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reviewer6@nptel.iitm.ac.in

NPTEL (<https://swayam.gov.in/explorer?ncCode=NPTEL>) » Basic Electrical Circuits (course)

Announcements (announcements)

About the Course (preview)

Ask a Question (forum)

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Mentor (student/mentor)

Unit 6 - Week 4: Nodal analysis

Course outline

How does an NPTEL online course work?

Week 0

Week 1: Preliminaries; Current and voltage; Electrical elements and circuits; Kirchhoff's laws; Basic elements; Linearity

Week 2: Elements in series and parallel; Controlled sources

Week 3: Power and energy in electrical elements; Circuit analysis methods

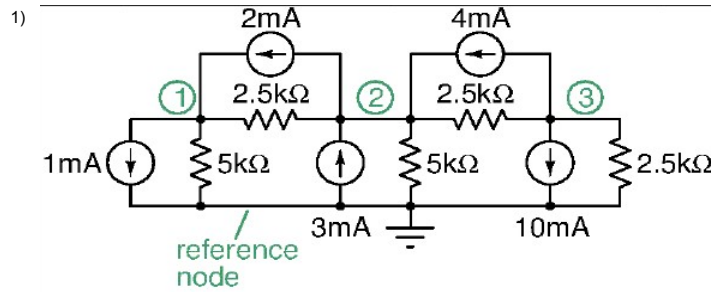
Week 4: Nodal analysis

- What is nodal analysis (unit?unit=26&lesson=67)
- Setting up nodal analysis equations (unit?unit=26&lesson=68)
- Structure of the conductance matrix (unit?unit=26&lesson=69)
- How elements appear in the nodal analysis formulation (unit?unit=26&lesson=70)
- Completely solving the circuit starting from nodal analysis (unit?unit=26&lesson=71)
- Nodal analysis example (unit?unit=26&lesson=79)
- Matrix inversion basics (unit?unit=26&lesson=72)
- Nodal analysis with independent voltage sources (unit?unit=26&lesson=80)
- Supernode for nodal analysis with independent voltage sources (unit?unit=26&lesson=73)
- Nodal analysis with VCCS (unit?unit=26&lesson=74)
- Nodal analysis with VCVS (unit?unit=26&lesson=75)
- Nodal analysis with CCVS (unit?unit=26&lesson=76)
- Nodal analysis with CCCS (unit?unit=26&lesson=77)

Assignment 4

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-10-14, 23:59 IST.



Assume source vector to be:

$$\begin{bmatrix} 1 \text{ mA} \\ 5 \text{ mA} \\ -14 \text{ mA} \end{bmatrix}$$

Setup the nodal analysis equations for the circuit above. Enter the G matrix in the space provided below.

A matrix of the form:

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

can be entered as: -1 0 0;0 1 0;0 0 -1

- Do not have any space before the first element of the row.
- Put a semicolon after the last element of row1 & row2. Do not put any semicolon after last element of 3rd row.
=> row1;row2;row3
- Do not put a space before or after semicolon.
- Do not have any trailing zeros, i.e., do not write 5.5 as 5.50 or 5 as 5.0
- Follow the rounding off instruction strictly.
- Follow all the instructions strictly otherwise you will loose your marks.

(The [G] matrix entries should be in millisiemens (mS). Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) 0.6 -0.4 0;-0.4 1 -0.4;0 -0.4 0.8

1 point

- [Nodal analysis summary \(unit?unit=26&lesson=78\)](#)
- [Week 4 Lecture material \(unit?unit=26&lesson=185\)](#)
- [Practising how to inter matrix value \(unit?unit=26&lesson=213\)](#)
- [Basic Electrical Circuits : Week 4 Feedback Form \(unit?unit=26&lesson=197\)](#)
- [Quiz : Assignment 4 \(assessment?name=212\)](#)
- [Assignment 4 solutions \(unit?unit=26&lesson=216\)](#)

