil, the p-n junction remains in forward biasing and conducts whereas when -ve half of the input A.C is fed through the secondary coil, p-n junction becomes reverse biased and does not conduct

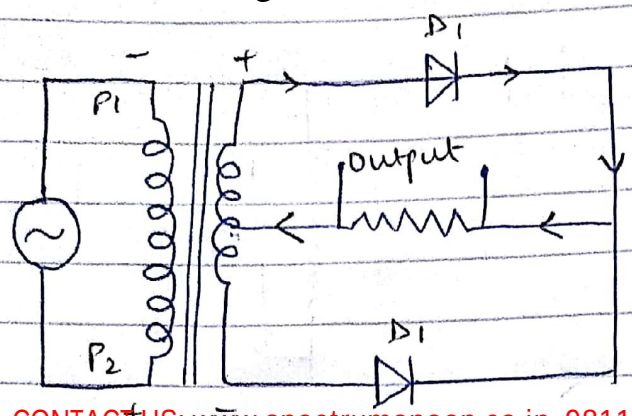
As a result, the output obtained from this device is discontinuous pulsating D.C

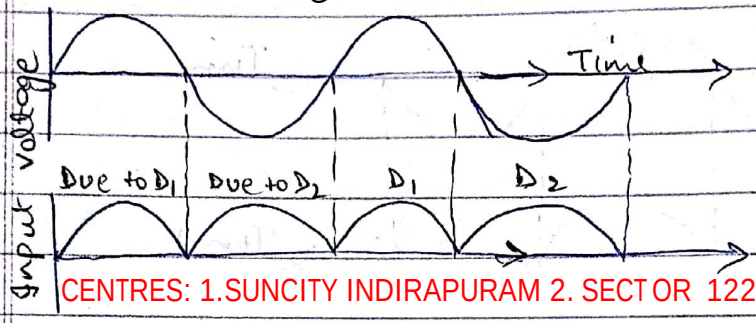
$$I_{rms} = \frac{I_0}{2} \qquad I_{mean} = \frac{I_0}{\pi}$$

$$\text{Ripple Factor} = \frac{\text{AC component}}{\text{DC compound}}$$

$$= \sqrt{\frac{I_{rms}^2}{I_{mean}^2} - 1} \approx 1.22$$

P-N Junction as Full Wave Rectifier





→ Working and Theory

In Full Wave Rectifier, 2 diodes are used, D_1 & D_2. If in the first half cycle input, D_1 is forward biased and D_2 is reverse biased, so output will be obtained from D_1 and in the next half cycle, D_1 becomes reverse biased and D_2 is forward biased. Output is obtained from D_2. In this way, a continuous and pulsating DC as output is obtained.

* In order to use the output from D_1 and D_2, the load resistance is installed by taking a centre tap from secondary coil of transformer.

* In case of half wave rectifier, output frequency was same as that of input frequency but in case

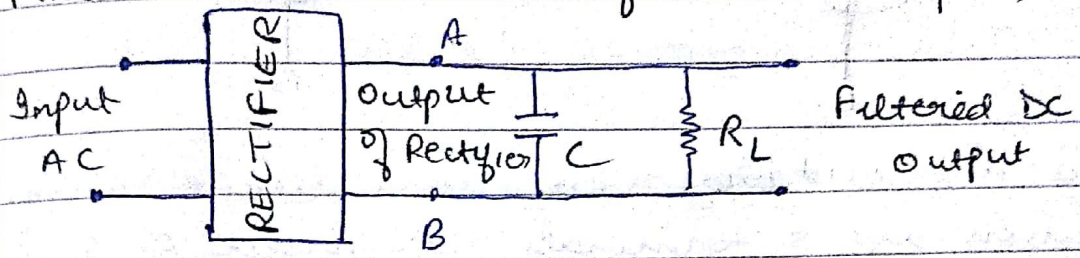
of full wave rectifier, output frequency will be doubled

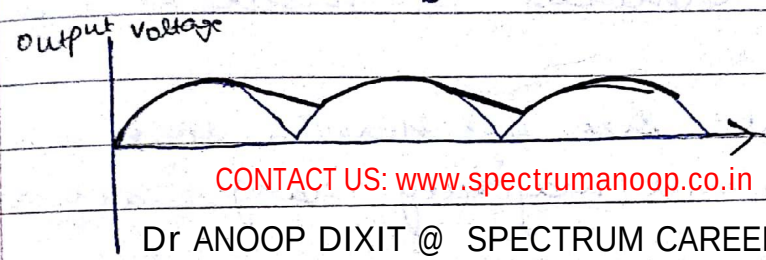
Output frequency = 2x Input frequency

$I_{rms} = \frac{I_o}{\sqrt{2}}$ $I_{mean} = \frac{2I_o}{\pi}$ (same)

Ripple factor = 0.48

* Filter circuit ~~(Rectified DC output)~~





- A Filter circuit consists of a capacitor in parallel or an inductor in series with load resistance.
- Purpose of this circuit is to filter out the ripples in the rectified current to give pure DC current
- When voltage across the capacitor is rising, it gets charged. If there is no load, it remains charged upto peak value of rectified output but when there is load, it gets discharged through the load, hence minimised the fluctuation
- For having high quality filtration, the greater value of capacitance can be used