Seat/Section: 44

Question 1: Which matrix equation correctly represents the mesh-current equations of the circuit shown?

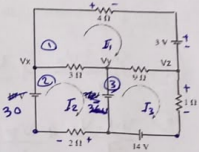


Figure: Q1

A:

$$\begin{bmatrix} 16 & -3 & -9 \\ -3 & 5 & 0 \\ -9 & 0 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} 3 \\ 8 \\ -32 \end{bmatrix}$$

B:

$$\begin{bmatrix} 16 & 3 & 9 \\ 3 & 5 & 0 \\ 9 & 0 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} -3 \\ -8 \\ 32 \end{bmatrix}$$

C:

$$\begin{bmatrix} 16 & -3 & -9 \\ -3 & 5 & 0 \\ -9 & 0 & 10 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} -3 \\ -8 \\ 32 \end{bmatrix}$$

D:

$$\begin{bmatrix} 4 & -3 & -9 \\ -3 & 2 & 0 \\ -9 & 0 & 1 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} -3 \\ -8 \\ 32 \end{bmatrix}$$

Question 2: Using the bottom-center node as the reference node, which equation correctly represents the nodal equation associated with V_x?

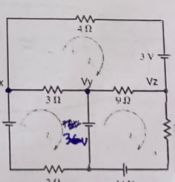


Figure: Q2

A: None of the above *B:*

$$13V_x - 3V_z = 69$$

C:

$$13V_x - 3V_z = 141$$

D:

$$13V_x + 3V_z = 141$$

E:

$$7V_x - 3V_z = 141$$

Question 3: Which matrix equation correctly represents the nodal-voltage equations of the circuit shown?

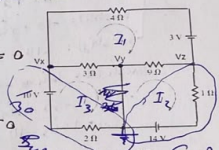


Figure: Q3

Supermodel

Super node

A:

$$\begin{bmatrix} 13 & 3 \\ 9 & 49 \end{bmatrix} \begin{bmatrix} V_x \\ V_z \end{bmatrix} = \begin{bmatrix} 141 \\ -459 \end{bmatrix}$$

B:

$$\begin{bmatrix} 13 & -3 \\ -9 & 49 \end{bmatrix} \begin{bmatrix} V_x \\ V_z \end{bmatrix} = \begin{bmatrix} 141 \\ -459 \end{bmatrix}$$

C:

$$\begin{bmatrix} 13 & -3 \\ -9 & 49 \end{bmatrix} \begin{bmatrix} V_x \\ V_z \end{bmatrix} = \begin{bmatrix} 69 \\ -531 \end{bmatrix}$$

D:

$$\begin{bmatrix} 7 & -3 \\ -9 & 40 \end{bmatrix} \begin{bmatrix} V_x \\ V_z \end{bmatrix} = \begin{bmatrix} 141 \\ -459 \end{bmatrix}$$

Question 4: For the circuit shown, which equation correctly represents mesh current I_1?

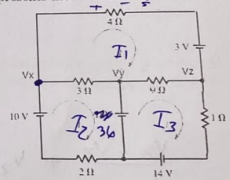


Figure: Q4

A:

$$16I_1 - 3I_2 - 9I_3 = -3$$

B:

$$16I_1 + 3I_2 + 9I_3 = -3$$

C:

$$4I_1 - 3I_2 - 9I_3 = -3$$

D:

$$16I_1 - 3I_2 - 9I_3 = 3$$

E: None of the above

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Question 5: For the circuit shown, how many independent mesh-current equations are required?

3 meshes.

as mentioned Before

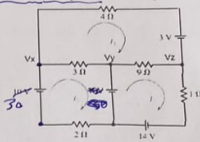


Figure: Q5

A: 3 *B*: None of the above *C*: 2 *D*: 5 *E*: 4

Question 6: Using the bottom-center node as the reference node, how many independent nodal equations are required to determine the unknown node voltages?

3 Nodal Equations.

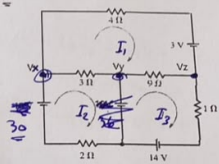
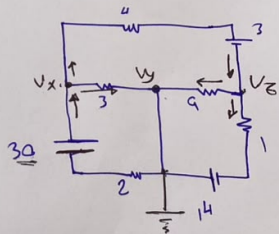


Figure: Q6

A: 2
B: 4
C: None of the above *D*: 3
E: 1



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