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Electrical Electronics Engineering

ENG 382.

Assignment 3

Let $T_1 = a$, $T_2 = b$, $T_3 = c$, $T_4 = d$, $T_5 = e$, $T_6 = f$.

$$a + b - 2c + d + 3e - f = 4 \quad \dots (i)$$

$$2a - b + c + 2d + e - 3f = 20 \quad \dots (ii)$$

$$a + 3b - 3c - d + 2e + f = -15 \quad \dots (iii)$$

$$5a + 2b - c - d + 2e + f = -3 \quad \dots (iv)$$

$$-3a + b + 2c + 3d + e + 3f = 16 \quad \dots (v)$$

$$4a + 3b + c - 6d - 3e - 2f = -27 \quad \dots (vi)$$

eqn ix

$$2(a + b - 2c + d + 3e - f = 4) \Rightarrow 2a + 2b - 4c + 2d + 6e - 2f = 8$$

$$1(a + b - 2c + d + 3e - f = 4) = a + b - 2c + d + 3e - f = 4$$

$$5(a + b - 2c + d + 3e - f = 4) = 5a + 5b - 10c + 5d + 15e - 5f = 20$$

$$-3(a + b - 2c + d + 3e - f = 4) = -3a - 3b + 6c - 3d - 9e + 3f = -12$$

$$4(a + b - 2c + d + 3e - f = 4) = 4a + 4b - 8c + 4d + 2e - 4f = 16$$

Subtracting equations

$$\begin{array}{r} 2a + 2b - 4c + 2d + 6e - 2f = 8 \\ -2a - b + c + 2d + e - 3f = 20 \\ \hline \end{array}$$

$$a + 3b$$

$$+ 2a - b + c + 2d + e - 3f = 20$$

$$-2a + 2b - 4c + 2d + 6e - 2f = 8$$

$$-3b + 5c + 0 - 5e - f = 12$$

$$+ a + 3b - 3c - d + 2e + f = 15$$

$$+ a + b - 2c + d + 3e - f = 4$$

$$0 + 2b - c - 2d - e + 2f = -19$$

$$5a + 2b - c - d + 2e + f = -3$$

$$5a + 5b - 10c + 5d + 15e - 5f = 20$$

$$0 - 3b + 9c - 6d - 13e + 6f = -23$$

$$-3a - b + 2c + 3d + e + 3f = 16$$

$$-3a - 3b + 6c - 3d - 9e + 3f = -12$$

$$0 + 2b - 4c + 6d + 10e = 28$$

$$4a + 3b + c - 6d - 8e - 2f = -27$$

$$-4a + 4b + 8c + 4d + 12e - 4f = 16$$

$$-b + 9c - 10d - 15e + 2d = -43$$

eq 2' is now the pivot

$$2/-3 [-3b + 5c - 5e - f = 12] \times 2 \Rightarrow -10c + 10e + 2f = -8$$

$$-3/-3 [-3b + 5c - 5e - f = 12] \Rightarrow -3b + 5c - 5e - f = 12$$

$$2/-3 [-3b + 5c - 5e - f = 12] \Rightarrow 12b - \frac{10}{3}c + \frac{10}{3}e + 2f = -8$$

$$-1/-3 [-3b + 5c - 5e - f = 12] \Rightarrow -b + \frac{5}{3}c - \frac{5}{3}e - \frac{1}{3}f = 4$$

Subtracting eq's

$$-3b + 5c - 5e - f = 12$$

$$2b - c - 2d - e + 2f = -19$$

$$-2b - \frac{10}{3}c + 10e + \frac{2}{3}f = -8$$

$$\frac{+7}{3}c - 2d - \frac{13}{3}e + \frac{4}{3}f = -11 \quad \text{--- 3''}$$

$$-3b + 4c - 6d - 13e + 6f = -23$$

$$-3b + 5c - 5e - f = 12$$

$$4c - 6d - 8e + 7f = -35 \quad \text{--- 4''}$$

$$2b - 4c + 6d + 10e - 0f = 28$$

$$-2b - \frac{10}{3}c + \frac{10}{3}e + \frac{2}{3}f = -8$$

$$-\frac{2}{3}c + 6d + \frac{20}{3}e - \frac{2}{3}f = 36 \quad \text{--- 5''}$$

$$-b + 9c - 10d - 15e + 2f = -43$$

$$-b + \frac{5}{3}c + 0d - \frac{5}{3}e - \frac{1}{3}f = 4$$

$$0 + \frac{22}{3}c - 10d - \frac{40}{3}e + \frac{7}{3}f = -47 \quad \text{--- 6''}$$

