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$$\begin{aligned} 1) \quad & T_1 + T_2 - 2T_3 + T_4 + 3T_5 - T_6 = 4 \\ & 2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 = 20 \\ & T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 = -15 \\ & 5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3 \\ & -3T_1 - T_2 + 2T_3 + 3T_4 + T_5 + 3T_6 = 16 \\ & 4T_1 + 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = -27 \end{aligned}$$

a) Using Gauss elimination method

Answer

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 & -1 & 1 & 2 & 1 & -3 \\ 1 & 3 & -3 & -1 & 2 & 1 \\ 5 & 2 & -1 & -1 & 2 & 1 \\ -3 & -1 & 2 & 3 & 1 & 3 \\ 4 & 3 & 1 & -6 & -3 & -2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20 \\ -15 \\ -3 \\ 16 \\ -27 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 1-\frac{1}{1} & -1-\frac{1}{1} & 1-\frac{2}{1} & 2-\frac{1}{1} & 1-\frac{3}{1} & -3-\frac{-1}{1} \\ 1-\frac{1}{1} & 3-\frac{1}{1} & -3-\frac{-2}{1} & -1-\frac{1}{1} & 2-\frac{3}{1} & 1-\frac{-1}{1} \\ 5-\frac{1}{1} & 2-\frac{1}{1} & -1-\frac{-2}{1} & -1-\frac{1}{1} & 2-\frac{3}{1} & 1-\frac{-1}{1} \\ -3-\frac{1}{1} & -1-\frac{1}{1} & 2-\frac{-2}{1} & 3-\frac{1}{1} & 1-\frac{3}{1} & 3-\frac{-1}{1} \\ 4-\frac{1}{1} & 3-\frac{1}{1} & 1-\frac{-2}{1} & -6-\frac{1}{1} & -3-\frac{3}{1} & -2-\frac{-1}{1} \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20-\frac{1}{1} \times 4 \\ -15-\frac{1}{1} \times 4 \\ -3-\frac{1}{1} \times 4 \\ 16-\frac{1}{1} \times 4 \\ -27-\frac{1}{1} \times 4 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & -1 & 2 \\ 0 & -3 & 4 & -6 & -13 & 6 \\ 0 & 2 & -4 & 6 & 10 & 0 \\ 0 & -1 & 9 & -10 & -15 & 2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19 \\ -23 \\ 28 \\ *11* \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2-\frac{2}{-3} & -3-\frac{1-\frac{2}{-3}}{-3} & -2-\frac{2}{-3} & 0-\frac{1-\frac{2}{-3}}{-3} & 2-\frac{2}{-3}-1 \\ 0 & -3+\frac{3}{-3} & 9+\frac{3}{-3} & -6+\frac{3}{-3} & 0-\frac{13+\frac{3}{-3}}{-3} & 6+\frac{3}{-3}-1 \\ 0 & 2+\frac{2}{-3} & -4+\frac{2}{-3} & 6+\frac{2}{-3} & 0-\frac{10+\frac{2}{-3}}{-3} & 0-\frac{2}{-3}-1 \\ 0 & -1+\frac{1}{-3} & 9+\frac{1}{-3} & -10+\frac{1}{-3} & 0-\frac{15+\frac{1}{-3}}{-3} & 2+\frac{1}{-3}-1 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19-\frac{2}{-3} \\ -28+\frac{3}{-3} \\ 28-\frac{2}{-3} \\ -4+\frac{1}{-3} \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 2.3 & -2 & -4.3 & 1.3 \\ 0 & 0 & 4 & -6 & -8 & 7 \\ 0 & 0 & -0.6 & 6 & 6.6 & -0.6 \\ 0 & 0 & 7.3 & -10 & -13.3 & 2.3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11.6 \\ -35 \\ 36 \\ -4.2 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 2.3 & -2 & -4.3 & 1.3 \\ 0 & 0 & 0 & -2.5 & -0.57 & 4.71 \\ 0 & 0 & 0 & 5.428 & 5.428 & -0.28 \\ 0 & 0 & 0 & -3.71 & 0.28 & -1.85 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -16.14 \\ 32.85 \\ -12.42 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 2.3 & -2 & -4.3 & 1.3 \\ 0 & 0 & 0 & -2.5 & -0.57 & 4.71 \\ 0 & 0 & 0 & 4.2 & 9.67 & 9.67 \\ 0 & 0 & 0 & 0 & 1.1 & -8.67 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -16.14 \\ -1.22 \\ 10.89 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 2.3 & -2 & -4.3 & 1.3 \\ 0 & 0 & 0 & -2.5 & -0.57 & 4.71 \\ 0 & 0 & 0 & 0 & 4.2 & 9.67 \\ 0 & 0 & 0 & 0 & 0 & -11.21 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -16.14 \\ 1.22 \\ 11.21 \end{bmatrix}$$

$$2) -11.21 T_6 = -11.21$$

$$T_6 = \frac{-11.21}{-11.21}$$

$$T_6 = -1$$

$$2) 4.22 T_5 + 9.67 T_6 = -1.22$$

$$4.22 T_5 + 9.67(-1) = -1.22$$

$$T_5 = \frac{8.45}{4.22}$$

$$T_5 = 2.002$$

$$2) -2.57 T_4 + 0.57 T_5 + 4.71 T_6 = -16.14$$

$$-2.57 T_4 + 1.14 - 4.71 = -16.14$$

$$\Rightarrow -2.57 T_4 = -16.14 + 4.71 - 1.14$$

$$2) T_4 = 4.89$$

$$2) 2.33 T_3 - 2 T_4 - 4.33 T_5 + 1.33 T_6 = -11$$

$$2.33 T_3 - 9.78 - 8.66 - 1.33 = -11$$

$$T_3 = 3.76$$

$$2) -3 T_2 + 5 T_3 - 5 T_5 - T_6 = 12$$

$$-3 T_2 + 18.8 - 10 + 1 = 12$$

$$-3 T_2 = 12 - 18.8 + 10 - 1$$

$$T_2 = -0.73$$

$$2) T_1 + T_2 - 2 T_3 + T_4 + 3 T_5 - T_6 = 4$$

$$T_1 = 0.75 - 7.52 + 4.89 + 6 + 1 = 4$$

$$T_1 = 4.36$$

$$T_1 = 0.36$$

$$\therefore T_6 = -1 \quad T_2 = -0.73$$

$$T_5 = 2 \quad T_1 = 0.36$$

$$T_4 = 4.89$$

$$T_3 = 3.76$$