

1.40 Find V_x in the network in Fig. P1.40 using Tellegen's theorem.

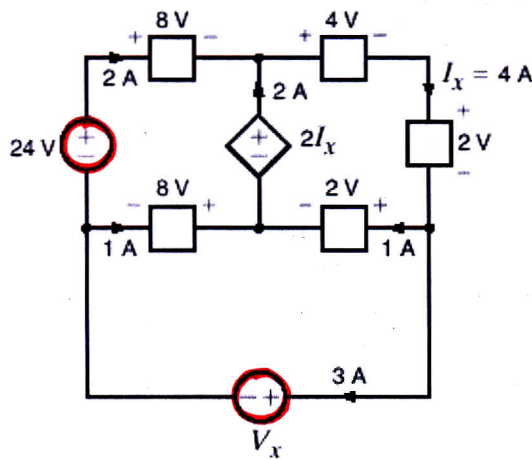


Figure P1.40

SOLUTION:

$$P_1 = 8(2) = 16\text{W absorbed}$$

$$P_2 = 4(4) = 16\text{W absorbed}$$

$$P_3 = 2(4) = 8\text{W absorbed}$$

$$P_4 = 2(1) = 2\text{W absorbed}$$

$$P_5 = 8(-1) = -8\text{W}$$

$$P_5 = 8\text{W supplied}$$

$$P_{24\text{V}} = 24(-2)$$

$$P_{24\text{V}} = -48\text{W}$$

$$P_{24\text{V}} = 48\text{W supplied}$$

$$P_{2I_x} = 2I_x(-2)$$

$$P_{2I_x} = -4I_x = -4(4) = -16\text{W}$$

$$P_{2I_x} = 16\text{W supplied}$$

$$P_{V_x} = V_x(3) = 3V_x \text{ absorbed}$$

$$\text{Power supplied} = \text{Power absorbed}$$

$$P_5 + P_{24\text{V}} + P_{2I_x} = P_1 + P_2 + P_3 + P_4 + P_{V_x}$$

$$8 + 48 + 16 = 16 + 16 + 8 + 2 + 3V_x$$

$$V_x = 10\text{V}$$