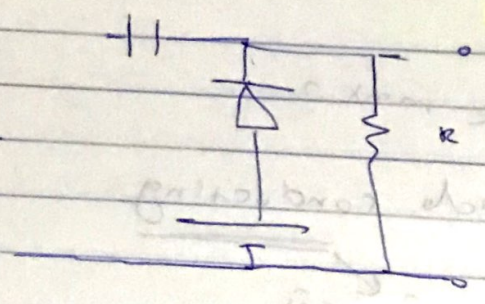
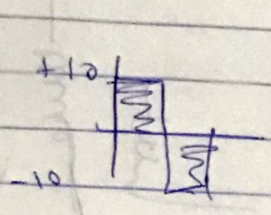


Q1

V_{out} max?

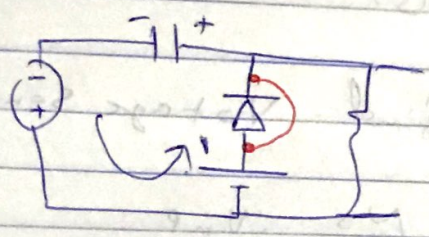


When $V_i = -10$

$$10 + 1 = V_o$$

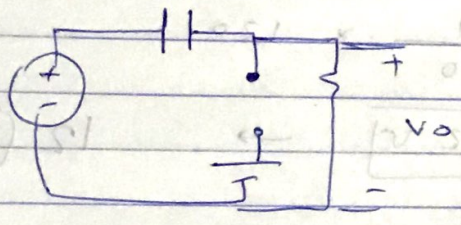
$$V_o = 11V$$

$$V_o = 1V$$



When $V_i = +10$

$$V_o = 10 + 11 = 21V$$

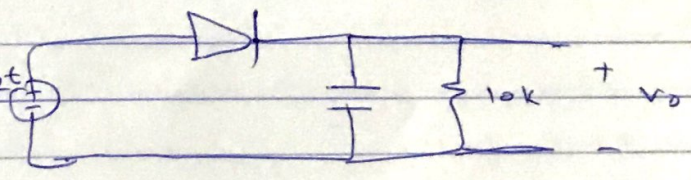


V_{out} max = +21V

Q2

V_{cr, p-p} = 2V

$$V_s = 100 \sin 377t$$



$$V_s = V_m \sin \omega t$$

$$\boxed{V_m = 100} \quad 377 = 2\pi f_0 \rightarrow \boxed{f_0 = 60 \text{ Hz}}$$

$$V_{cr, p-p} = \frac{V_m}{fCR}$$

$$2 = \frac{100}{60 \times C \times 10k}$$

$$\boxed{C = 83.3 \text{ } \mu\text{f}}$$

Q 3

$$V_A = 10 \sin \omega t \text{ V}$$

$$R = 4.7 \text{ k}\Omega$$

$$I_{dc} = ?$$

$$V_K = 0.7 \text{ V}$$

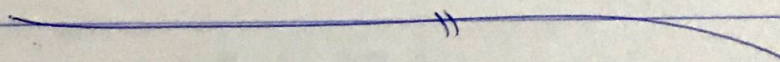
for full wave Rectifier

$$V_{dc} = 0.636 V_m$$

$$V_m = 10 - 0.7 = 9.3 \text{ V}$$

$$\text{So } \underline{V_{dc(\text{load})}} = 5.9148 \text{ V}$$

$$\text{the load current } \frac{5.9148}{4.7 \text{ k}} = 1.258 \text{ mA}$$



Q 4

$I_x = ?$

first check mode of operation!

$$V_{th} = \frac{R_L}{R_L + R_S} \cdot V_{in} = \frac{1\text{k}}{1\text{k} + 3\text{k}} = \frac{10}{4} = 2.5 \text{ V} = 5 \text{ V}$$

$$5 < 10$$

$$V_{th} < V_Z \rightarrow$$

Zener works in region 2, it acts as open circuit.

$$V_L = 5 \text{ V}$$

$$I_L = \frac{V_L}{R_L} = \frac{5}{1\text{k}} = \underline{\underline{5 \text{ mA}}}$$

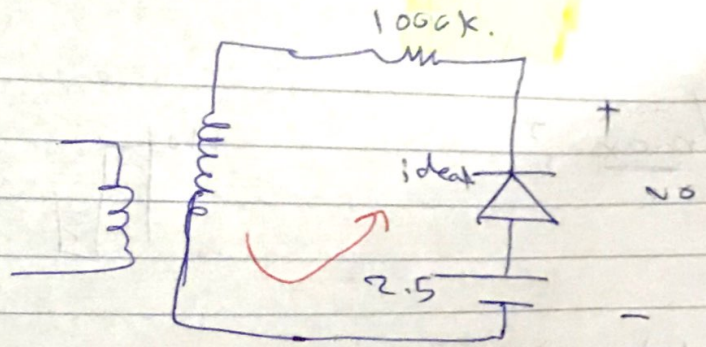


Q 5

V_{out} max?

if Diode conducting

دیاگرم (میں) (5)

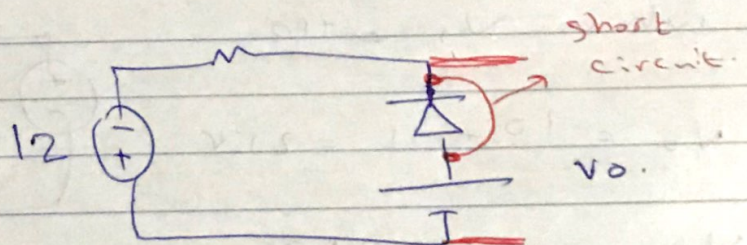


• first find Voltage source from transformer.

$$V_m = \frac{N_s}{N_p} \cdot V_{mp}$$

$$V_m = \frac{1}{10} \times 120$$

$$V_m = 12 \text{ V}$$



$$V_o = +2.5 \text{ V}$$