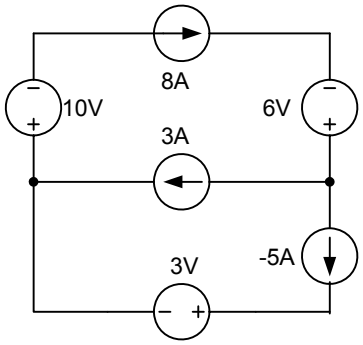
Q1. a) Is the interconnection in Figure Q1(a) valid? Explain.



b) (i) How do you identify the power absorbed or supplied by an element.

(ii) Consider the circuit shown in Figure Q1(b). Given i = -3A and V_{ab} = -10V. The total power absorb is 50W, determine the voltage drop, V_{bc} and the power absorbed by each element.

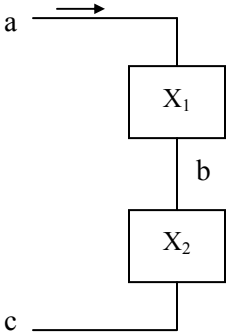


Figure Q1(b)

Q2. Consider the circuit shown in Figure Q2. Find V_o.

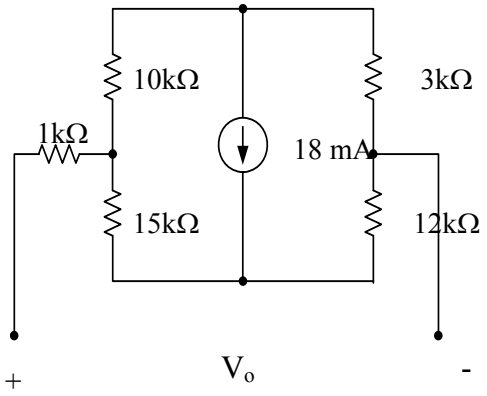


Figure Q2

Q3. Determine the equivalent resistance R_{ab} in the circuit shown in Figure Q3.0.

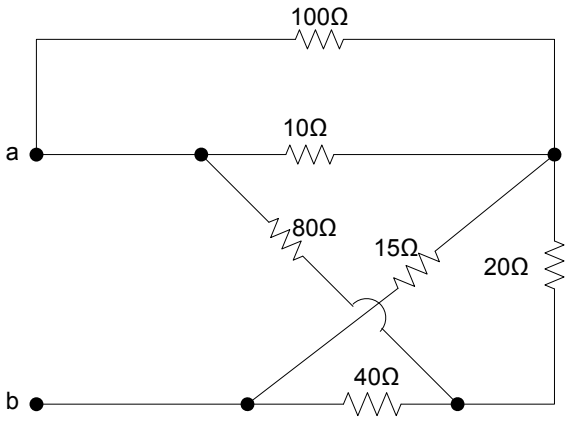


Figure Q3.0

Q4. Consider the circuit shown in Figure Q4. Write down the equation in the matrix form to solve the circuit using

(a) mesh analysis

(b) nodal analysis.

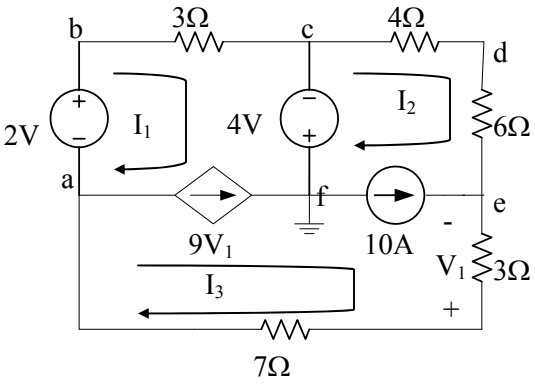


Figure Q4

Q1. What do you mean by passive and active elements? Give examples.

Q2. The *law of conservation of energy* must be obeyed in any electric circuit. What does it mean from this statement?

Q3. Describe the source transformations technique.

Q4. Compute the power absorbed or supplied by each component of the circuit in Fig. Q4. Show that the total power supplied to the circuit is equal to the total power absorbed by the circuit.

