

EDC CLASS TEST - 1

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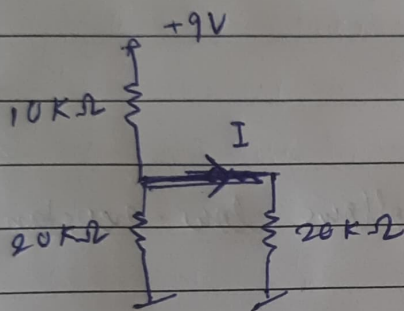
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NAME : ABHINAV AGRAWAL

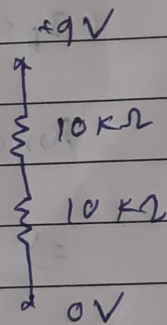
ROLL : 2K20/EE/07

Fig Q1

The Diode is forward Biased hence will act as a wire

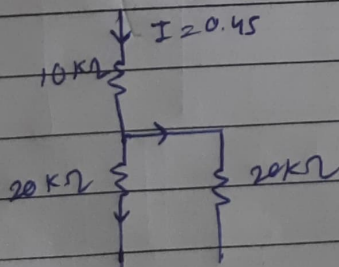


The net circuit will be \Rightarrow



Therefore $I_{\text{net}} = \frac{V}{R} = \frac{9}{20} = 0.45 \text{ A}$

The current will be divided in the equal parts as there is equal resistance



Therefore $I = \frac{0.45}{2} = 0.225 \text{ A}$

Ans = 0.225 A

Ans 2

The Diode is forward

$$V_{out} = V_1 - V_2 \quad \text{--- (1)}$$

$$V_{out} = V_T \ln\left(\frac{I_a}{10}\right) - V_T \ln\left(\frac{I_b}{10}\right)$$

$$V_{out} = V_T \ln\left(\frac{I_a}{I_b}\right)$$

\Rightarrow

$$\ln\left(\frac{I_a}{I_b}\right) = \frac{V_{out}}{V_T} = \frac{50}{25} = 2$$

$$\Rightarrow \boxed{I_a = I_b e^2} \quad \text{--- (2)}$$

Using (1) & (2)

$$V_1 - V_2 = (I_b - I_a) R$$

$$\Rightarrow R = \frac{V_1 - V_2}{I_a - I_b} = \frac{50 \times 10^{-3}}{\frac{10}{1+e^2} - \frac{10}{e^2}} = \frac{50 \times 10^{-3}}{10(e^2 - 1)}$$

$$10 = I_a + I_b$$

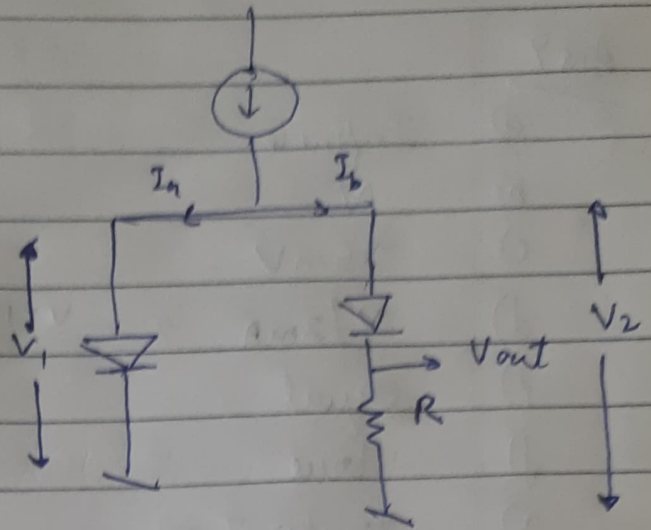
$$10 = I_b(1 + e^2) \Rightarrow \boxed{I_b = \frac{10}{1 + e^2}}$$

