

B Tech Electrical

NAME

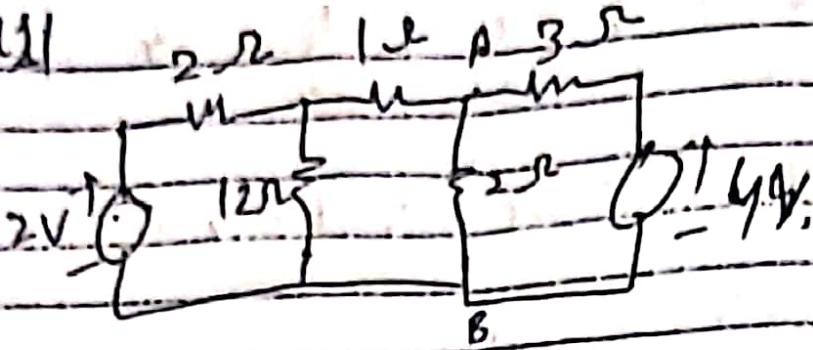
MUHAMMAD ABBAS

ID

16721

①

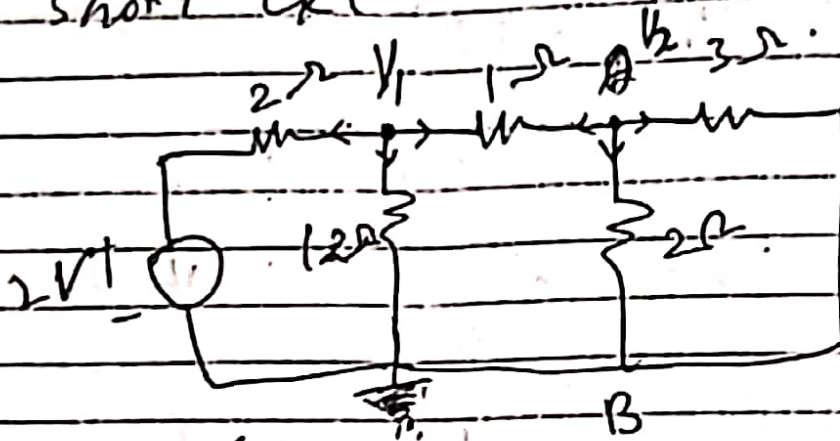
Q111



Required $V_{AB} = ?$

Solⁿ using Superposition Theorem.

Suppose to use 2V source & 4V is short ckt.



$V_{AB} = ?$

using Nodal Analysis.

V_1

$$\frac{V_1 - 2}{2} + \frac{V_1}{12} + \frac{V_1 - V_2}{1} = 0$$

$$6V_1 - 12 + V_1 + 12V_1 - 12V_2 = 0$$

$$19V_1 - 12V_2 = 12 \rightarrow \text{①}$$



(2)

$$\frac{V_2 - V_1}{1} + \frac{V_2}{2} + \frac{V_2}{3} = 0$$

$$6V_2 - 6V_1 + 3V_2 + 2V_2 = 0$$

$$-6V_1 + 11V_2 = 0$$

$$V_2 = \frac{6V_1}{11} \rightarrow \text{put in (1)}$$

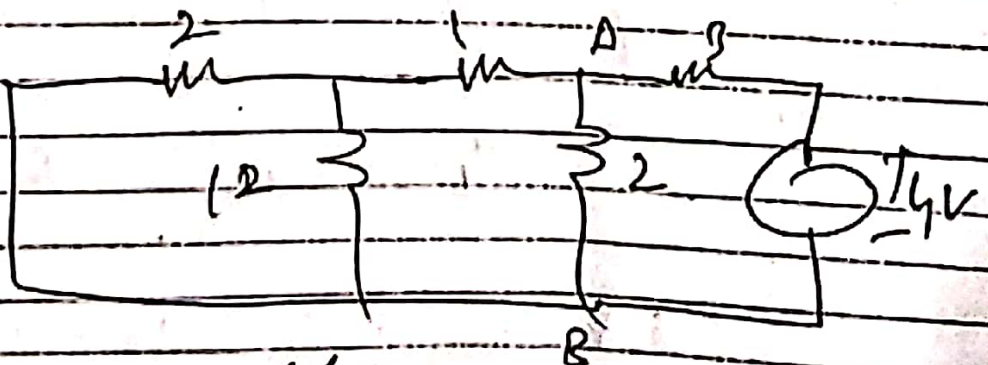
$$19V_1 - 12\left(\frac{6V_1}{11}\right) = 12$$

