Assignment 3

Name :- AGBAJE MINEVESHO MICHAEL

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Department :- Computer Engineering

College :- Engineering

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Question

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

$$2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 = 20$$

$$T_1 + 3T_3 - 3T_3 - T_4 + 2T_5 + T_6 = -15$$

$$5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3$$

$$-3T_1 - T_2 + 2T_3 + 3T_4 + T_5 + 3T_6 = 16$$

$$4T_1 + 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 = -27$$

Solution

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

$f_1 = 2/1 = 2$

$f_2 = 1/1 = 1$

$f_3 = 5/1 = 5$

$f_4 = -3/1 = 3$

$f_6 = 4/1 = 4$

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

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2 & -1 & -2 & 1 & 2 \\ 0 & -3 & 9 & -6 & -13 & 6 \\ 0 & 2 & -4 & 6 & 10 & 0 \\ 0 & 1 & 9 & 10 & 15 & +2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19 \\ -23 \\ 28 \\ -43 \end{bmatrix}$$

$f_1 = -2/3$

$f_2 = \frac{-3}{-3} = 1$

$f_3 = -2/3$

$f_4 = \frac{-1}{-3} = \frac{1}{3}$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 2+\frac{2}{3}(-3) & -1+\frac{2}{3}(5) & -2+\frac{2}{3}(0) & -1+\frac{2}{3}(-5) & 2+\frac{2}{3}(-1) \\ 0 & 3+1(-3) & 9-1(5) & -6+1(0) & -13-1(-5) & 6-1(-1) \\ 0 & 2+\frac{2}{3}(-3) & 4+\frac{2}{3}(5) & 6+\frac{2}{3}(0) & 10+\frac{2}{3}(-5) & 6+\frac{2}{3}(-1) \\ 0 & -1+\frac{1}{3}(-3) & 9-\frac{1}{3}(5) & -10-\frac{1}{3}(0) & -15-\frac{1}{3}(-5) & 2-\frac{1}{3}(-1) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -19+\frac{2}{3}(12) \\ -23-1(12) \\ 28+\frac{2}{3}(12) \\ -43-\frac{1}{3}(12) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 & -6 & -8 & 7 \\ 0 & 0 & -2/3 & 6 & 20/3 & -2/3 \\ 0 & 0 & 22/3 & -10 & -40/3 & 7/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -35 \\ +36 \\ -47 \end{bmatrix}$$

$f_1 = \frac{4 \times 3}{7} = \frac{12}{7}$

$f_2 = \frac{-2 \times 3}{3 \times 7} = \frac{-2}{7}$

$f_3 = \frac{22 \times 3}{3 \times 7} = \frac{22}{7}$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & -3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 4 - \frac{12}{7}(\frac{7}{3}) & -6 - \frac{12}{7}(-2) & -8 - \frac{12}{7}(-\frac{13}{3}) & 7 - \frac{13}{7}(\frac{4}{3}) \\ 0 & 0 & -\frac{2}{3} + \frac{2}{7}(\frac{7}{3}) & -6 + \frac{2}{7}(2) & \frac{20}{3} + \frac{2}{7}(\frac{-13}{3}) & -\frac{2}{3} + \frac{2}{7}(\frac{4}{3}) \\ 0 & 0 & \frac{22}{3} - \frac{22}{7}(\frac{7}{3}) & -10 - \frac{22}{7}(-2) & -\frac{40}{3} - \frac{22}{7}(-\frac{13}{3}) & \frac{7}{3} - \frac{22}{7}(\frac{4}{3}) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -33 - \frac{12}{7}(-11) \\ 36 + \frac{2}{7}(-11) \\ -49 - \frac{22}{7}(-11) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & 18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 38/7 & 38/7 & -2/7 \\ 0 & 0 & 0 & -26/7 & 2/7 & -13/7 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ 230/7 \\ -87/7 \end{bmatrix}$$

