

(2)

$v = 4 \text{ m/s}$ to 0 m/s

$$\frac{dv}{dt} = -2\sqrt{v}$$

$$\int_4^0 \frac{dv}{\sqrt{v}} = \int -2 dt$$

$$\int_4^0 v^{-1/2} dv = -2 \int dt$$

$$\left[\frac{v^{-\frac{1}{2}+1}}{-\frac{1}{2}+1} \right]_4^0 = -2t$$

$$\left[\frac{v^{1/2}}{\frac{1}{2}} \right]_4^0 = -2t$$

$$2[\sqrt{v}]_4^0 = -2t$$

$$0 + 2 = 2t$$

$$t = 2 \text{ s}$$

③

$$P_R = 100 \text{ W}$$

$$V_R = 200 \text{ V}$$

$$P_R = \frac{V_R^2}{R_2}$$

$$R_2 = \frac{V_R^2}{P_R} = \frac{200 \times 200}{100}$$

$$R_2 = 400 \Omega$$

$$R_t = R_0 (1 + \alpha \Delta t)$$

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

$$T_1 = 25^\circ \text{C}$$

$$R_1 = 400 \Omega$$

$$400 = 400 (1 + 3 \times 10^{-3} \times (T_2 - 25))$$

$$10 = 1 + 3 \times 10^{-3} \times (T_2 - 25)$$

$$9 = 3 \times 10^{-3} \times T_2 - 25$$

$$3000 + 25 = T_2$$

$$3025 = T_2$$

④

$$i = \frac{V}{Z}$$

$$i_1 = 4A$$

$$\frac{\omega_0}{2}$$

$$i_2 = 2A$$

$$2\omega_0$$

$$X_L = \omega L = \frac{\omega_0}{2} L$$

$$X_C = \frac{1}{\omega C} = \frac{1}{\frac{\omega_0}{2} C} = \frac{2}{\omega_0 C}$$

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

$$Z = \sqrt{R^2 + \left(\frac{\omega_0 L}{2} - \frac{2}{\omega_0 C} \right)^2} \quad \text{--- ①}$$

$$X_L = \omega L = 2\omega_0 L$$

$$X_C = \frac{1}{\omega C} = \frac{1}{2\omega_0 C}$$

$$Z' = \sqrt{R^2 + \left((2\omega_0 L) - \left(\frac{1}{2\omega_0 C} \right) \right)^2} \quad \text{--- ②}$$