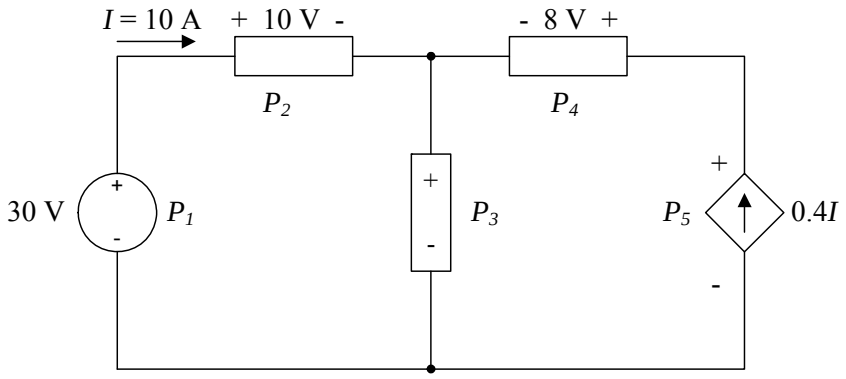


Fig. Q4

Q5 Obtain the equivalent resistance at the terminals *a*-*b* in Fig. Q5.

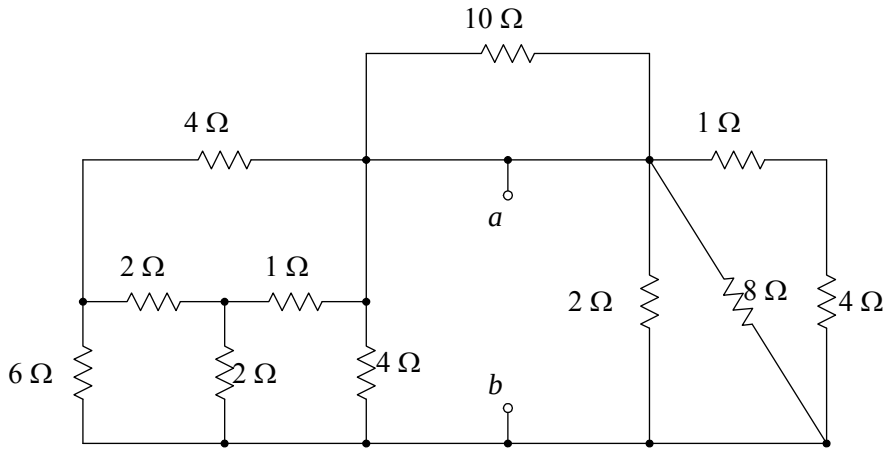


Fig. Q5

Q6. For the circuit shown in Fig. Q6,

i) State the number of nodes.

ii) State the number of essential nodes.

iii) Determine the essential node voltages using nodal analysis.

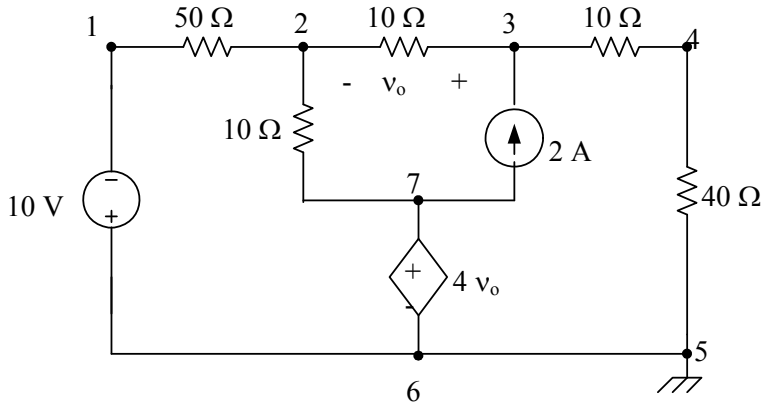


Fig. Q6

Q1. (a) Find v_{ab} with polarity for the circuits shown in Figure Q1(a). Each box can contain a load or a power supply, or a combination of both.

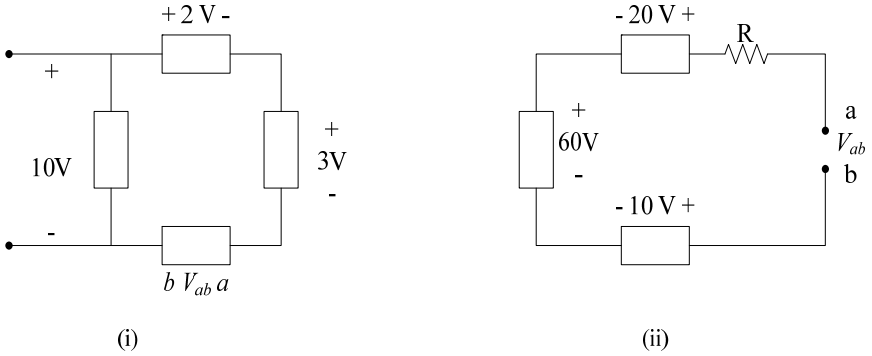


Figure Q1(a)

(b) Find the total power developed in the circuit shown in Figure Q1(b), if v_0 = 5 V.

