

23/02/2022

BEEE Assignment 2

Q.1 MCQ.

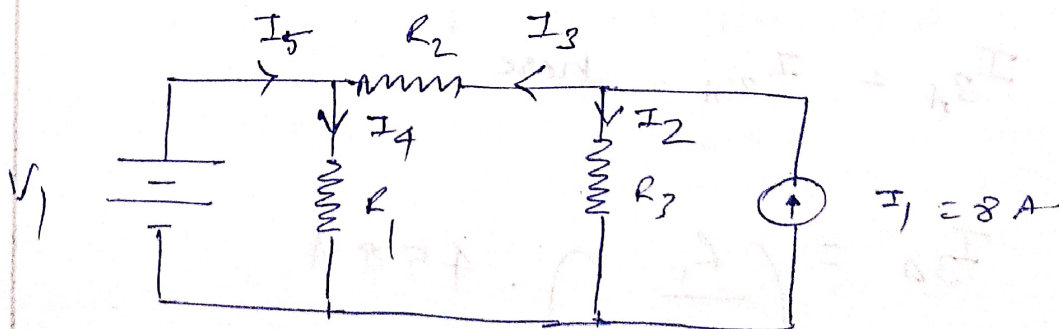
- (1) B.  $3.67 \Omega$
- (2)  $R_C + R_B + \frac{R_C R_D}{R_A}$  (A)
- (3) (A) 10 A.
- (4) (B) Nodal Analysis
- (5) (B) ~~opened.~~ ~~opened~~ started.
- (6) (B) 4.55 A
- (7) (A) current lags voltage by  $90^\circ$ .
- (8) 75  $\Omega$  (B)
- (9) (A) 75 Hz, 100 V
- (10) (D) unity

Q.2:

$$V_1 = 9 \text{ V}$$

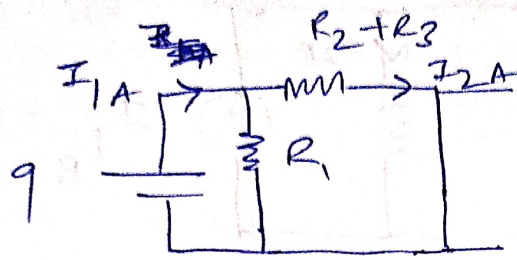
$$R_2 = 0 + 5 + 4 = 9 \Omega$$

$$R_1 = 5 \Omega, R_3 = 3 \Omega, I_1 = 8 \text{ A}$$



Activating  $V_1$ , and deactivating others

By Superposition Principle,  
 Activating only  $V_s = 9V$ ,



Equivalent Resistance,  $R_{eq}$   

$$R_{eq} = \frac{(R_1)(R_2 + R_3)}{R_1 + R_2 + R_3}$$

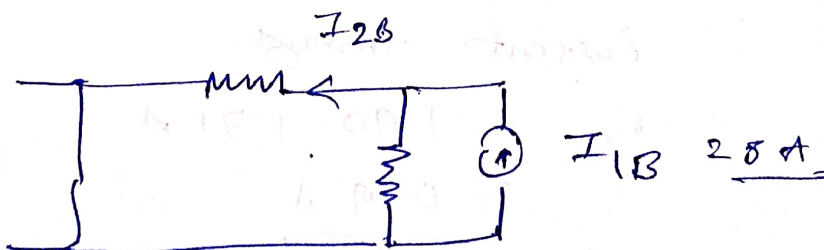
$$= \frac{60}{17} = 3.5 \Omega$$

$$I_{1A} = \frac{V}{R} = \frac{9}{3.5} = 2.57A$$

$$I_{2A} = \frac{R_1}{R_{eq}} \cdot 2.57 = \frac{15}{17} \cdot (2.57)$$

$$= \frac{0.77A}{(\rightarrow)}$$

Activating 8A Supply,



$$I_{2B} = \frac{R_3}{R_{eq}} \cdot I_{1B} = \frac{3}{17} \cdot 8 = \underline{1.4A}$$

$$(\leftarrow)$$

$$\therefore \text{Net } I = 1.4 - 0.77A = 0.63A$$

through  $R_2 = 9 \Omega$   $(\leftarrow)$



Q 3.