$$V_1 = 0.9635 \text{ V}$$

$$V_2 = 0.5255 \text{ V}$$

$$V_{AB} = V_2 - 0 = 0.5225 \text{ V}$$

Now 2V is short ckt
and 4V is act as source



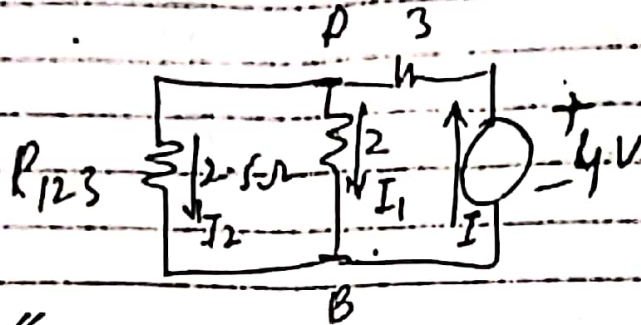
after parallel & series simplification

$$R_{12} = 2 \parallel 12$$

$$R_{123} = 2 \parallel 12 + 1$$

(3)

$$R_{123} = 1.5 + 1 = 2.5 \Omega.$$



$$V_{AB} = I_1 (2) \rightarrow \text{①}$$

$$I = \frac{4}{2.5 \parallel 2 + 3} = \frac{4}{4.111} = 0.972 \text{ A}$$

using current division rules.

