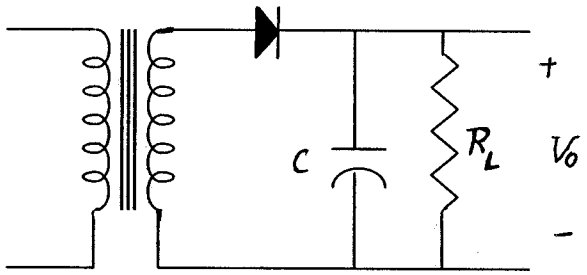
(B)

ECE3455,Q4) In the half-wave power supply shown, the secondary voltage of the transformer is 12 Vrms and the load resistor is 1 Kohm. The diode average curent is 414 mA. Find

a) The ripple voltage(pp).
b) The DC value of the output voltage.
c) The value of capacitor. $f = 60$ HZ



solution: Since the secondary voltage of the transformer is $V_s = 12$ V(rms)

$$V_p = 12\sqrt{2} - 0.7 = 16.97 - 0.7 = 16.27\ [V]$$

The Load Current is about

$$I_L = \frac{V_p}{R_L} = \frac{16.27}{1000} = 16.27\ [mA]$$

We can find the angle of Conduction of diode

$$I_D(av) \cdot \theta_D = 360 \times I_L = 360 \times 16.27$$

$$\theta_D = \frac{360 \times 16.27}{I_D(av) = 414} = 14.15^\circ$$

on the other hand $\cos\theta_D = \frac{V_p - V_r}{V_p} = \cos 14.15 = 0.9696$

or $V_r = 0.03\, V_p = 0.493\ [V]$

b) $V_o(DC) = V_p - \frac{1}{2} V_r = 16.02\ [V]$

c) $C = \frac{V_p}{f \cdot R_L \cdot V_r} = \frac{16.27}{60 \times 10^3 \times 0.493} = 550\ \mu f$