$f_1 = \frac{-32 \times 7}{7 \times 18} = \frac{-19}{9}$

$f_2 = \frac{+26 \times 7}{+7 \times 18} = \frac{13}{9}$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/8 & 4/3 \\ 0 & 0 & 0 & -18/7 & -40/7 & 33/7 \\ 0 & 0 & 0 & 38/7 + \frac{19}{9}(\frac{-18}{7}) & 38/7 + \frac{19}{19}(\frac{-27}{7}) & -2/7 + \frac{19}{9}(\frac{33}{7}) \\ 0 & 0 & 0 & -\frac{26}{7} - \frac{13}{9}(\frac{-18}{7}) & \frac{2}{7} - \frac{13}{9}(\frac{-27}{7}) & -13/7 + \frac{13}{9}(\frac{33}{7}) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ 230/7 + \frac{19}{9}(\frac{113}{7}) \\ -87/7 - \frac{13}{9}(\frac{-103}{7}) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 10/9 & -26/3 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 98/9 \end{bmatrix}$$

$$f_1 = \frac{10 \times 9}{9 \times 38} = \frac{5}{19}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & \frac{10}{9} - \frac{5}{19}\left(\frac{38}{9}\right) & -26/3 - \frac{5}{19}\left(\frac{29}{3}\right) \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ \frac{98}{9} - \frac{15}{19}\left(\frac{-11}{9}\right) \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 0 & -3 & 5 & 0 & -5 & -1 \\ 0 & 0 & 7/3 & -2 & -13/3 & 4/3 \\ 0 & 0 & 0 & -18/7 & -4/7 & 33/7 \\ 0 & 0 & 0 & 0 & 38/9 & 29/3 \\ 0 & 0 & 0 & 0 & 0 & -213/19 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 12 \\ -11 \\ -113/7 \\ -11/9 \\ 213/19 \end{bmatrix}$$

$$-213/19\ T_6 = 213/19$$

$$T_6 = \frac{213}{19} \times \frac{-19}{213} = -1$$

$$\frac{38}{9} T_5 + \frac{29}{3} T_6 = -\frac{11}{9}$$

$$\frac{38}{9} T_5 + \frac{29}{3}(-1) = -\frac{11}{9}$$

$$T_5 = \left(\frac{-11}{9} + \frac{29}{3}\right) \times \frac{9}{38}$$

$$T_5 = 2_4$$

$$-\frac{18}{7} T_4 - \frac{4}{7} T_5 + \frac{33}{7} T_6 = -113/7$$

$$-\frac{18}{7} T_4 - \frac{40}{7}(2) + \frac{33}{7}(-1) = -\frac{113}{7}$$

$$-\frac{18}{7} T_4 - \frac{8}{7} - \frac{33}{7} = -\frac{113}{7}$$

$$T_4 = \left(\frac{-113}{7} + \frac{8}{7} + \frac{33}{7} \right) \times \frac{-7}{+18} = 4$$

$$\frac{7}{3} T_3 - 2 T_4 - \frac{13}{3} T_5 + \frac{4}{3} T_6 = -11$$

$$\frac{7}{3} T_3 - 2(4) - \frac{13}{3}(2) + \frac{4}{3}(-1) = -11$$

$$\frac{7}{3} T_3 - 8 - \frac{26}{3} - \frac{4}{3} = -11$$

$$T_3 = (-11 + 8 + \frac{26}{3} + 4/3) \times \frac{3}{7}$$

$$T_3 = 3$$

$$-3 T_2 + 5 T_3 + 0 T_4 - 5 T_5 - T_6 = 12$$

$$-3 T_2 + 5(3) - 5(2) + 1 = 12$$

$$T_2 = \frac{12 - 15 + 10 - 1}{-3} = -2$$

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

$$T_1 - 2 - 2(3) + 4 + 6 + 1 = 4$$

$$T_1 - 2 - 6 + 4 + 6 + 1 = 4$$

$$T_1 = 4 + 2 + 6 - 4 - 6 - 1$$

$$T_1 = 1$$

∴ Hence :- $T_1 = 1$, $T_2 = -2$, $T_3 = 3$, $T_4 = 4$, $T_5 = 2$, $T_6 = -1$