eq 3'' is now the pivot eqn

$$+12/7 [+7/3c - 2d - 13/3e + 4/3f = -11] \Rightarrow +4c + 24/7d + 52/7e + 16/7f = -132/7$$

$$-2/7 [+7/3c - 2d - 13/3e + 4/3f = -11] \Rightarrow -2/3c + 4/7d + 26/21e + 8/21f = 22/7$$

$$+22/7 [+7/3c - 2d - 13/3e + 4/3f = -11] \Rightarrow 22/3c + 44/7d + 286/21e + 88/21f = -242/7$$

subtracting

$$4c - 6d - 8e + 7f = -35$$

$$- [4c + 24/7d + 52/7e + 16/7f = -132/7]$$

$$0 - 2.5714d - 0.5714e + 4.7142f = -16.1429 \quad \text{--- 4'''}$$

$$-2/3c + 6d + 20/3e - 2/3f = 36$$

$$-[-2/3c + 4/7d + 26/21e - 8/21f = 20/7]$$

$$0 + 5.42857d + 5.42857e - 0.28571f = 32.85714 \quad \dots 5'''$$

$$22/3c - 10d - 40/3e + 7/3f = -44$$

$$-[-22/3c - 44/7d - 286/21e + 88/21f = -242/7]$$

$$0 - 3.71429d + 0.285714e - 1.85714f = -12.4286 \quad \dots 6'''$$

eg 4''' is now the pivot

$$-2 \cdot 1111 [-2.5714d - 0.5714e + 4.7142f = -16.1429]$$

$$\Rightarrow 5.42857d + 1.2063e - 9.9521f = 34.0793$$

$$1.44446 [-2.5714d - 0.5714e + 4.7142f = -16.1429]$$

$$\Rightarrow -3.71429d - 0.82536e + 6.80947f = 23.31777$$

Subtracting

$$5.42857d + 5.42857e - 0.28571f = 32.85714$$

$$-[-5.42857d + 1.2063e - 9.9521f = 34.0793]$$

$$0 + 4.2223e + 9.66639f = -1.2222 \quad \dots 5''''$$

$$-3.71429d + 1.2063e - 9.9521f = 34.0793$$

$$-[-3.71429d + 0.0]$$

$$-3.71429d + 0.285714e - 1.85714f = -12.4286$$

$$-[-3.71429d - 0.82536e + 6.80947f = 23.31777]$$

$$\Rightarrow 0d + 1.1111e - 8.6667f = 10.8889 \quad \dots 6''''$$

eg 5'''' is pivot equation

$$0.2632 [4.2223e + 9.66639f = -1.2222]$$

$$\Rightarrow 1.1111e + 2.5442f = -0.32168$$

$$1.1111e - 8.6667f = 10.8889$$

$$-1.1111e + 2.5442f = -0.32168$$

$$= 0e - 11.2109f = 11.2106$$

$$f = \frac{11.2106}{11.2109} \approx 0.9999733 \approx -1$$

$$f = -1$$

$$1.1111e = 8.6667(-1) = 10.889$$

$$e = \frac{10.889 - 8.6667}{1.1111}$$

$$e = 2$$

$$-3.71429d + 0.285714(2) - 1.85714(-1) = -12.4286$$

$$d = \frac{-12.4286 - 0.571428 - 1.85714}{-3.71429}$$

$$= 4$$

$$4c - 6d - 8e + 7f = -35$$

$$4c - 24 - 16 - 7 = -35$$

$$c = \frac{-35 + 47}{4} = \frac{12}{4} = 3$$

$$2b - c - 2d - e + 2f = -19$$

$$2b - 3 - 8 - 2 - 2 = -19$$

$$b = \frac{-19 + 15}{2} = \frac{-4}{2} = -2$$

$$a + b - 2c + d + 3e - f = 4$$

$$-2 + 3 - 8 - 2 - 6 + 4 + 6 + 1 = 4$$

$$a = 4 - 3 = 1$$

$$a = 1, b = -2, c = 3, d = 4, e = 2, f = -1$$

Therefore

$$T_1 = 1$$

$$T_2 = -2$$

$$T_3 = 3$$

$$T_4 = 4$$

$$T_5 = 2$$

$$T_6 = -1$$