

ELEMENTS OF ELECTRICAL ENGINEERING

Course Code : UE25EE141A/B



FACULTY CONTRIBUTED:

Department of EEE, RR Campus

Prof . Jyothi T N

Prof. Vadhiraj K P P

Prof. Kruthika N

Prof. Suma S

Prof. Pushpa K R

Prof. Sangeeta Modi

Department of ECE, EC Campus

Prof. Lokesh L

Prof. Dhanashree G Bhate

Dr. Renuka R Kajur

Prof. Rajesh Chandrashekar

Prof. Sangam Kumar G H

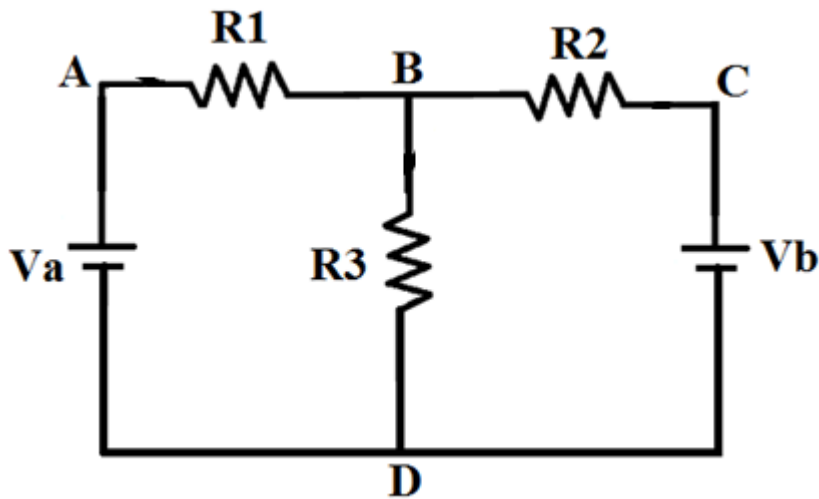
ELEMENTS OF ELECTRICAL ENGINEERING

Mesh Analysis

Jyothi T N

Department of Electrical & Electronics Engineering

- A Loop is a closed path with current flow in every element in that path.
- A mesh is a fundamental loop. It doesn't have smaller loops within itself.



Loops:

A-B-D-A

B-C-D-B

A-B-C-D-A

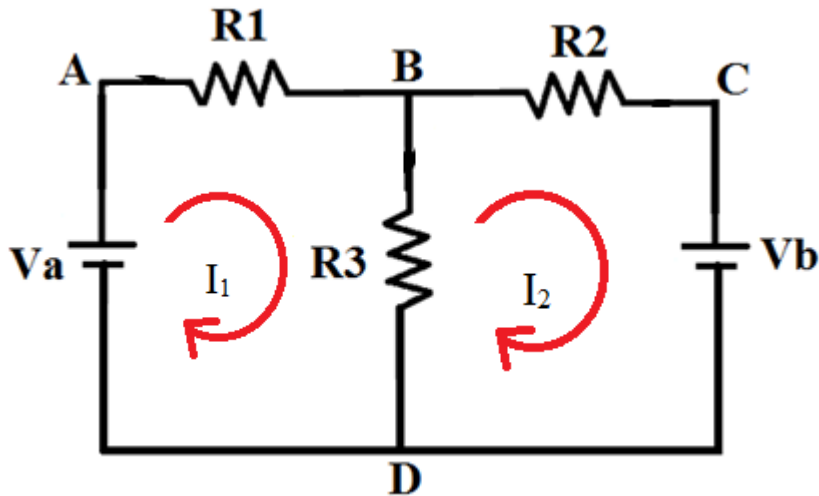
Meshes:

A-B-D-A

B-C-D-B

Step 1: Identify the number of meshes in the network.

Step 2: Assign one mesh current in each mesh preferably in the same direction.

