Tutorial - 2

(Basic Laws & Theorems) - 1

P2.1 In the circuit configuration of Fig P2.1 determine the voltage drop across each element as well as the power dissipated. All the resistances are in ohms.

[$V_{10\Omega} = 18V$, $V_{40\Omega} = 24V$, $V_{5\Omega} = 6V$, $V_{15\Omega} = 16V$]

[$P = 32.4W$, $P = 14.4W$, $P = 7.2W$, $P = 21.6W$]

P2.2 In the configuration of Fig P2.2, find the value of E which permits a power dissipation of 180W in the 20Ω resistor. All resistances are in ohms. [165 V]

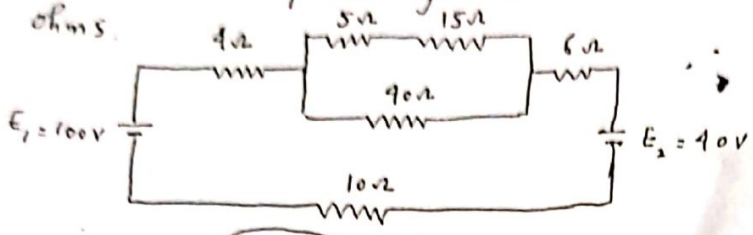


Fig P2.1

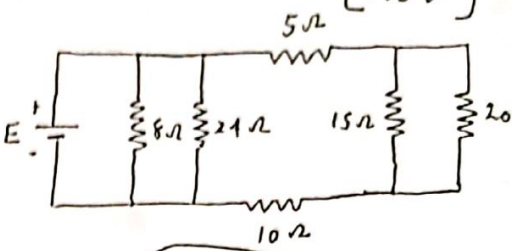


Fig P2.2

P2.3 Find the voltage appearing across the 18Ω resistor in the network of Fig P2.3. [15V]

P2.4 In the circuit of Fig P2.4 find the value of R [7Ω]

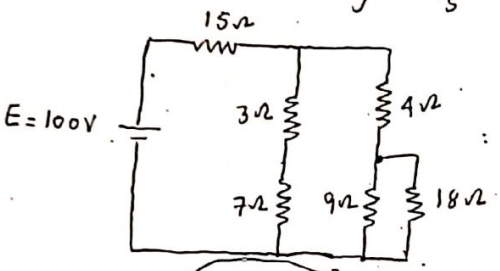


Fig P.2.3

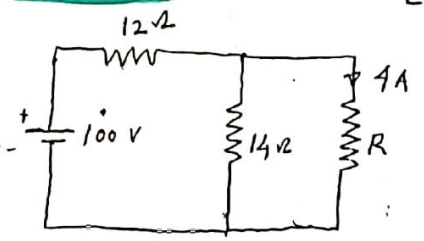
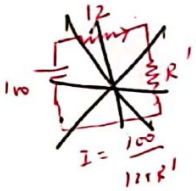


Fig P2.4



P2.5 In Fig P1.2 Compute the voltage required between terminals ab so that a voltage drop of 45V occurs across 15Ω resistor. [V] [40 V]

P2.6 In the circuitry of Fig P1.1 determine

(a) the voltage needed across ab so that the voltage drop occurs the 15-Ω resistor is 45V

(b) The corresponding voltage across the 8-Ω resistor for this condition. [150V, 40V]

Fig P2.1, using

...ious methods

[$I_A = \frac{5}{3}$ A, $I_B = \frac{10}{3}$ A, $I_C = 2.5$ A, $I_D = 1.25$]

... using the voltage division rule, calculate V_1 and V_2 in Fig P2.8

[11.39 V, −73.01 V]

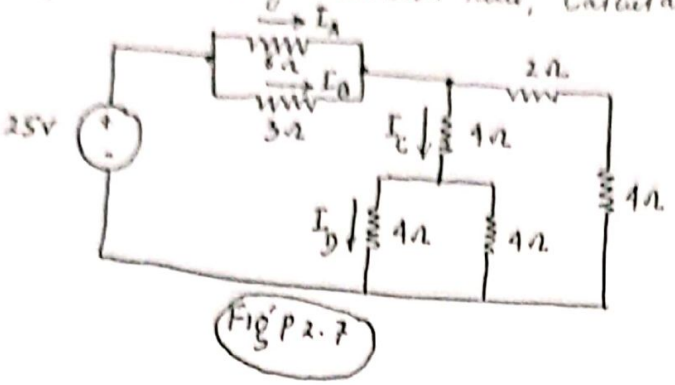


Fig P2.7

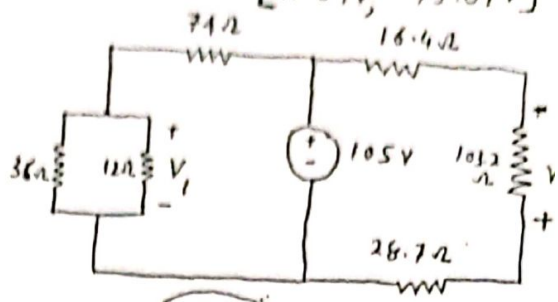


Fig P2.8

P2.9 → In Fig P2.9, both ammeters indicate 1.70 A. The source supplies 300 ... Find R_1 and R_2.