Week 5 : Mesh analysis; Circuit theorems

Week 6: More circuit theorems; Two port parameters

Week 7: Two port parameters continued; Reciprocity in resistive networks

Week 8: Opamp and negative feedback; Example circuits and additional topics

Week 9 :First Order Circuits

Week 10 : First order circuits with time-varying inputs

Week 11: Second order system response

Week 12: Direct calculation of steady state response from equivalent components

Text Transcripts

Download Videos

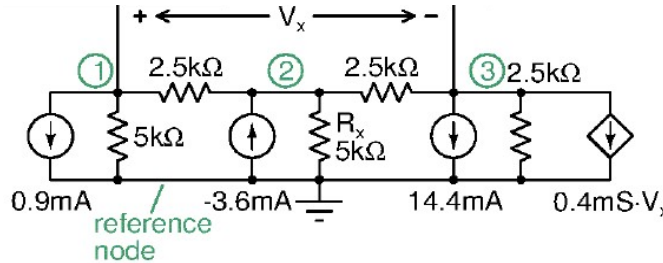
2) Determine the voltage at node 3 in the circuit above.

(The answer must be in **volts (V)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) -19,-18.5

3)



Assume source vector to be:

-0.9 mA
-3.6 mA
-14.4 mA

Setup the nodal analysis equations for the circuit above. Enter the G matrix in the space provided below.

A matrix of the form : $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

can be entered as: -1 0 0;0 1 0;0 0 -1

- Do not have any space before the first element of the row.
- Put a semicolon after the last element of row1 & row2. Do not put any semicolon after last element of 3rd row.
=> row1;row2;row3
- Do not put a space before or after semicolon.
- Do not have any trailing zeros, i.e., do not write 5.5 as 5.50 or 5 as 5.0
- Follow the rounding off instruction strictly.
- Follow all the instructions strictly otherwise you will lose your marks.

(The [G] matrix entries should be in **millisiemens (mS)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) 0.6 -0.4 0;-0.4 1 -0.4;0.4 -0.4 0.4

4) Determine the power dissipated in the resistor R_x in the circuit above.

(The answer must be in **milliwatts (mW)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

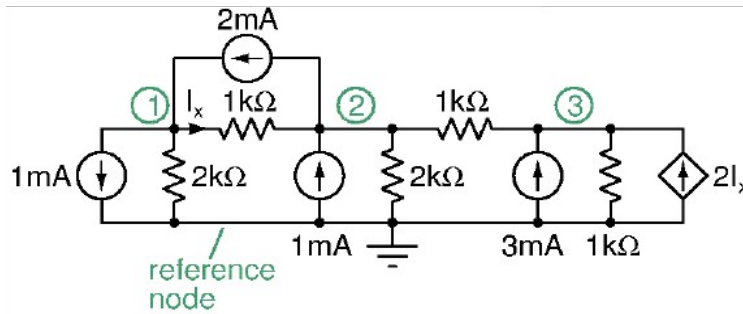
Accepted Answers:
(Type: Range) 179,181

1 point

1 point

1 point

5)



Assume source vector to be:

$$\begin{bmatrix} 1 \text{ mA} \\ -1 \text{ mA} \\ 3 \text{ mA} \end{bmatrix}$$

Setup the nodal analysis equations for the circuit above. Enter the G matrix in the space provided below.

A matrix of the form :

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

can be entered as: -1 0 0;0 1 0;0 0 -1

- Do not have any space before the first element of the row.
- Put a semicolon after the last element of row1 & row2. Do not put any semicolon after last element of 3rd row.
=> row1;row2;row3
- Do not put a space before or after semicolon.
- Do not have any trailing zeros, i.e., do not write 5.5 as 5.50 or 5 as 5.0
- Follow the rounding off instruction strictly.
- Follow all the instructions strictly otherwise you will loose your marks.