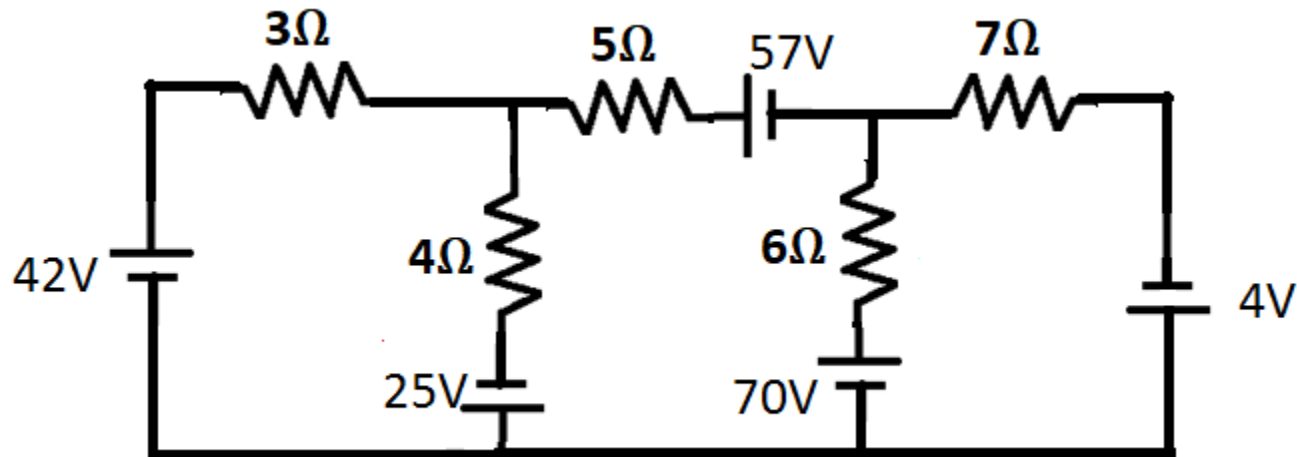


Step 3: Write KVL in every mesh.

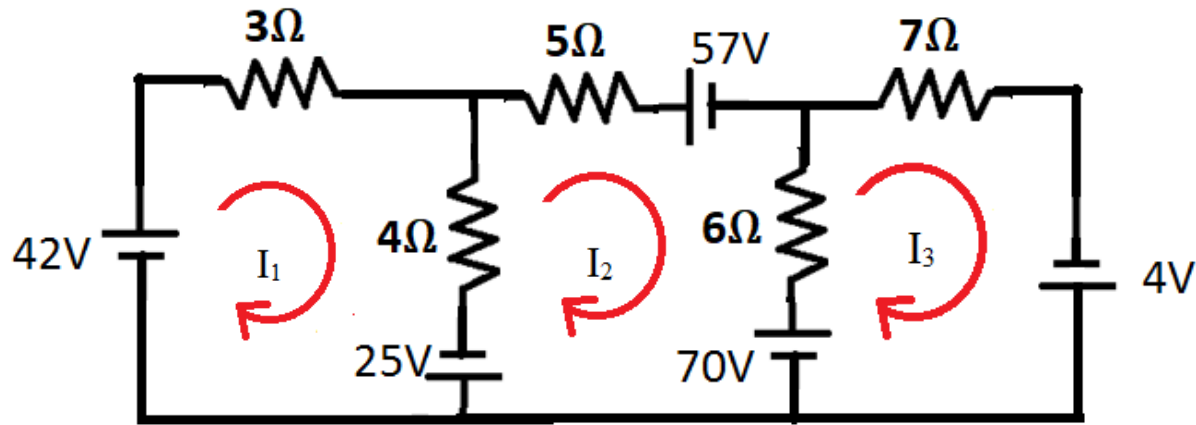
Step 4: Solve simultaneous equations to obtain Mesh currents.

Question:

Obtain current through 6Ω resistor using Mesh Analysis.



Solution:



