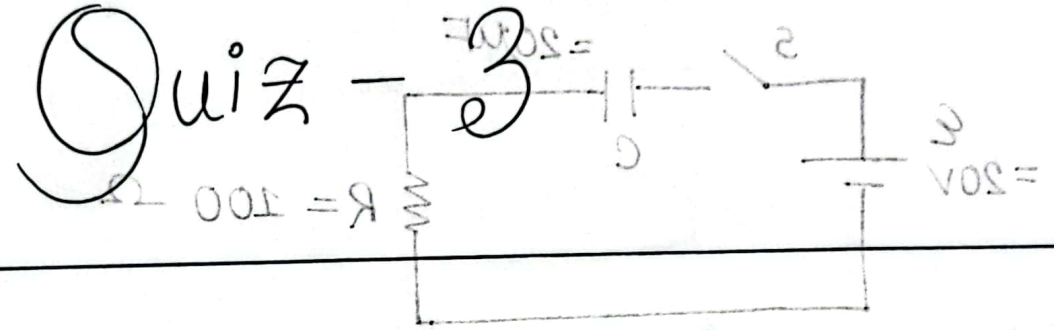
Quiz - 3



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Course code : PHY112

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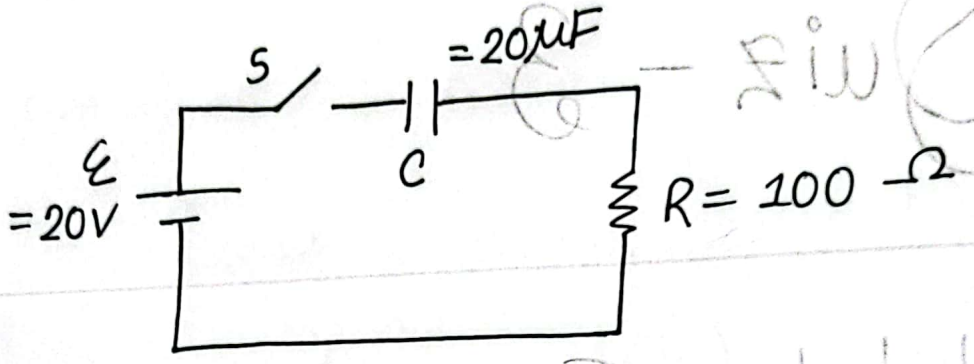
signature

Answer to the Q. NO – 01



In charging mode,

$\mathcal{E} = 20V$

$R = 100\ \Omega$

(a) $V_{R,max} = ?$

Solve: $I = \frac{20}{100} = \frac{1}{5} A$

$\therefore V_{R,max} = 20\ V.$ (Ans:)

(b) $V_{C,max} = 20\ V$ (Ans:)

(c) $\tau_c = RC$

$= 100 \times 20\ \mu F$

$= 100 \times 20 \times 10^{-6}$

$= 2 \times 10^{-3}$

(d) $I_{max} = \mathcal{E}/R = \frac{20}{100} = 0.2\ A$

(Ans:)

(e) $q = C.\mathcal{E}.\left(1 - e^{-t/RC}\right)$

$= \left\{20 \times 10^{-6} \times 20 \times \left(1 - e^{-\frac{1.38 \times 10^{-3}}{2 \times 10^{-3}}}\right)\right.$

$= 1.99 \times 10^{-4} C$

Here,

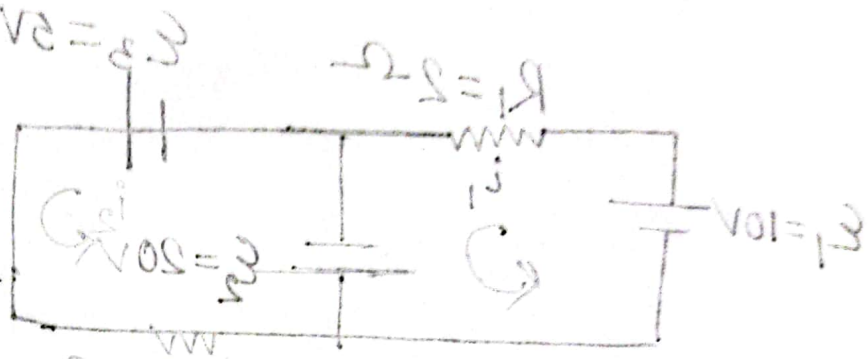
$t = RC \ln 2$

$= 2 \times 10^{-3} \times 100 \times \ln 2$

$= 1.38 \times 10^{-3}$

(Ans:)

(e) $q_{max} = ?$



When $t = \infty$,

$$q_{(t)} = q_{max}$$

$$\therefore q_{(t)} = C\mathcal{E}\left(1 - e^{-t/RC}\right)$$

$$C\mathcal{E}\left(1 - e^{-\frac{\infty}{RC}}\right)$$

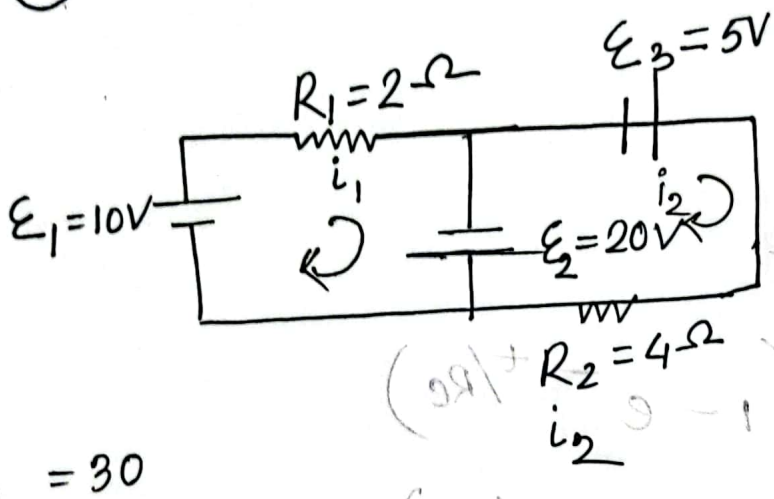
$$C\mathcal{E}$$

$$\therefore q_{max} = 20 \times 20 \times 10^{-6}$$

$$= 400 \times 10^{-6}$$

(Ans:)

Answer to the Q. NO - 02



i_2

$R_1 = 2\Omega$
$R_2 = 4\Omega$
$\mathcal{E}_1 = 10V$
$\mathcal{E}_2 = 20V$
$\mathcal{E}_3 = 5V$

(a) $2i_1 = 30$

$\Rightarrow \boxed{i_1 = 15A}$ (Ans:)

Now, KVL apply,

$-5 + 4i_2 + 20 = 0$

$\Rightarrow \boxed{i_2 = -3.75A}$ (Ans:)

(b) $V_a - V_b = (15 \times 2) - 5$

$\Rightarrow V_a - V_b = 30 - 5$

$\therefore \boxed{V_a - V_b = 25V}$ (Ans:)

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