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V_{oc}

$V_{oc} = V_{TH} = V \quad , V_{in} = V_1$

$$\frac{V_1 - 0.1}{0.1} + \frac{V_1 - 0}{1000} + \frac{V_1 - V}{10} = 0$$

$$10^4 V_1 - 10^3 + V_1 + 100 V_1 - 100 V = 0 \quad \text{—} (1)$$

$$\frac{V_1 - V}{10} = \frac{V_1 - 10^5 V_1}{0.1} \Rightarrow V_1 - V = 100V - 10^7 V_1$$

$$(1 + 10^7) V_1 = (100 + 1) V$$

$$V_1 = \frac{101}{10^7} V$$

Approx.

From (1)

$$\left(10^4 \left(\frac{101}{10^7}\right) + 100 \left(\frac{101}{10^7}\right) + \left(\frac{101}{10^7}\right)\right) V - 100V - 10^3$$

$$\left(\frac{101}{1000} + \frac{101}{10^5} + \frac{101}{10^7} - 100\right) V = 10^3$$

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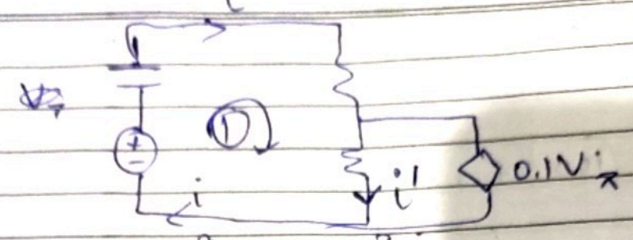
Q.2



$V_x = 10^3 \times i = 10^3 i$

$i' = i + 0.1 V_x = 101 i$

Applying KVL in loop

$1 - V_c - 10^3 i - 10^3 101 i = 0$ — (1)

at $t = 0$, $V_c = 0$
at $t = \infty$ $V_c = 1$

$1 - V_c - (102 \times 10^3) i = 0$

102×10^3 act as R_{eff} for Capacitor

$\tau = RC = 0.102$

$V_c = V_c(\infty) + (V_c(0) - V_c(\infty)) e^{-t/\tau}$

$= 1(1 - e^{-t/0.102})$

$i = C \frac{dV}{dt} = \frac{10^{-3}}{102} e^{-t/0.102}$

$V_o = 101 \times 10^3 i = \frac{101}{102} e^{-t/0.102}$

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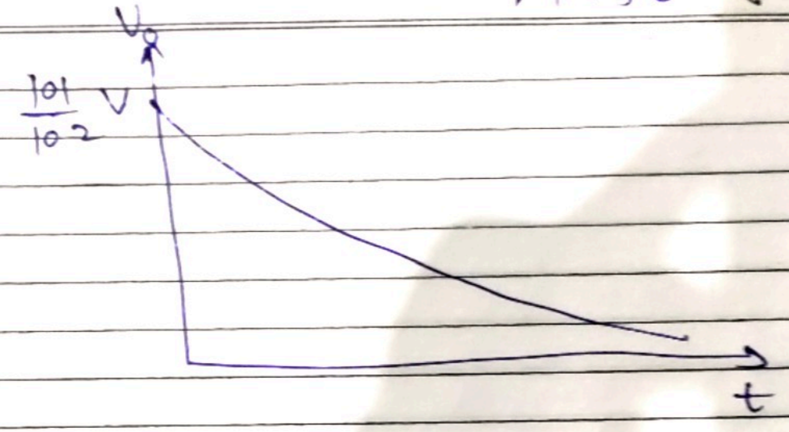

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$$\left(101 + \frac{101}{100} + \frac{101}{10^4} - 10^5\right) V = 10^6$$

$$(100 + 1 + 0.01 - 10^5) V = 10^6$$

$$(101.01 - 10^5) V = 10^6$$

Approx $V = \frac{-10^6}{99899} V = -10.01 V$

$V_{Th} = -10.01 V$

for R_{TH}

$$\frac{0.1 \times 10^3}{(10 \| 1000) + 0.1} \text{ Amp}$$

$$= \frac{-100 \times 1010}{10101} A$$

$$I_{sc} = (I_{total}) \frac{1000}{10 + 1000} = \frac{-10^5}{10101} A$$

$$R_{Th} = \frac{V_{Th}}{i_{Th}} = \frac{0.1}{0.1 \times 10^{-3}} = \boxed{1 K\Omega} \text{ Answer.}$$