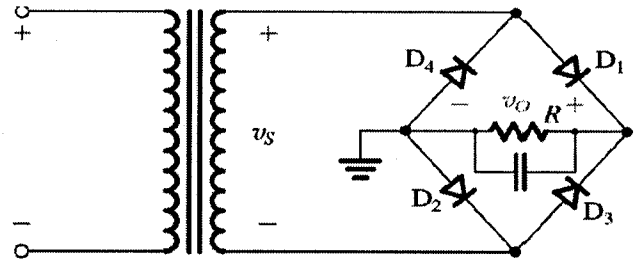


ECE3455, Q4) In the circuit shown, the input of the transformer is a **triangular** wave with amplitude of 100[V] and frequency of 100 [Hz]. If  $V_{D(on)}=0.7$  [V] and  $R=100$  [ohms]. If the average output voltage is 10 volts and the ripple is 1.5 V(pp).

- Find the value of the capacitor.
- Find the turn ratio of the transformer ( $N_2/N_1$ ).
- Find the conduction angle and the average current of each diode, .



Solution :

(A)

$$V_o(av) = V_p - \frac{1}{2} V_r \Rightarrow 10 = V_p - \frac{1}{2} \times 1.5 \Rightarrow V_p = 10.75 \quad [V]$$

$$V_s = V_p + 1.4 = 10.75 + 1.4 = 12.15 [V]$$

$$a) C = \frac{V_p}{2 \cdot f \cdot R \cdot V_r} = \frac{10.75}{2 \times 100 \times 100 \times 1.5} = 358 \text{ MF}$$

$$b) n = \frac{N_2}{N_1} = \frac{V_s}{V_{Line}} = \frac{12.15}{100} = 0.12$$

$$c) \theta = \frac{V_r}{V_p} \times 90^\circ = \frac{1.5}{10.75} \times 90 = 12.55^\circ$$

$$I_D(av) = \frac{180}{\theta} \times \frac{V_p}{R} = \frac{180}{12.55} \times \frac{10.75}{100} = 1.54 \text{ A}$$