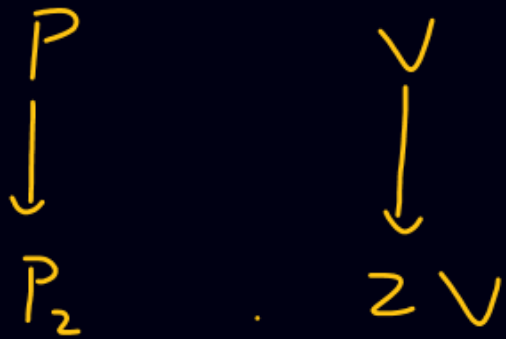
$$X_L = X_C$$

$$\omega L = \frac{1}{\omega C}$$

$$Z = Z'$$

⑨

$$\gamma = \frac{5}{3}$$

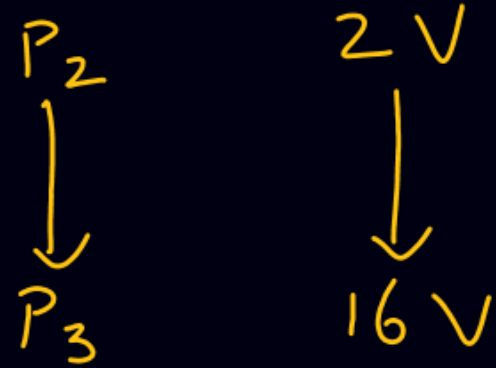


$$T = \text{const}$$

$$P_1 V_1 = P_2 V_2$$

$$P \times V = P_2 \times 2V$$

$$P_2 = \frac{P}{2}$$



$$P V^\gamma = \text{const}$$

$$P_2 V_2^\gamma = P_3 V_3^\gamma$$

$$\frac{P}{2} \times (2V)^{5/3} = P_3 \times (16V)^{5/3}$$

$$\frac{P}{2} \times \left(\frac{2V}{16V} \right)^{5/3} = P_3$$

$$P_3 = \frac{P}{2} \times \left(\frac{1}{2^3} \right)^{5/3}$$

$$= \frac{P}{2 \times 32}$$

$$= \frac{P}{64}$$

(16)

$$n \text{ VSD} = (n-1) \text{ MSD}$$

$$1 \text{ VSD} = \frac{(n-1)}{n} \text{ MSD}$$

$$L.C = \text{MSD} - \text{V.S.D}$$

$$= \text{MSD} - \left(\frac{n-1}{n} \right) \text{MSD}$$

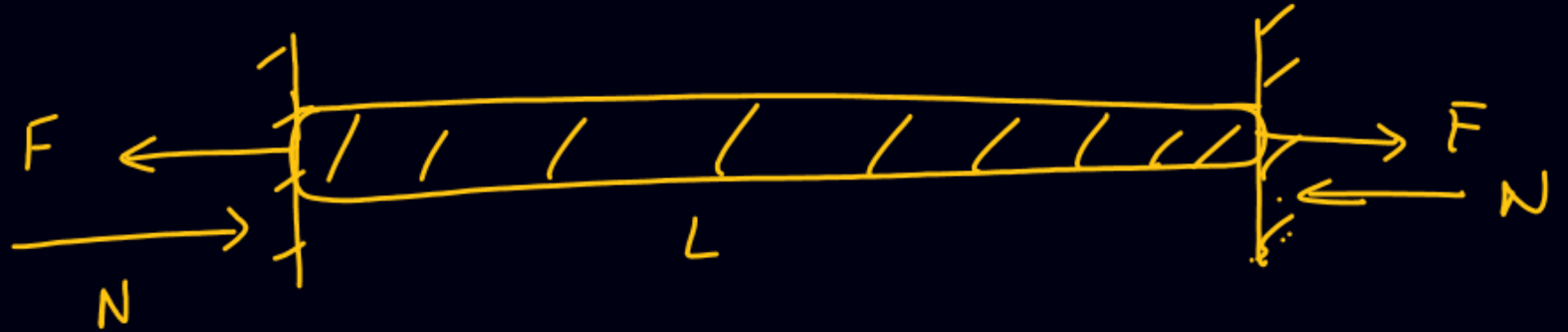
$$= \text{MSD} \left[1 - \left(\frac{n-1}{n} \right) \right]$$

$$= \text{MSD} \left[\frac{\cancel{n} - \cancel{n} + 1}{n} \right]$$

$$L.C = \frac{a \times 10}{n}$$

(11)