$$I_1 = \left(\frac{2.5}{2 + 2.5} \right) I = 0.5405 \text{ A}$$

$$V_{AB}'' = I_1 (2) = (0.5405)(2) = 1.081 \text{ V}$$

So

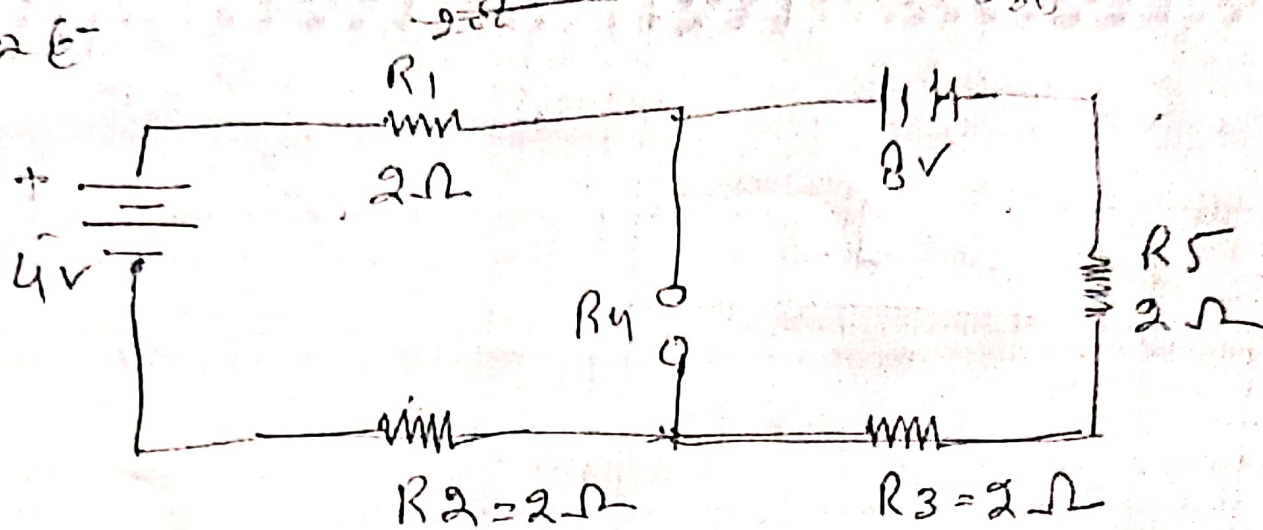
Net voltage

$$V_{AB} = V_{AB}' + V_{AB}'' = 0.5225 + 1.081 \text{ V}$$

$$V_{AB} = 1.6035 \text{ V}$$

Q2E

Page (4)



