D.Y. Patil College of Engineering &Technology

Kasaba Bawada, Kolhapur 416006

(An Autonomous Institute)

Academic Year: 2023-24 **Sem:** I **Class:** F.Y.B. Tech.

Course: Linear Algebra and Calculus **Course Code:** 231FYL101

Tutorial-II

Linear Algebra-I: Solutions of Non-homogeneous simultaneous linear equations, Applications in Electrical Circuits

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.1	Reduce matrices to echelon form and apply the concept of rank of matrices to solve system of linear equations

Q.1 Test the consistency of the following equations and if consistent solve it

a) $x + y + z = -3$
$3x + y - 2z = -2$
$2x + 4y + 7z = 7$

b) $x + y + z = 3$
$x + 2y + 3z = 4$
$x + 4y + 9z = 6$

c) $x - y - z = 2$
$x + 2y + z = 2$
$4x - 7y - 5z = 2$

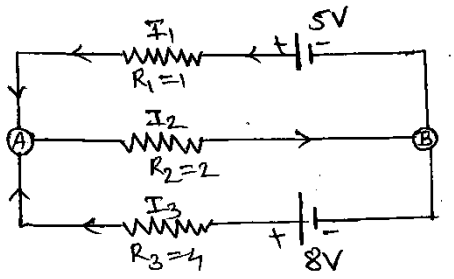
d) $x + y - 3z = -1$
$4x - 2y + 6z = 8$
$15x - 3y + 9z = 21$

e) $-2x + y + z = 1$
$x - 2y + z = 1$
$x + y - 2z = -2$

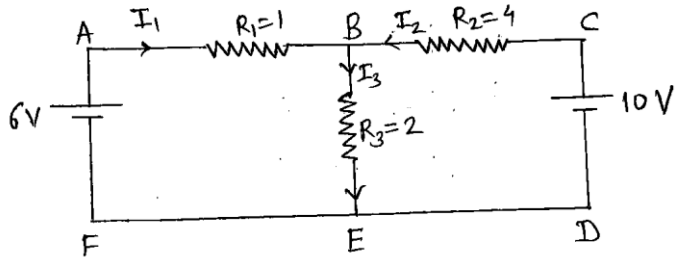
f) $2x - y - z = 2$
$x + 2y + z = 2$
$4x - 7y - 5z = 2$

g) $3x + y + 2z = 3$
$x - 2y + z = -3$
$x + y - 2z = 4$

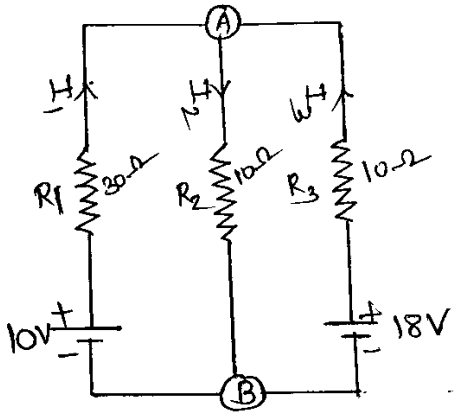
Q.2 a) Determine the currents for the electrical network shown in the following figure



b) Find the currents I1, I2 and I3 in the circuit shown in the figure



c) Find the currents in the circuit shown below



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Tutorial-III

Linear Algebra–II: Dependence and Independence of vectors

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.2	Identify eigen values & make use of it for finding eigen vectors.

Q.1	Examine whether the following sets of vectors are linear independent or dependent, if dependent find relation between them. a) X_1=[2, -1, 4], X_2=[0, 1, 2], X_3=[6, -1, 16], X_4=[4, 0, 12] b) X_1 =[1, 2, 4], X_2 =[2, -1, 3], X_3 =[0, 1, 2], X_4 =[-3, 7, 2] c) X_1 =[3, 2, 7], X_2 =[2, 4, 1], X_3 =[1, -2, 6] d) X_1 =[1, 3, 4, 2], X_2 =[3, -5, 2, 6], X_3 =[2, -1, 3, 4] e) X_1 =[1, -1, 1], X_2 =[2, 1, 1], X_3 =[3, 0, 2]
Q.2	Examine whether the following set of vectors are linear independent or dependent a) X_1 = [1, 1, 1], X_2 = [1, 2, 3], X_3 = [2, 3, 8] b) X_1 = [3, 1, 1], X_2 = [2, 0, -1], X_3 = [4, 2, 1] c) X_1 = [2, 2, 7, -1], X_2 = [3, -1, 2, 4], X_3 = [1, 1, 3, 1] d) X_1 = [2, 2, 1], X_2 = [1, 3, 1], X_3 = [1, 2, 2] e) X_1 = [1, -1, 2, 2], X_2 = [2, -3, 4, -1], X_3 = [-1, 2, -2, 3]

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Tutorial-IV

Linear Algebra-II: Eigen values and Eigen vectors of Matrix, Cayley-Hamilton Theorem

Course Outcomes (COs): After successful completion of this tutorial, the students will be able to:	
101.2	Identify eigen values & make use of it for finding eigen vectors.

Q.1	Calculate eigen values and eigen vectors of the following matrices a) $A=\begin{bmatrix}2&0&-1\\0&2&0\\-1&0&2\end{bmatrix}$ b) $A=\begin{bmatrix}3&-1&1\\-1&5&-1\\1&-1&3\end{bmatrix}$ c) $A=\begin{bmatrix}3&1&1\\1&3&-1\\1&-1&3\end{bmatrix}$ d) $A=\begin{bmatrix}2&-1&1\\1&2&-1\\1&-1&2\end{bmatrix}$
Q.2	Verify Cayley-Hamilton theorem and hence find A^{-1} a) $A=\begin{bmatrix}1&3&3\\1&4&3\\1&3&4\end{bmatrix}$ b) $A=\begin{bmatrix}1&2&3\\3&1&1\\0&1&2\end{bmatrix}$
Q.3	Verify Cayley-Hamilton theorem and hence find A^4 a) $A=\begin{bmatrix}1&2&-2\\-1&3&0\\0&-2&1\end{bmatrix}$ b) $A=\begin{bmatrix}1&1&3\\1&0&-3\\-2&1&0\end{bmatrix}$