(The [G] matrix entries should be in **millisiemens (mS)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) 1.5 -1 0;-1 2.5 -1;-2 1 2

1 point

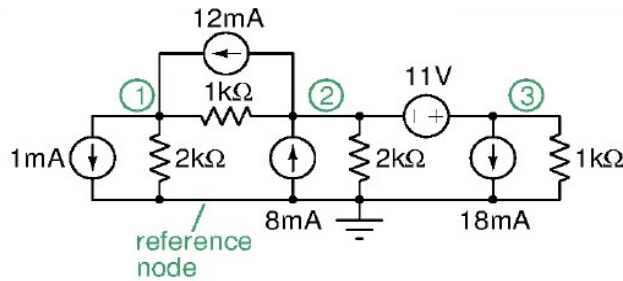
6) Determine the voltage at node 3 in the circuit above.

(The answer must be in **volts (V)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.1,2.5

1 point

7)



Assume source vector to be:

$$\begin{bmatrix} 11 \text{ mA} \\ -22 \text{ mA} \\ 11 \text{ V} \end{bmatrix}$$

Setup the nodal analysis equations for the circuit above. Enter the G matrix in the space provided below.

Have the equations in the following order: node equation, supernode equation, voltage source equation.

A matrix of the form :

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

can be entered as: -1 0 0;0 1 0;0 0 -1

- Do not have any space before the first element of the row.
- Put a semicolon after the last element of row1 & row2. Do not put any semicolon after last element of 3rd row.
=> row1;row2;row3
- Do not put a space before or after semicolon.
- Do not have any trailing zeros, i.e., do not write 5.5 as 5.50 or 5 as 5.0
- Follow the rounding off instruction strictly.
- Follow all the instructions strictly otherwise you will loose your marks.

(The [G] matrix entries should be in **millisiemens (mS)** if they are conductances or scalars as applicable. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) 1.5 -1 0;-1 1.5 1;0 -1 1

1 point

8) Determine the voltage at node 2 in the circuit above. (You have already setup the nodal analysis equation for this circuit in the previous question. But, the [G] matrix has conductances and dimensionless numbers. Be careful while inverting the matrix!).

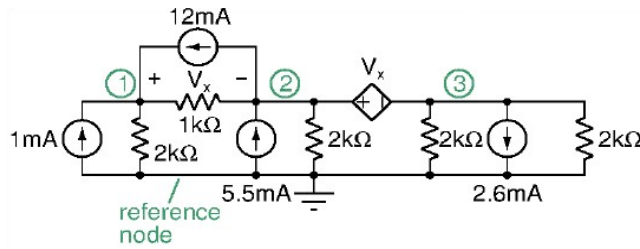
(The answer must be in **volts (V)**. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) -14.25,-13.75

1 point

9)



Assume source vector to be:

$$\begin{bmatrix} 13 \text{ mA} \\ -9.1 \text{ mA} \\ 0 \end{bmatrix}$$

Setup the nodal analysis equations for the circuit above. Enter the G matrix in the space provided below.

Have the equations in the following order: node equation, supernode equation, voltage source equation.

A matrix of the form :

$$\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$$

can be entered as: -1 0 0;0 1 0;0 0 -1

- Do not have any space before the first element of the row.
- Put a semicolon after the last element of row1 & row2. Do not put any semicolon after last element of 3rd row.
=> row1;row2;row3
- Do not put a space before or after semicolon.
- Do not have any trailing zeros, i.e., do not write 5.5 as 5.50 or 5 as 5.0
- Follow the rounding off instruction strictly.
- Follow all the instructions strictly otherwise you will lose your marks.

(The [G] matrix entries should be in millisiemens (mS) if they are conductances or scalars as applicable. Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: String) 1.5 -1 0;-1 1.5 1;1 -2 1

(Type: String) 1.5 -1 0;-1 1.5 1;-1 2 -1

1 point

10) Determine the voltage at node 1 in the circuit above. (You have already setup the nodal analysis equation for this circuit in the previous question. But, the [G] matrix has conductances and dimensionless numbers. Be careful while inverting the matrix!).

(The answer must be in volts (V). Round off fractional answers to one decimal place.)

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 11,11.4

1 point