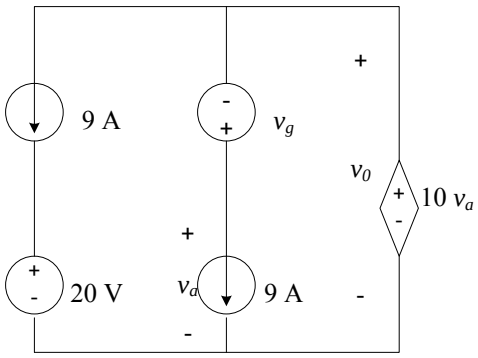


Figure Q1(b)

Q2. Determine the equivalent resistance, R_{eq} for the circuit shown in Figure Q2.0 looking from the voltage source. Calculate the current i_s, i_5 and voltage, v as indicated in the circuit.

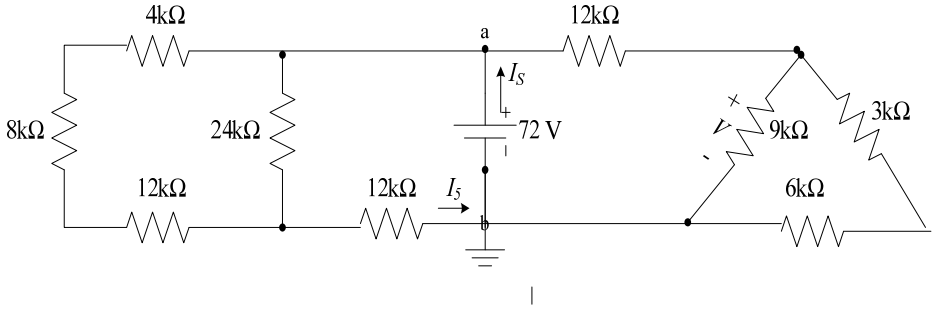


Figure Q2.0

Q3. Derive the node-voltage equations for the circuit shown in Figure Q3.0. Determine the voltages for node a, b, and c.

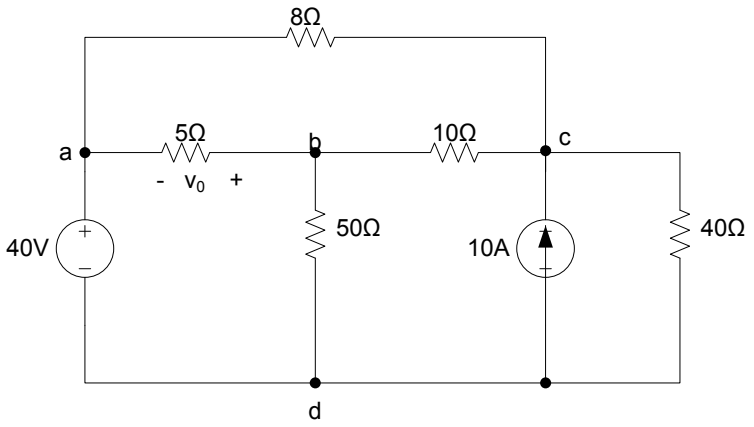


Figure Q3.0

Q4. Derive the mesh-current equations for the circuit shown in Figure Q4.0. Determine the loops current.

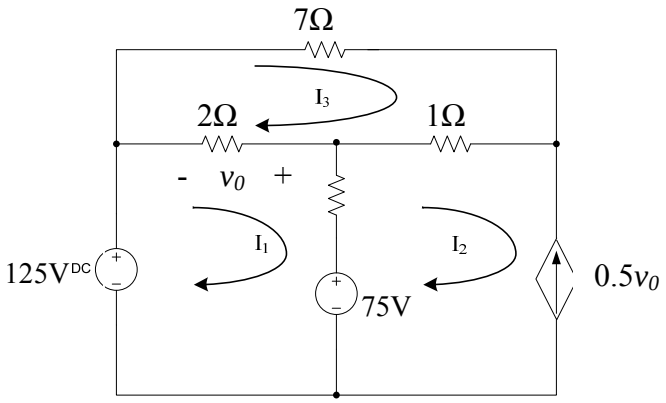


Figure Q4.0

Q1. Define or explain the following terms. Give units where appropriate.