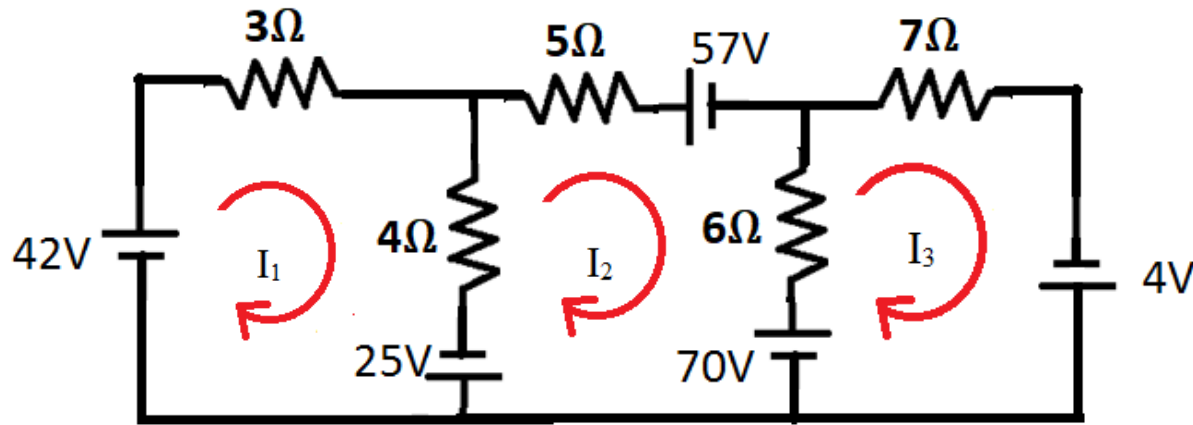
Number of Meshes = 3

$$\text{KVL (Mesh 1)} : -3I_1 - 4(I_1 - I_2) + 25 + 42 = 0 \quad \text{---- (1)}$$

$$\text{KVL (Mesh 2)} : -5I_2 - 57 - 6(I_2 - I_3) - 70 - 25 - 4(I_2 - I_1) = 0 \quad \text{---- (2)}$$

$$\text{KVL (Mesh 3)} : -7I_3 + 4 + 70 - 6(I_3 - I_2) = 0 \quad \text{---- (3)}$$

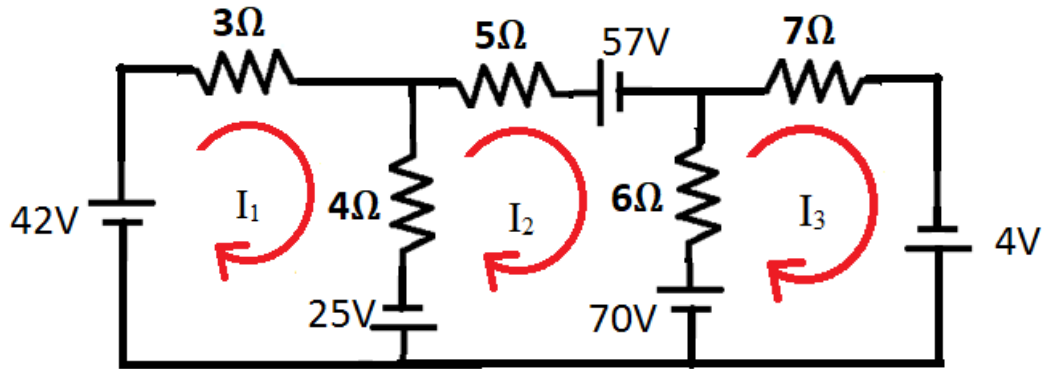
Solution (Continued..):



Solving the simultaneous equations (1), (2) & (3),

$$I_1 = 5A ; I_2 = -8A ; I_3 = 2A$$

Current through 6Ω resistor = $(I_2 \sim I_3) = (I_3 - I_2) = 10A$



- Coefficient of same mesh current = Sum of all resistances in that mesh.
- Coefficient of other mesh current = Negative of Sum of all common resistances between the meshes.

$$\text{KVL (Mesh 1)} : 7I_1 - 4I_2 - 0I_3 = +25 + 42 \quad \text{---- (1)}$$

$$\text{KVL (Mesh 2)} : -4I_1 + 15I_2 - 6I_3 = -57 - 70 - 25 \quad \text{---- (2)}$$

$$\text{KVL (Mesh 3)} : 0I_1 - 6I_2 + 13I_3 = +4 + 70 \quad \text{---- (3)}$$

Text Book:

1. “Basic Electrical Engineering” S.K Bhattacharya, 1stEdition Pearson India Education Services Pvt. Ltd., 2017
2. “Basic Electrical Engineering”, D. C. Kulshreshta, 2ndEdition, McGraw-Hill. 2019
3. “Special Electrical Machines” E G Janardanan, PHI Learning Pvt. Ltd., 2014

Reference Books:

1. “Engineering Circuit Analysis” William Hayt, Jack Kemmerly, Jamie Phillips and Steven Durbin, 10th Edition McGraw Hill, 2023
2. “Electrical and Electronic Technology” E. Hughes (Revised by J. Hiley, K. Brown & I.M Smith), 12th Edition, Pearson Education, 2016.



THANK YOU

Jyothi T N

Department of Electrical & Electronics Engineering

jyothitn@pes.edu