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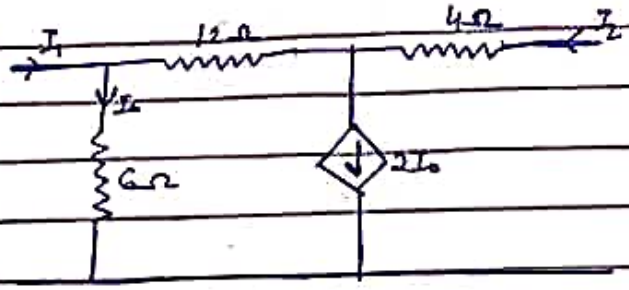
# Electrical Science - II

## Take Away - 4

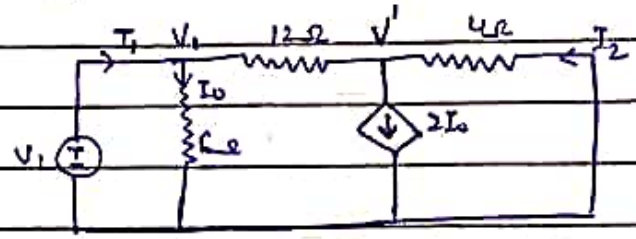
Q.1.




$$I_1 = Y_{11}V_1 + Y_{12}V_2$$
$$I_2 = Y_{21}V_1 + Y_{22}V_2$$

$$\begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} Y_{11} & Y_{12} \\ Y_{21} & Y_{22} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix}$$

(1) $\therefore V_2 = 0$




$$I_1 = I_0 + \frac{V_1 - V'}{12}$$

$$I_1 = \frac{V_1}{6} + \frac{V_1}{12} - 4(I_1 - 3I_0)$$

$$I_1 = \frac{3V_1}{12} - 4I_1 + 12I_0$$

$$5I_1 = \frac{3V_1}{4} + \frac{12V_1}{6} = \frac{9V_1}{4}$$

$$\frac{I_1}{V_1} = \frac{9}{20} = Y_{11}$$

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$V = V_1 - 12(I_1 - I_0)$

$-4I_2 = V_1 - 12I_1 + 12I_0$

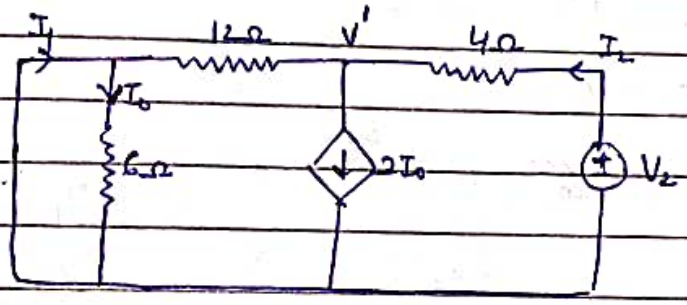
$-4I_2 = V_1 - \frac{3}{12} \times \frac{9}{20_5} V_1 + \frac{2}{12} \times \frac{V_1}{6}$

$-4I_2 = V_1\left[1 - \frac{27}{5} + 2\right] = V_1\left[\frac{15-27}{5}\right]$

$-4I_2 = \frac{V_1}{5} \times -12$

$\frac{I_2}{V_1} = \frac{3}{5} = Y_{21}$

(2) $\therefore \quad V_1 = 0$




$I_2 = 2I_0 + \frac{V'}{12}$ $\quad \because I_0 = 0$

$I_2 = \frac{V_2 - 4I_2}{12}$

$5I_2 = V_2 + \frac{V'}{12} = V_2 + \frac{V_2 - 4I_2}{12}$

$I_2 = \frac{V_2 - 4I_2}{12}$

$12I_2 = V_2 - 4I_2$

$16I_2 = V_2$

$\frac{I_2}{V_2} = \frac{1}{16} = Y_{22}$

$V' = -12I_1$

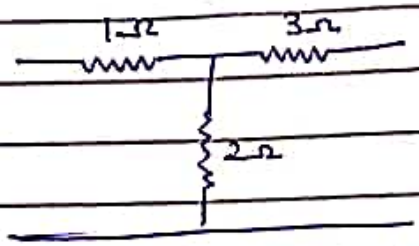
$V_2 - 4I_2 = -12I_1$

$V_2 - 4\frac{V_2}{16} = -12I_1$

$12\frac{V_2}{16} = -12I_1$

$\frac{I_1}{V_2} = \frac{1}{16} = Y_{12}$

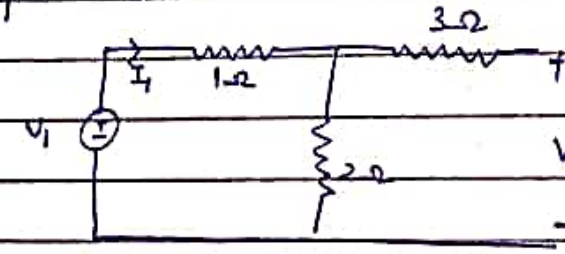
Q.2.




$V_1 = AV_2 - BI_2$

$I_1 = CV_2 - DI_2$

① for $\therefore I_2 = 0$



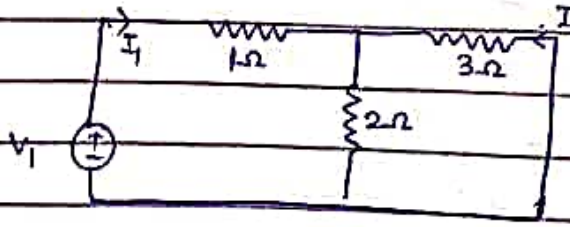

$V_1 = 3I_1$

$V_2 = 2I_1$

$A = \frac{V_1}{V_2} = \frac{3}{2}$

$C = \frac{I_1}{V_2} = \frac{1}{2}$

② for $\therefore V_2 = 0$




$V_1 = \left(1 + \frac{3\times2}{5}\right) I_1$

$V_1 = \frac{11}{5} I_1$

$V = V_1 - I_1$

$-3I_2 = \frac{11}{5} I_1 - I_1 = \frac{6I_1}{5}$

$-\frac{I_1}{I_2} = \frac{5}{2} = D$

$-3I_2 = V_1\left[1 - \frac{5}{11}\right]$

$-3I_2 = V_1 \frac{6}{11}$

$-\frac{V_1}{I_2} = \frac{11}{2} = B$