

1.36 Find I_x in the circuit in Fig. P1.36 using Tellegen's theorem.

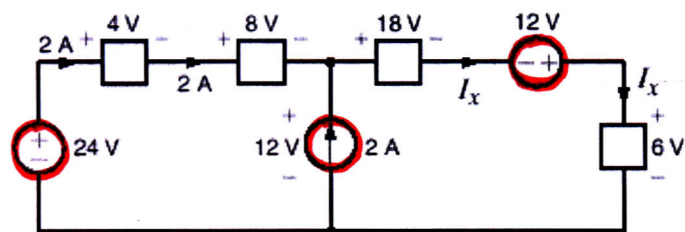


Figure P1.36

SOLUTION:

$$P_{24V} = (24)(-2) = -48W$$

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

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

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

$$P_{2A} = 12(-2) = -24W$$

$$P_{2A} = 24W \text{ supplied}$$

$$P_{18V} = 18I_x \text{ absorbed}$$

$$P_{12V} = 12(-I_x) = -12I_x$$

$$P_{12V} = 12I_x \text{ supplied}$$

$$P_{6V} = 6I_x \text{ absorbed}$$

Power supplied = Power absorbed

$$P_{24V} + P_{2A} + P_{12V} = P_{4V} + P_{8V} + P_{18V} + P_{6V}$$

$$48 + 24 + 12I_x = 8 + 16 + 18I_x + 6I_x$$

$$12I_x = 48$$

$$I_x = 4A$$