(a) Ohm's Law
(b) Energy
(c) Voltage
(d) Direct current

Q2. Consider circuit in Figure Q2. If the power absorbed by 8 Ω resistor is 32 Watt,

(a) Determine the values of i, i_1, i_2 and v.
(b) Show that the total power supplied to the circuit is equal to the power absorbed by the circuit.

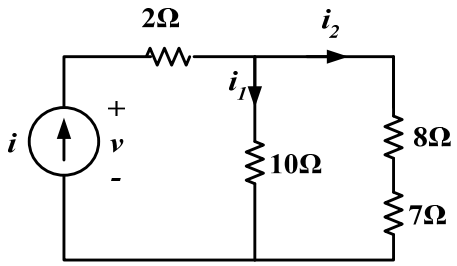


Figure Q2

Q3. Find the equivalent resistance at terminals *a*-*b* of the circuit in Figure Q3.

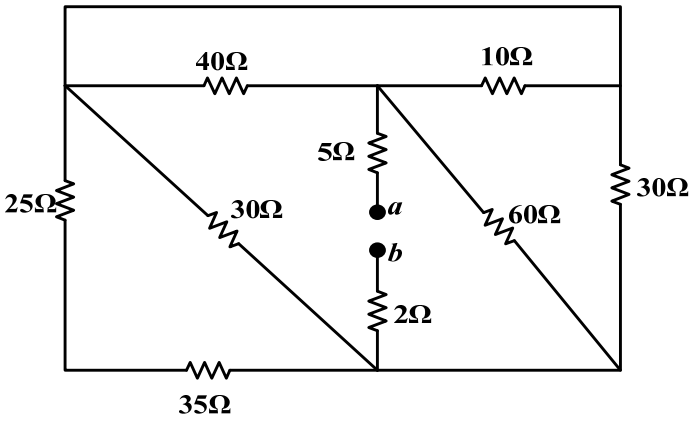


Figure Q3

Q4. Determine *i* for the Figure Q4.

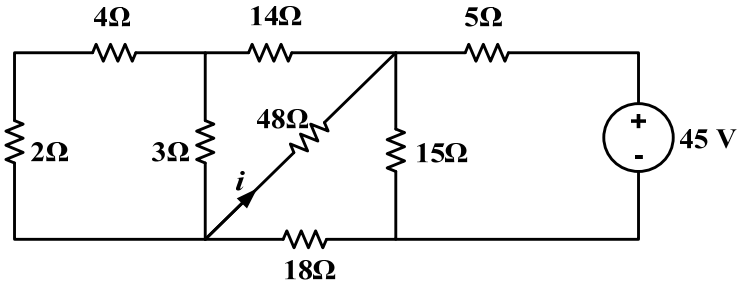


Figure Q4

Q5. Consider the circuit in Figure Q5. Using mesh analysis, write three equations of mesh currents in the form of matrix. [DO NOT SOLVE IT].

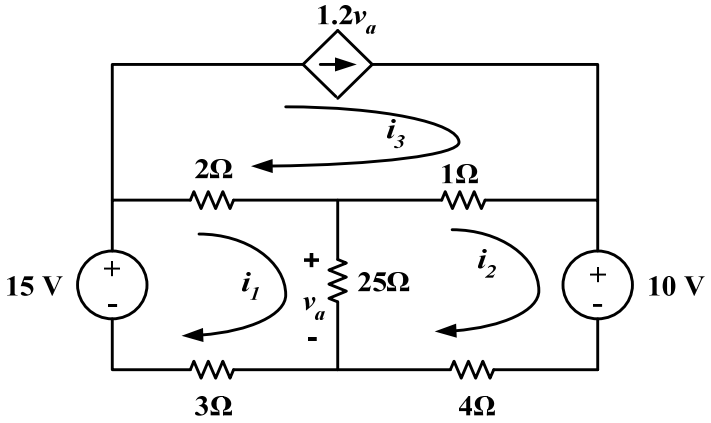


Figure Q5