$$Y = \frac{F l}{A \Delta l}$$



$$F = Y A \frac{\Delta l}{l}$$

$$F = Y A \alpha \Delta T$$

$$N = Y A \alpha \Delta T$$

12

$$a = 1 \text{ cm}$$

$$b = 2 \text{ cm}$$

$$c = 1 \text{ cm}$$

$$V = \frac{1}{4\pi\epsilon_0} \left[\frac{q}{b} + \frac{q'}{b} \right]$$

$$0 = \frac{q}{b} + \frac{q'}{b}$$

$$\frac{q'}{b} = -\frac{q}{b}$$

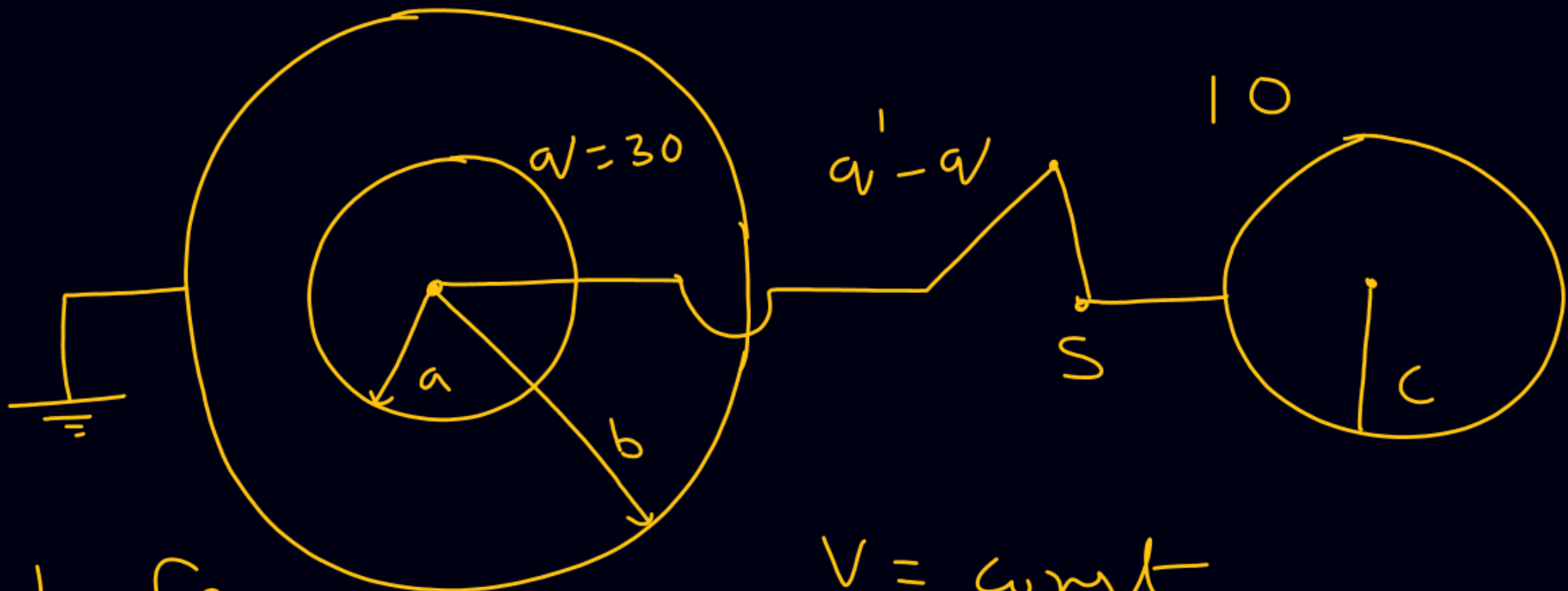
$$q' = -q$$

$$V = \frac{1}{4\pi\epsilon_0} \left[\frac{q}{a} - \frac{q}{b} \right]$$

$$V = \frac{q}{4\pi\epsilon_0} \left[\frac{b-a}{ab} \right]$$

$$4\pi\epsilon_0(ab) \frac{q}{b-a} = \left(\frac{q}{V} \right)$$

$$q' = -q = -20$$



$$V = \text{const}$$

$$q = CV$$

$$\frac{q_1}{q_2} = \frac{C_1}{C_2}$$

$$\frac{a'}{a - a'} = \frac{4\pi\epsilon_0 \left(\frac{ab}{b-a} \right)}{4\pi\epsilon_0 c}$$

$$\frac{a'}{a - a'} = \frac{ab}{c(b-a)}$$

$$\frac{a'}{a - a'} = \frac{2}{1(1)}$$

$$a' = 2a - 2a'$$

$$3a' = 2a$$

$$a' = \frac{2a}{3}$$

$$a' = \frac{2 \times 30}{3} \quad 10$$

$$a' = 20$$

$$a - a' = 30 - 20$$

$$a - a' = 10 \mu\text{C}$$

(14)