$$I = \frac{V}{R} = \frac{8-4}{8} = \frac{4}{8} =$$

$$I = 0.5 \text{ A}$$

$$V_1 = IR_1 = 1 \text{ V}$$

$$V_2 = IR_2 = "$$

$$V_3 = IR_3 = "$$

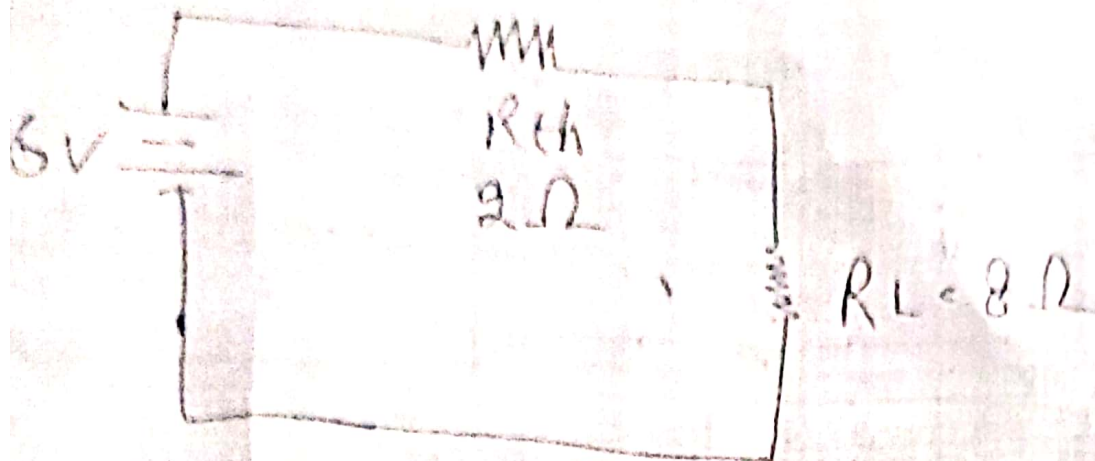
$$V_5 = IR_5 = "$$

$$V_{th} = 6 \text{ V}$$

$$R_{th} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$$

$$\frac{1}{R} = \frac{2}{4} = \frac{1}{2}$$

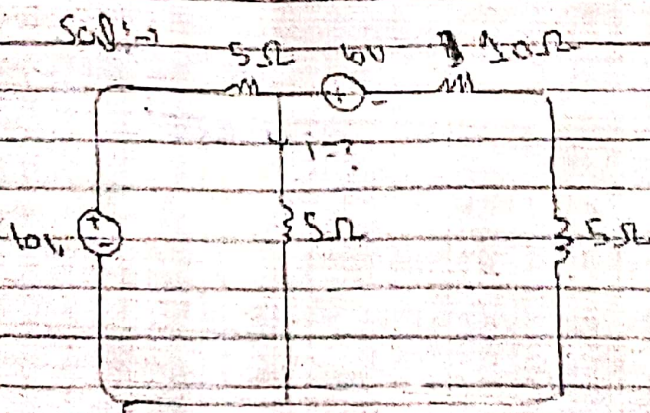
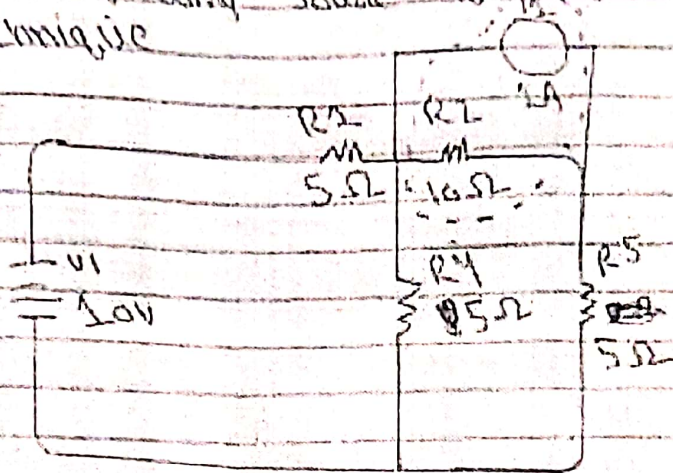
$$R_{th} = 2 \Omega$$



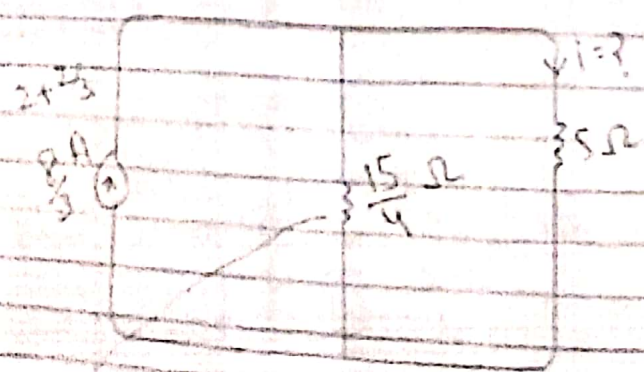
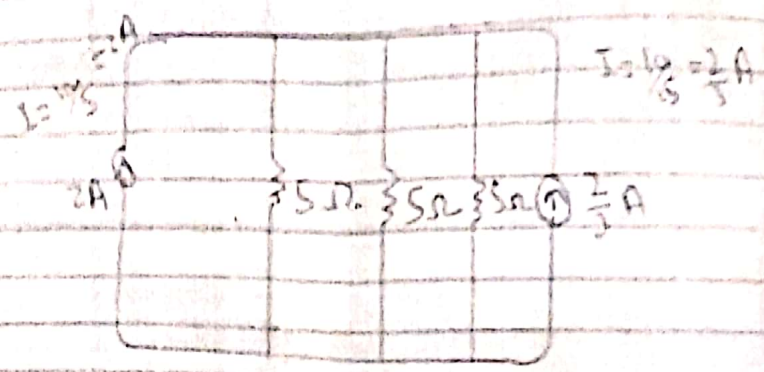
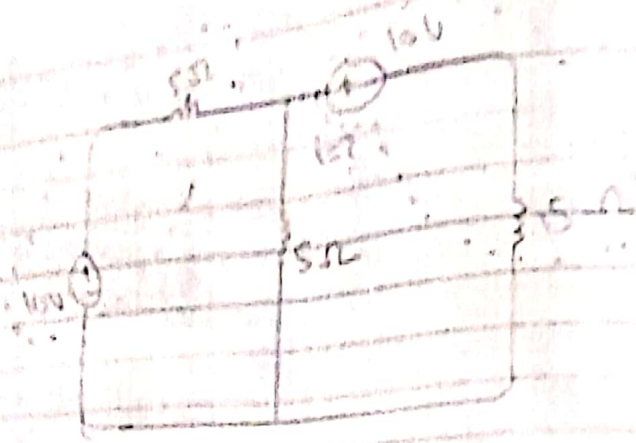
$$I = \frac{V_{th}}{R_{th} + R_L} = \frac{6}{2 + 8} = \frac{6}{10} = 0.6A$$

$$I = 0.6A$$

Q3. Find the current through the central 5Ω resistor using source transformation technique.