$$R = \frac{50 \times 10^{-3}}{\left(\frac{10}{1+e^2}\right) \cdot (e^2 - 1)}$$

$$= \frac{5 \times 10^{-3} \times (1 + e^2)}{e^2 - 1}$$

$$\boxed{R = \frac{41.94}{e^2 - 1} = 6.565 \text{ } \Omega}$$

$$\boxed{R = 6.565 \text{ } \Omega}$$



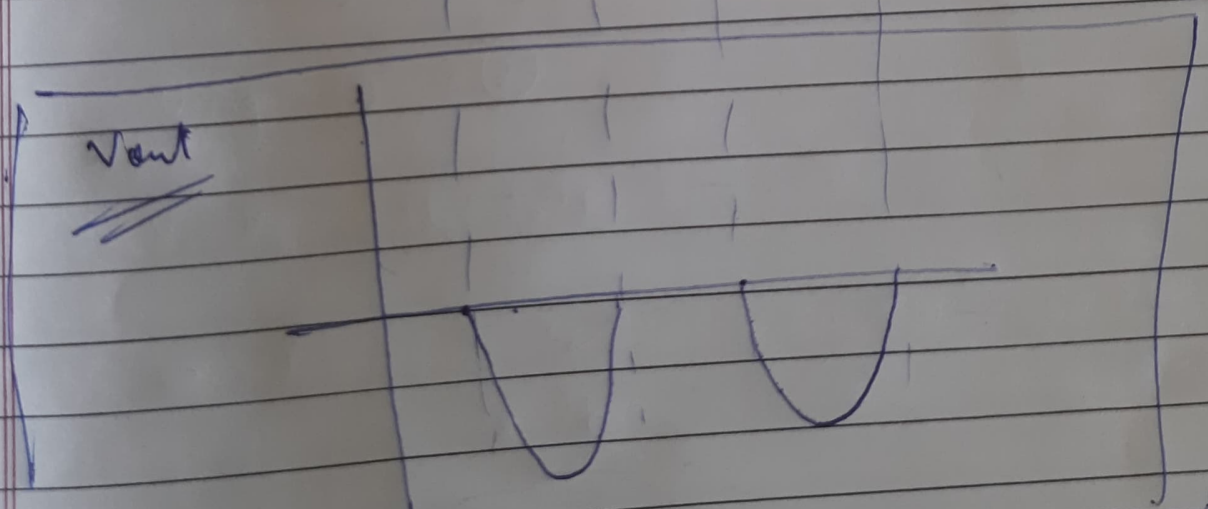
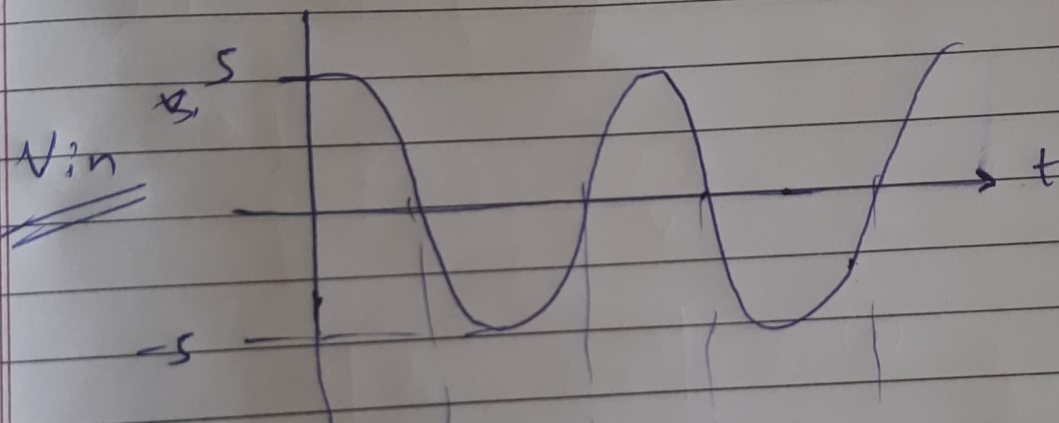
Ans 3

$$v_{in} = 5 \cos \omega t$$

\Rightarrow Diode is forward biased

~~Since~~ v_{in} vary from ~~2~~ -5 to 5

$\therefore \left(5 \cos \omega t < \frac{3}{5} \right)$ since diode is forward biased.
($\omega t < 53^\circ$)



Ans 4

- a) Infinite
- b) N
- c) 25mV
- d) $V/2mA = V \times 1000 / 2 = 500V$, $V/2$ voltage across diode
- e) equal
- f) True
- g) Temperature
- h) False
- i) True
- j) False