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SEMESTER = 2ND

Dept. = ELECTRICAL ENGG.

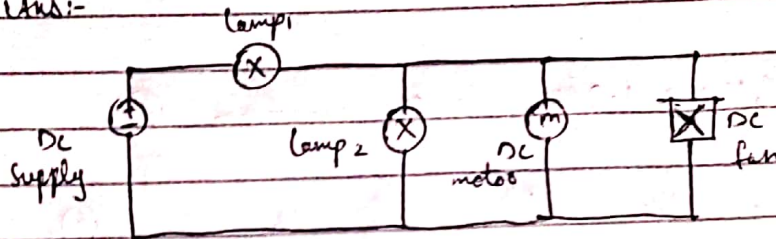
SUBJECT = LCA (Lab)

(Assignment) Open Ended
(Lab)

TEACHER = Sis. WALEED JAN

Q No

Ques:-



Soln-

Solve by node

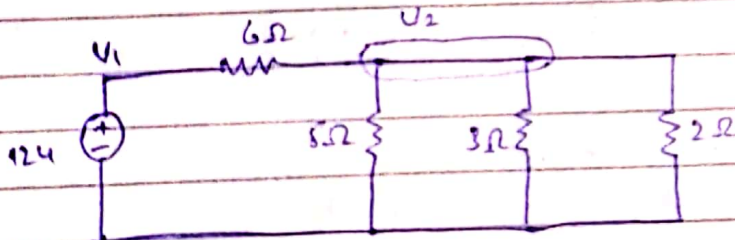
Let

$$R_1 = 6$$

$$R_2 = 5$$

$$R_3 = 3$$

$$R_4 = 2$$



Applying KCL on V_1

$$\frac{V_1 - V_2}{6} = 12$$

$$V_1 - V_2 = 72$$

$$V_1 = 72 + V_2 \quad \text{--- (1)}$$

Applying KCL on node 2.

$$\frac{V_2 - V_1}{6} + \frac{V_2}{5} + \frac{V_2}{3} + \frac{V_2}{2} = 0$$

$$\frac{5V_2 - 5V_1 + 6V_2 + 10V_2 + 15V_2}{30} = 0$$

$$\frac{-5V_1 + 36V_2}{30} = 0$$

$$-0.166V_1 + 1.2V_2 = 0 \quad \text{--- (2)}$$

Putting the values of V_1 in eq (2)

$$-0.166(72 + V_2) + 1.2V_2 = 0$$

$$-11.952 - 0.166V_2 + 1.2V_2 = 0$$

$$-11.95 + 1.034V_2 = 0$$

$$\frac{1.034V_2}{1.034} = \frac{11.95}{1.034}$$

$$\boxed{V_2 = 11.55}$$

Put V_2 in eq (1)

$$V_1 = 72 + V_2$$

$$V_1 = 72 + 11.55$$

$$\boxed{V_1 = 83.55}$$

Finding Current

$$i) \quad I_1 = \frac{V_1}{R_1}$$

$$= \frac{83.55}{6}$$

$$\boxed{I_1 = 13.925 \text{ A}}$$

$$\text{ii.) } I_2 = \frac{V_2}{R_2}$$

$$= \frac{11.55}{5}$$

$$I_2 = 2.31 \text{ A}$$

$$\text{iii.) } I_3 = \frac{V_3}{R_3} = \frac{11.55}{3}$$

$$I_3 = 3.85 \text{ A}$$

$$\text{iv.) } I_4 = \frac{I}{R_4} = \frac{83.55}{2}$$

$$I_4 = 41.77 \text{ A}$$

For voltage

$$\text{i.) } V_1 = I_1 R_1$$

$$= (13.92)(6)$$

$$V_1 = 83.52 \text{ V}$$

$$\text{ii.) } V_2 = I_2 R_2$$

$$= (2.31)(5)$$

$$V_2 = 11.55 \text{ V}$$

$$\text{iii.) } V_3 = I_3 R_3$$

$$= (3.85)(3)$$

$$V_3 = 11.55 \text{ V}$$

$$\text{iv.) } V_4 = I_4 R_4$$

$$= (41.77)(2)$$

$$V_4 = 83.54 \text{ V}$$

For Power

$$\begin{aligned} \text{i)} \quad P_1 &= V_1 \times I_1 \\ &= (83.55) (13.92) \\ \boxed{P_1 &= 1163.01 \text{ W}} \end{aligned}$$

$$\begin{aligned} \text{ii)} \quad P_2 &= V_2 I_2 \\ &= (11.55) (2.31) \\ \boxed{P_2 &= 26.68 \text{ W}} \end{aligned}$$

$$\begin{aligned} \text{iii)} \quad P_3 &= V_3 I_3 \\ &= (11.55) (3.85) \\ \boxed{P_3 &= 44.46 \text{ W}} \end{aligned}$$

$$\begin{aligned} \text{iv)} \quad P_4 &= V_4 I_4 \\ &= (83.54) (41.77) \\ \boxed{P_4 &= 3489.46 \text{ W}} \end{aligned}$$