$$E = -\frac{3}{r}$$

$$r_1 = 6 \text{ m}$$

$$r_2 = 12 \text{ m}$$

$$E = -\frac{dV}{dr}$$

$$dV = -E dr$$

$$dV = \frac{3}{r} dr$$

$$\int_{V_1}^{V_2} dV = \int_{r_1}^{r_2} \frac{3}{r} dr$$

$$V_2 - V_1 = 3 \left[\log_e(r) \right]_6^{12}$$

$$V_2 - 12 = 3 \left[\log_e 12 - \log_e 6 \right]$$

$$= 3 \log_e \left(\frac{12}{6} \right)$$

$$= 3 \times \log_e 2$$

$$V_2 - 12 = 3 \times 0.693$$

$$V_2 = 12 + 3 \times 0.693$$

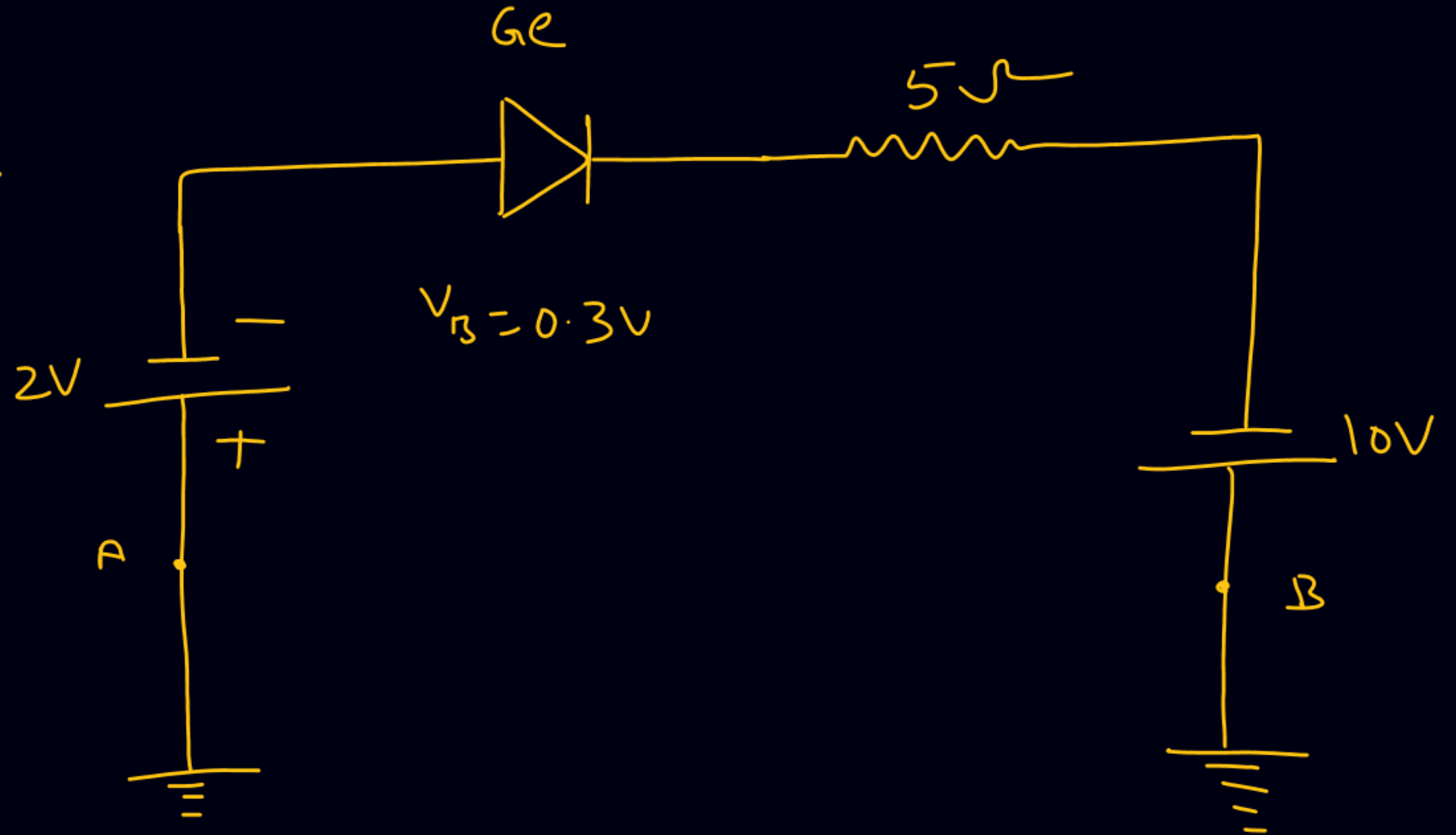
15

$$V_A - 2 - 0.3 - 5i + 10 = V_B$$

$$-2.3 + 10 = 5i$$

$$\frac{7.7}{5} = i$$

$$1.54 \text{ A} = i$$



(16)

P	Q
r_1	r_2
d	$d_Q = ?$

$$V_R = V_a + V_g$$

$$V_R = V_a + 3d_g$$

$$V_P = V_1 + 3d - (1)$$

$$V_Q = V_2 + 3d_Q - (2)$$

$$V_P = V_Q$$

$$V_1 + 3d = V_2 + 3d_Q$$

$$V_1 - V_2 + 3d = 3d_Q$$

$$\frac{V_1 - V_2}{3} + d = d_Q$$

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$$mv + 0 = 2m'v \cos 60^\circ$$