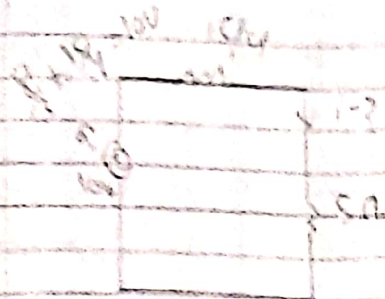


Note that the arrow terminal of 10V source is placed to the left become the current source was pointing to the left.



$$\frac{1}{R_{eq}} = \frac{1}{5} + \frac{1}{5} = \frac{3+1}{5} = \frac{4}{5}$$

Page # 8



$$i = \frac{35}{35} = 1 \text{ A} \quad \text{or} \quad \frac{15}{4} = \frac{15+20}{4}$$

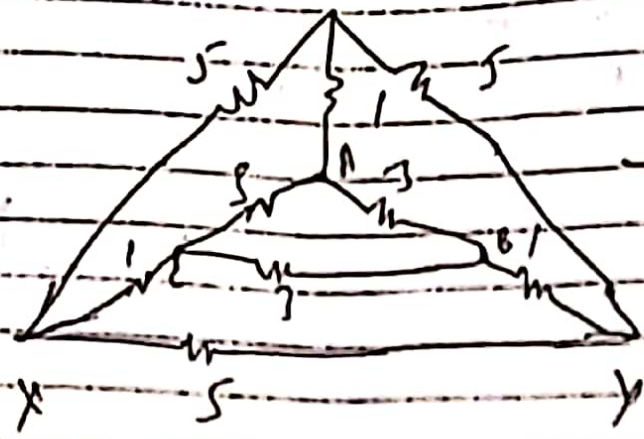


$$i = \frac{10}{35} = \frac{2 \times 4}{35} = \frac{8}{7} \text{ A}$$

Q. (4) (b)

Q. (4) (b)

$R_{xy} = ?$

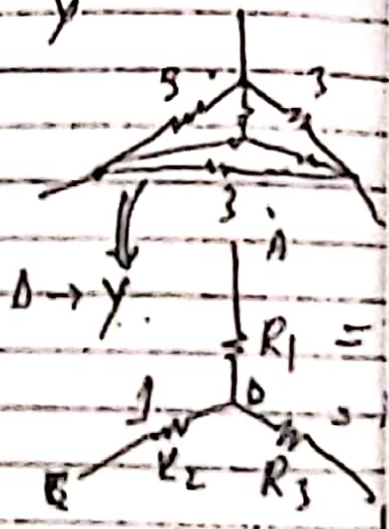


(A)

