

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

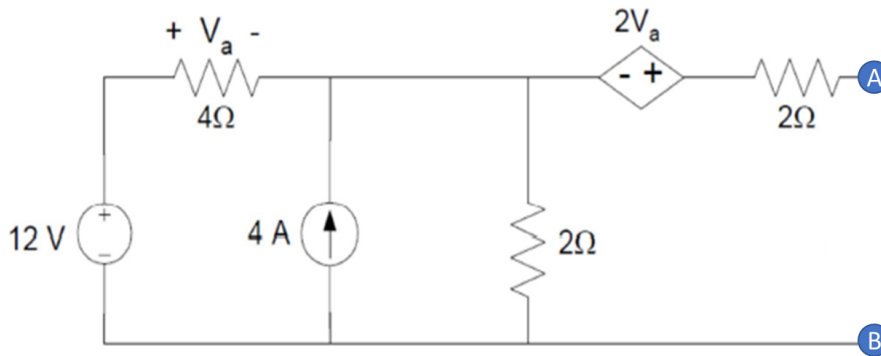
EE240 Circuits I
Quiz 04 Solutions

Total Marks: 10

Time Duration: 20 minutes

Question 1 (10 marks)

For a circuit below, find Thevenin equivalent circuit across the terminals A and B.

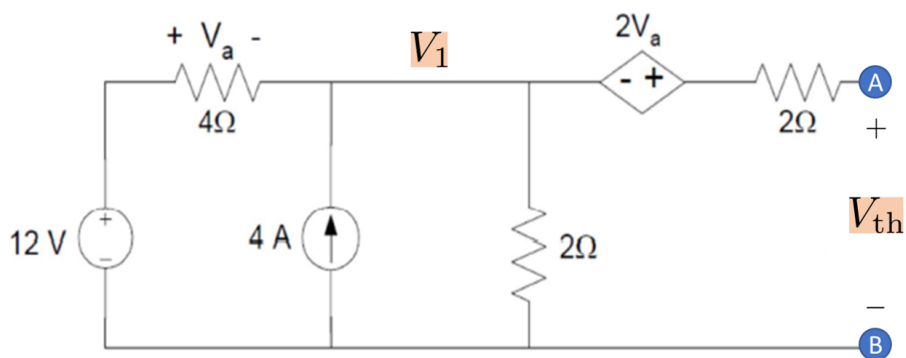


Solution: We first find V_{th} using nodal analysis (taking bottom node as reference node).

$$\frac{V_1 - 12}{4} + \frac{V_1}{2} - 4 = 0 \Rightarrow V_1 = \frac{28}{3} V$$

$$V_a = 12 - V_1 = \frac{8}{3} V$$

$$V_{th} = 2V_a + V_1 = \frac{44}{3} V$$

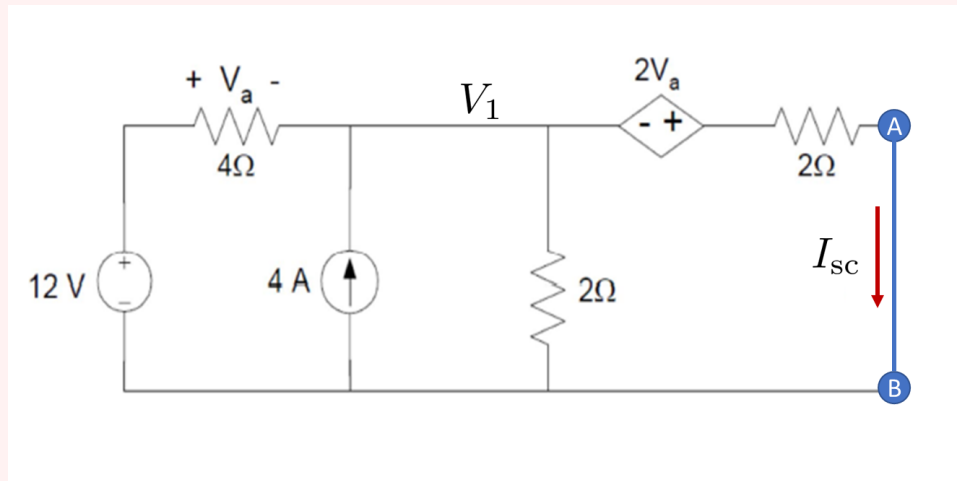


Now we find I_{sc} using nodal analysis (taking bottom node as reference node).

$$V_a = 12 - V_1$$

$$\frac{V_1 - 12}{4} + \frac{V_1}{2} + \frac{V_1 + 2V_a}{2} - 4 = 0 \Rightarrow V_1 = -20 V$$
$$V_a = 32 V$$

$$I_{sc} = \frac{2V_a + V_1}{2} = \frac{-20 + 64}{2} = 22 A$$



Now we find R_{th} as

$$R_{th} = \frac{V_{th}}{I_{sc}} = \frac{2}{3} \Omega$$