$$mV = 2m'v \times \frac{1}{2}$$

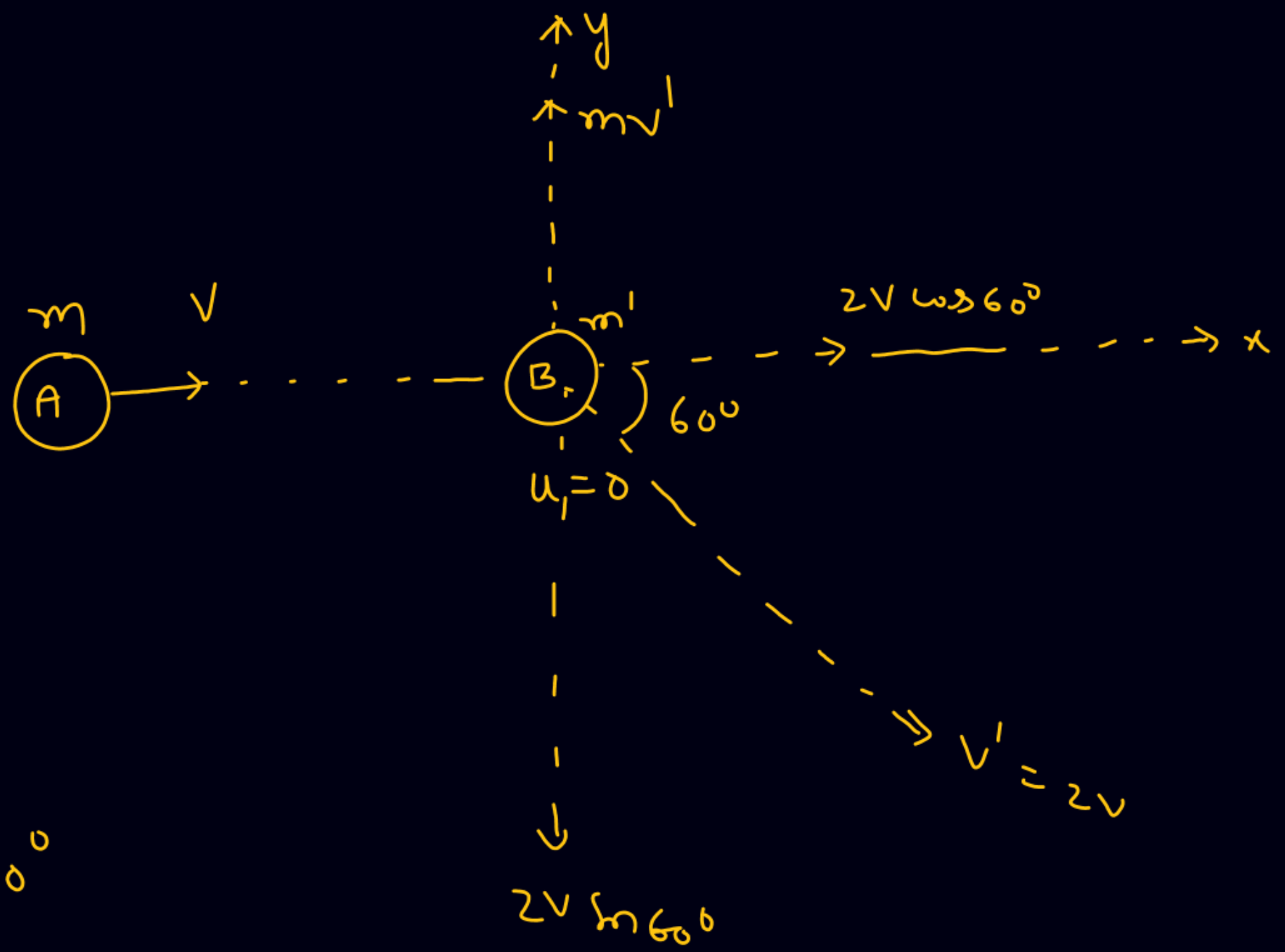
$$m = m'$$

$$0 = mv' - 2V \sin 60^\circ$$

$$mv' = 2V \times \sqrt{3} m$$

$$v' = \sqrt{3} V$$

$$V' = \sqrt{3} V$$



(18)

$$v = 1 + \frac{2}{f}$$

$$= 48 \times 2$$

$$= 96$$

$$f = \overset{T}{3} + \overset{R}{3} + \overset{V}{96}$$

$$f = 102$$

$$v = 1 + \frac{2}{102}$$

$$= \frac{104}{102}$$

=

(24)