$$R_1 = \frac{3 \times 3}{3 + 3} = \frac{9}{6} = 1.5$$

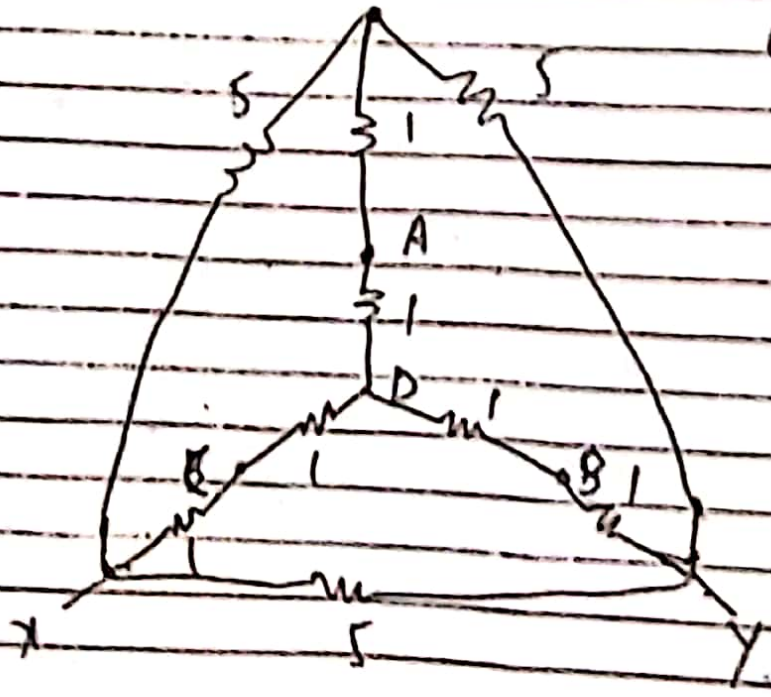
$$R_2 = 1$$

$$R_3 = 1$$

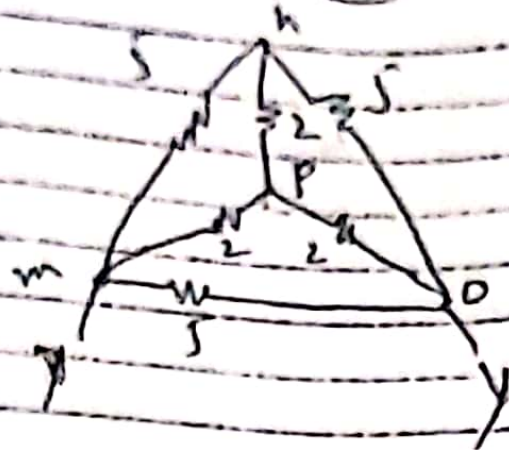


$D \rightarrow Y$

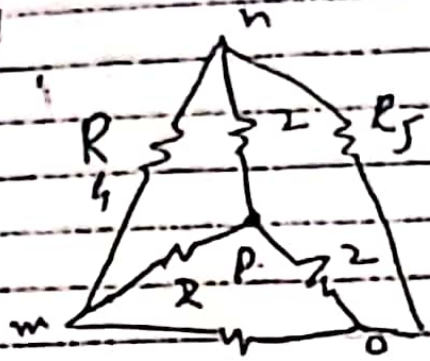
put in
ckt (A)



(10)



→ (11)



$$R_4 = 2 + 2 + \frac{2 \times 2}{2}$$

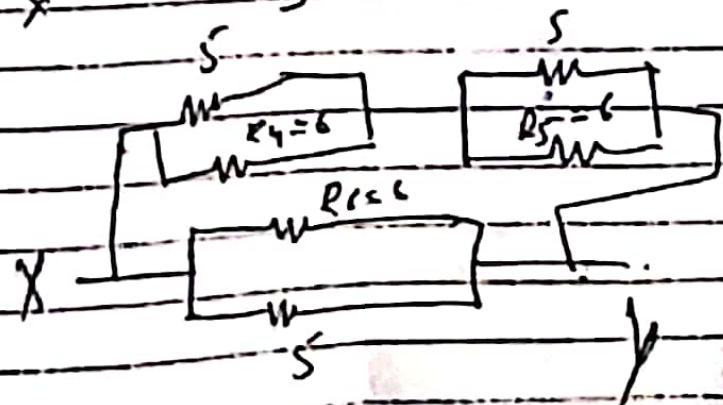
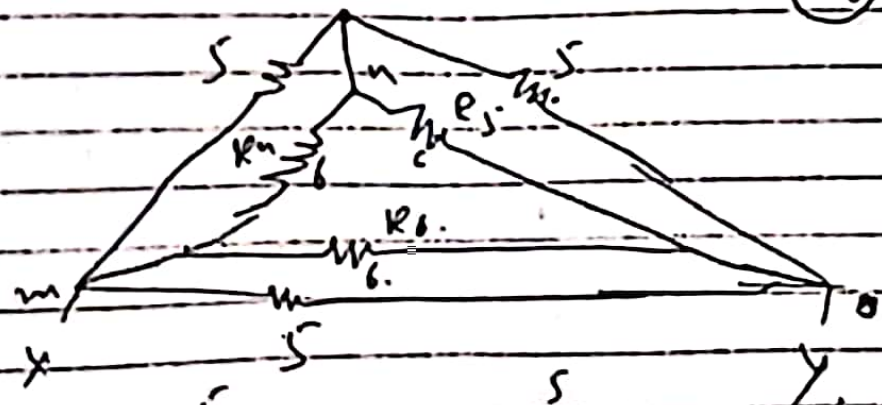
$$R_4 = 4 + 2 = 6 \Omega$$