$$R = 54 \Omega$$

$$L = 9 \text{ mH}$$

$$C = 150 \mu\text{F}$$

$$V = 150 \text{ V}$$

$$f = 50 \text{ Hz}$$

$$\omega = 2\pi f = \overset{3.14 \times 2}{\cancel{6.28}} (f) = \overset{3.14}{\cancel{6.28}} \text{ A rad/s}$$

$$X_L = \cancel{2\pi f L} \omega L$$

$$= \cancel{6.28} \cdot (\cancel{6.28}) (\cancel{9}) (10^{-3})$$

$$= (3.14) (9) (10^{-3})$$

$$= \underline{\underline{2.826 \Omega}}$$

$$X_C = \frac{1}{\omega C} = \frac{1}{(3.14)(150) \times (10^{-6})}$$

$$= \underline{\underline{21.23 \Omega}}$$

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

$$= \sqrt{54^2 + (21.23 - 2.826)^2}$$

$$= \sqrt{2916 + 338.7}$$

$$= \underline{\underline{57.05 \Omega}}$$

(b)

$$\text{Current} = \frac{150}{57.05} = \underline{\underline{2.629 \text{ A}}}$$

(a)

$$\text{Impedance} = \underline{\underline{57.05 \Omega}}$$

(c)

$$V \text{ through } R = I \cdot R = 2.629 \times 54 \Omega = \underline{\underline{141.9 \text{ V}}}$$

$$V \text{ through } L = I \cdot X_L = 2.629 \times 2.826 = \underline{\underline{7.42 \text{ V}}}$$

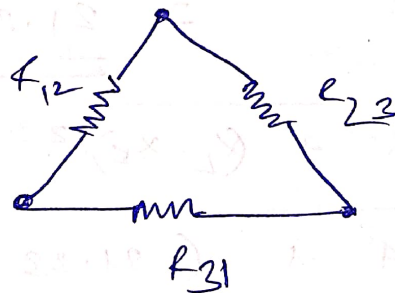
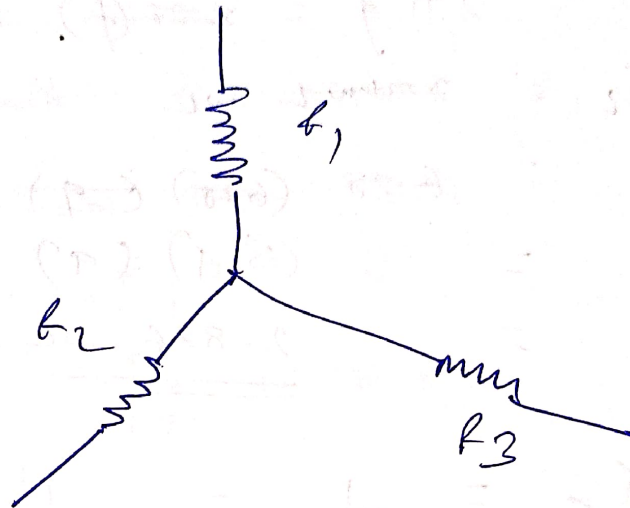
$$V \text{ through } C = I \cdot X_C = 2.629 \times 21.23 = \underline{\underline{55.81 \text{ V}}}$$

Q.4. Star  $\rightarrow$  Delta

$$R_1 = 25 \Omega$$

$$R_2 = 54 \Omega$$

$$R_3 = 9 \Omega$$



For Delta,

$$\begin{aligned} R_{12} &= R_1 + R_2 + \frac{R_1 \times R_2}{R_3} \\ &= 25 + 54 + \frac{25 \times 54}{9} \\ &= \underline{\underline{229 \Omega}} \end{aligned}$$

$$\begin{aligned} R_{23} &= R_2 + R_3 + \frac{R_2 \cdot R_3}{R_1} \\ &= 54 + 9 + \frac{54 \cdot 9}{25} \\ &= \underline{\underline{62.44 \Omega}} \end{aligned}$$

$$R_{31} = R_3 + R_1 + \frac{R_2 \cdot R_1}{R_2}$$

$$= 9 + 25 + \frac{(9 \cdot 25)}{54}$$

$$= \underline{\underline{38.1 \Omega}}$$