B x y A B

$$V_B - i_1 \times 1 - i_3 \times 0 + i_2 \times 3 = V_B$$

$$3i_2 = i_1 \quad \text{--- (1)}$$

x C D y x

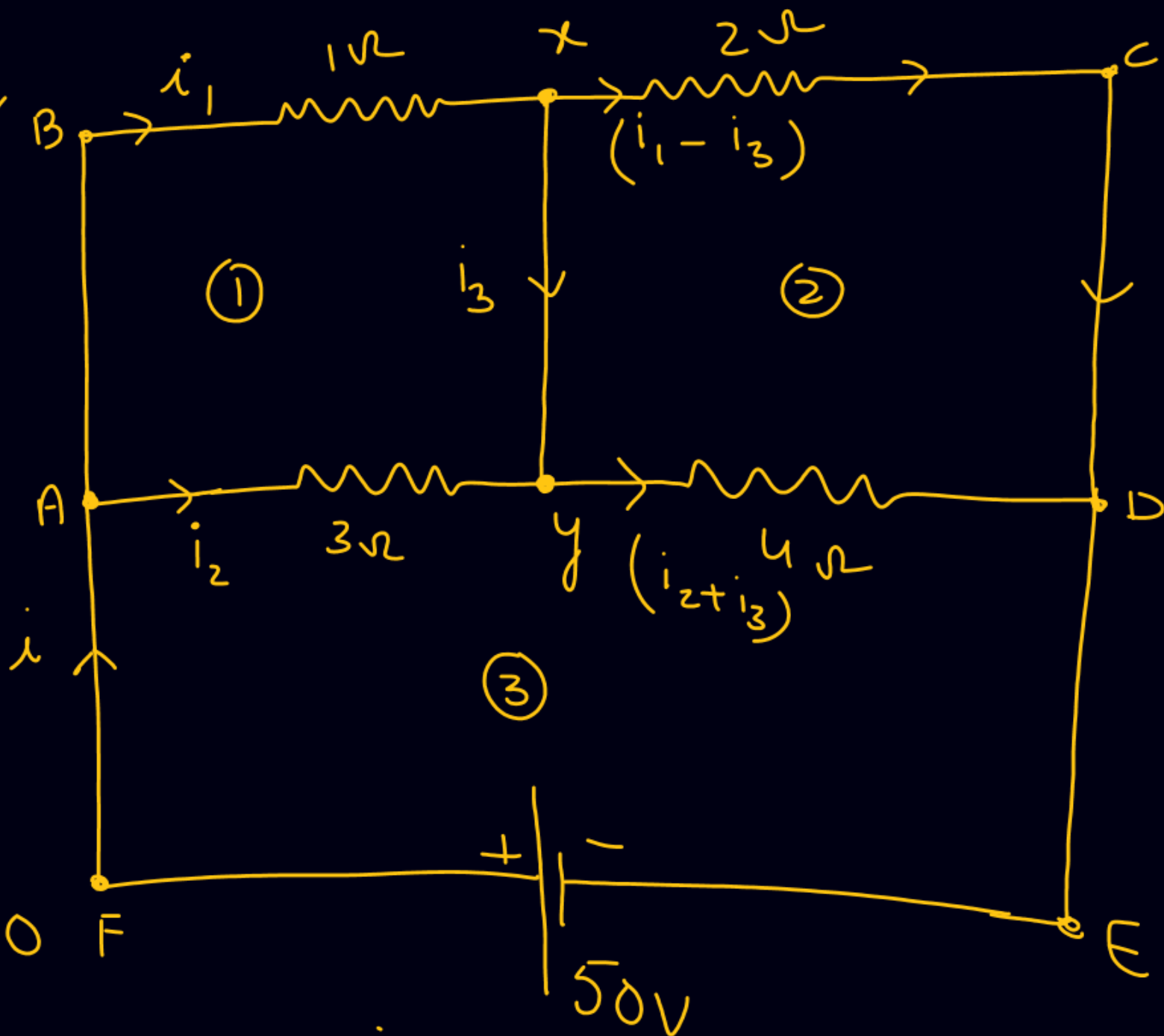
$$V_x - (i_1 - i_3) \times 2 + 4(i_2 + i_3) + i_3 \times 0 = V_x$$

