IQRA NATIONAL UNIVERSITY

DEPARTMENT OF ELECTRICAL ENGINEERING

LINEAR CIRCUIT ANALYSIS (LAB)

OPEN ENDED LAB

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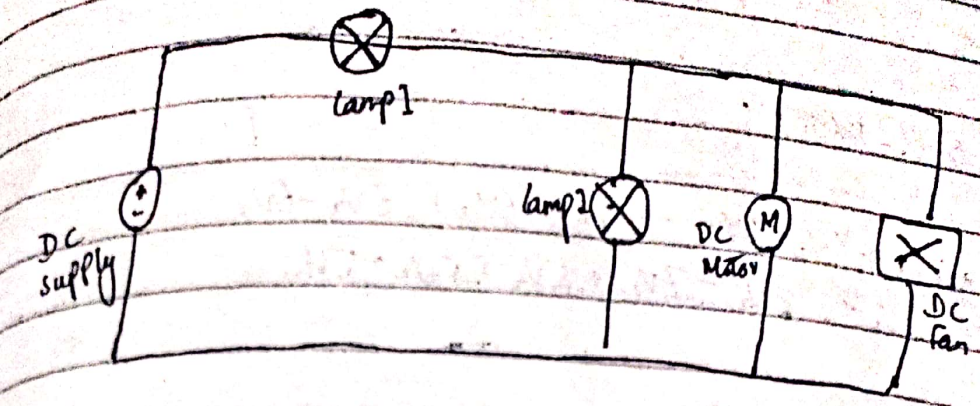
Q.2e

Ans figure



Solution

Solving through nodales

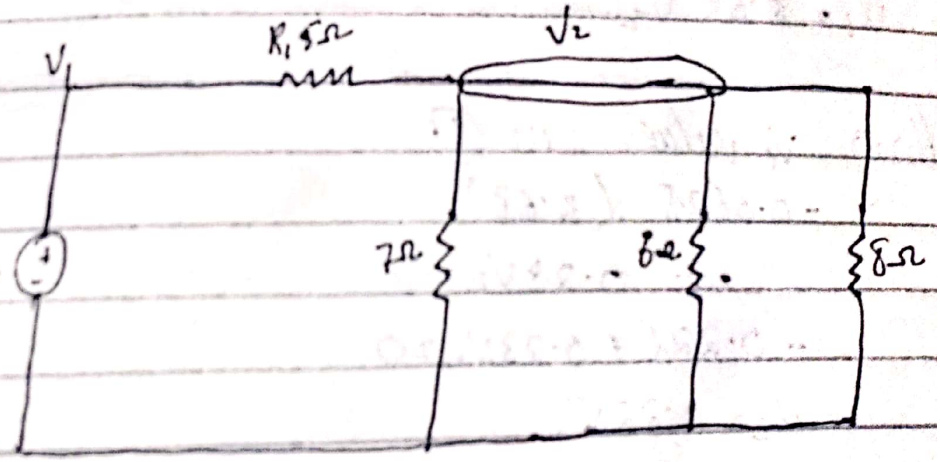
let

$R_1 = 5$

$R_2 = 7$

$R_3 = 6$

$R_4 = 8$



Applying KCL on V_1

$$\frac{V_1 - V_2}{5} = 2$$

$$V_1 - V_2 = 10$$

$8V_2 + 8V_2 + 8V_2 - 8V_1 + 6V_2 + 6V_2 + 6V_2 - 6V_1$

$7V_2 + 7V_2 + 7V_2 - 7V_1 + 5V_2 + 5V_2 + 5V_2$

$$\frac{78V_2 - 21V_1}{336} = 0$$

$$\frac{-21V_1 + 78V_2}{336} = 0$$

$$-0.0625V_1 + 0.23V_2 = 0$$

$$0.0625V_1 = 0.23V_2$$

$$V_1 = \frac{0.23V_2}{0.0625}$$

$$V_1 = 3.68\,V_2$$

putting V_1 value in (1)

$$-0.0625\,(3.68)$$

$$+ 0.23V_2 = 0$$

$$-0.225 + 0.23V_2 = 0$$

$$V_2 = \frac{0.225}{0.23}$$

$$= \boxed{0.97\,V}$$

$-0.0625 + 0.23V_2 = 20$

using by 1 eq①

$0.0625V_1 + 0.23V_2 = 20$

$-0.0625V_1 + 0.23V_2 = 20$

$+0.0625V_1 - 0.076V_2 = 14$

$0.154V_2 = 14$

$V_2 = 90.9V$

$0.0625V_1 + 0.23(90.9) = 20$

$V_1 = \frac{20.90}{0.0625}$ $= 334.4V$

① Find Currents

$I = V/R$

$I = \frac{334.4}{5} = 66.88A$

Across R_2

$I = V/R$

$I = 90.9/7 = 12.98A$

Across R_3

$I = V/R$

$I = 90.9/6 = 15.15$

Across R_4

$I = V/R$

$I = 90.6/8$

$I = 11.3625A$

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Finding Voltage

V_2 UR

$V_2 (66.88)(5) = \boxed{334.4V}$

V across R_2

$V_2 (12.98)(7) = \boxed{90.9W}$

V across R_3

$V_2 (5.45)(6) = \boxed{90.9W}$

V across R_4

$V_2 (0.3625)(8)$

$= \boxed{90.9W}$