$$R_5 = 4 + 2 = 6 \Omega$$

$$R_6 = 6 \Omega$$

↓
put in

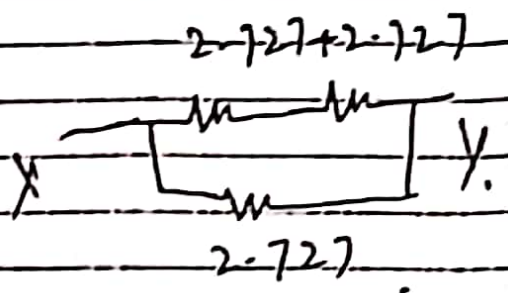
(12)



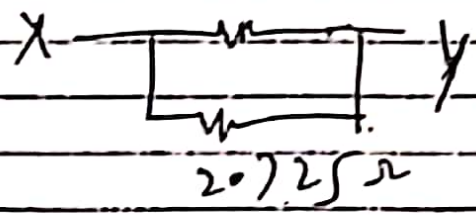
(11)

$$S_o R_{eq} = 5 \parallel R_6 = 5 \parallel 6 = \frac{5 \times 6}{5+6} = 30 \Omega$$

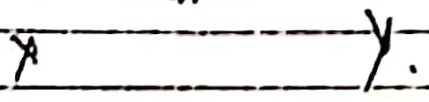
$$R_{eq} = \frac{30 \Omega}{1} = 2.727 \Omega$$



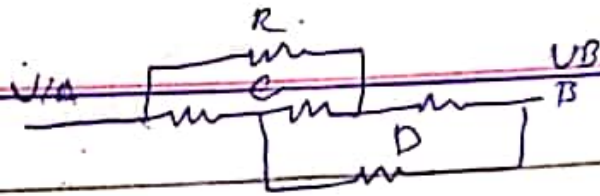
$$5.45 \Omega$$



$$1.81717 \Omega = \frac{5.45 \times 2.725}{5.45 + 2.725}$$

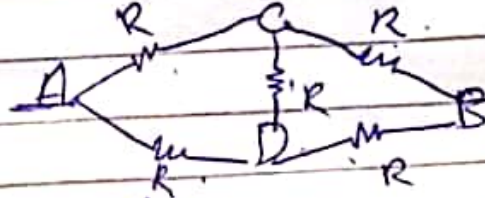


$$Z_{eq} = Z_{ny} = 1.81717 \Omega$$

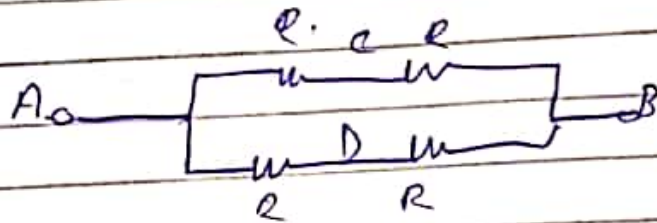


$$A = V_A$$

$$B = V_B$$



all have same values.



$$R_{eq} = \frac{2R \times 2R}{2R + 2R} \Rightarrow \frac{2(10) \times 2(10)}{2(10) + 2(10)}$$

$$R_{eq} = R$$