$$-2(i_1 - i_3) + 4(i_2 + i_3) = 0$$

$$-2i_1 + 2i_3 + 4i_2 + 4i_3 = 0$$

$$-2 \times 3i_2 + 6i_3 + 4i_2 = 0$$

$$-2i_2 + 6i_3 = 0$$



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$$S_2P - S_1P = n\lambda$$

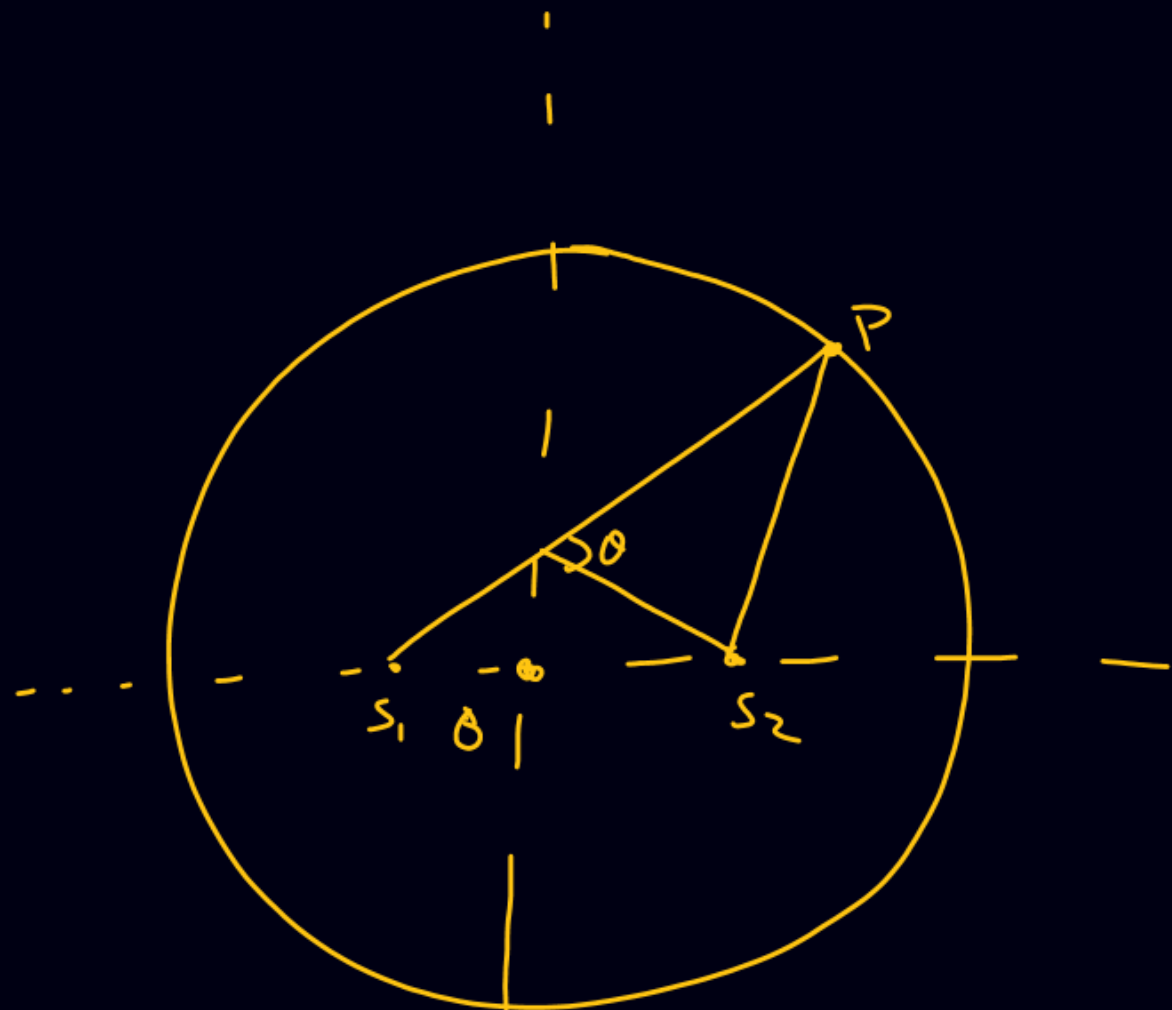
$$r \omega \theta = n\lambda$$

$$5 \times 4 \times \theta = 20\lambda$$

$$\omega \theta = \frac{n\lambda}{5}$$

$$= 4 \times 5$$

$$= 20$$



$$0 < \theta < 90^\circ$$

$$-3i_2 - 4(i_2 + i_3) + 50 = 0$$

$$-3i_2 - 4i_2 - 4i_3 + 50 = 0$$

$$-7i_2 - 4i_3 + 50 = 0$$

$$7i_2 + 4i_3 = 50 \quad \text{--- (3)}$$

$$2i_1 - 4i_2 = 6i_3$$

$$2 \times 3i_2 - 4i_2 = 6i_3$$

$$2i_2 = 6i_3$$

$$i_2 = 3i_3$$

$$7 \times 3i_3 + 4i_3 = 50$$

$$25i_3 = 50$$

$$i_3 = 2A$$

$$i_2 = 6A$$

$$i_1 = 18A$$