[23.9 Ω, 443 Ω]

P2.10 → Find the power delivered by the current source in Fig P2.10 [228 W

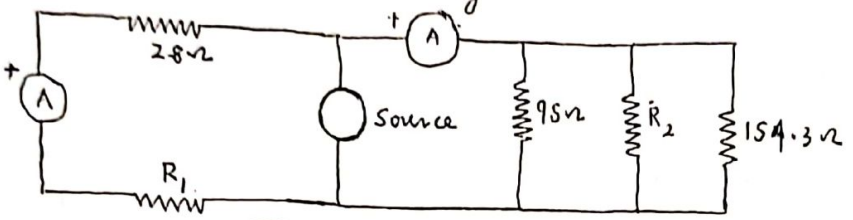


Fig P2.9

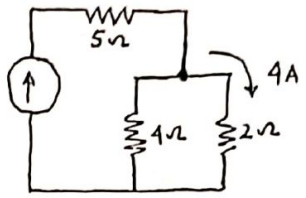


Fig P2.10

P2.11 → In the circuit shown in Fig P2.11, find the power absorbed by the 5-V battery.

[−5 W]

P2.12 → Obtain the current I_x in the 10-Ω resistor in Fig P2.12, using Superposition.

[−1 A]

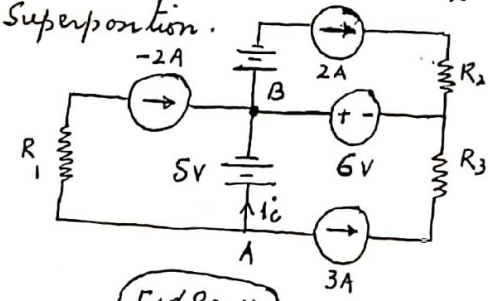


Fig P2.11

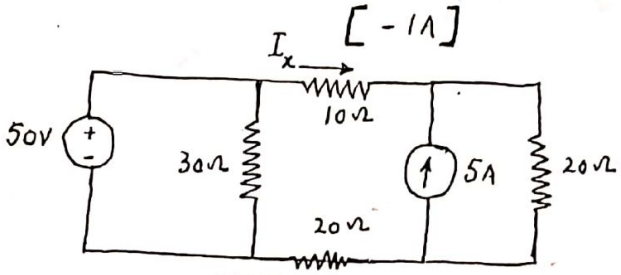


Fig P2.12

P2.13 → using Superposition, find I in Fig P2.13

[16.2 A]

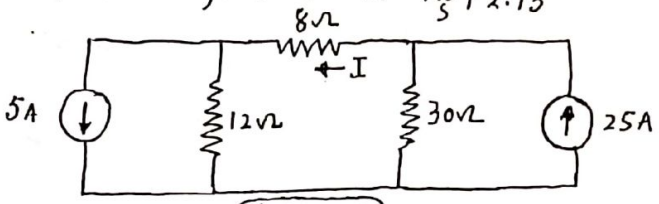


Fig P2.13

for the circuit of Fig P2.14 [1A]

Find the current and power dissipation in each resistor of the circuit shown in Fig P2.15

[$I_{90} = 0.11A$, $I_{50} = 0.33A$, $I_{130} = 0.33A$
$P_{90} = 17.1W$, $P_{50} = 5.56W$, $P_{130} = 14.44W$]

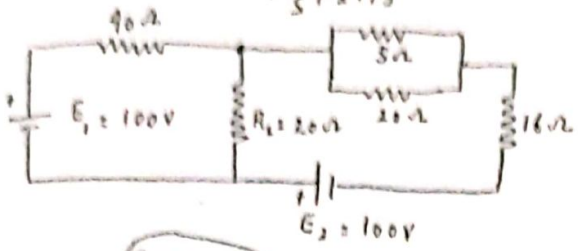


Fig P2.14

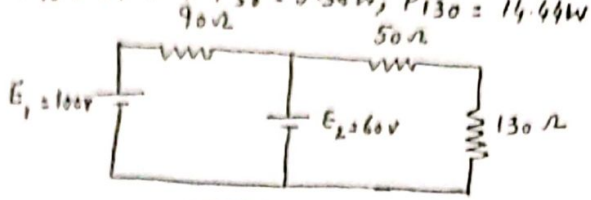


Fig P2.15

P2.16 → Use Superposition to find i_x in each of the circuits shown in Fig

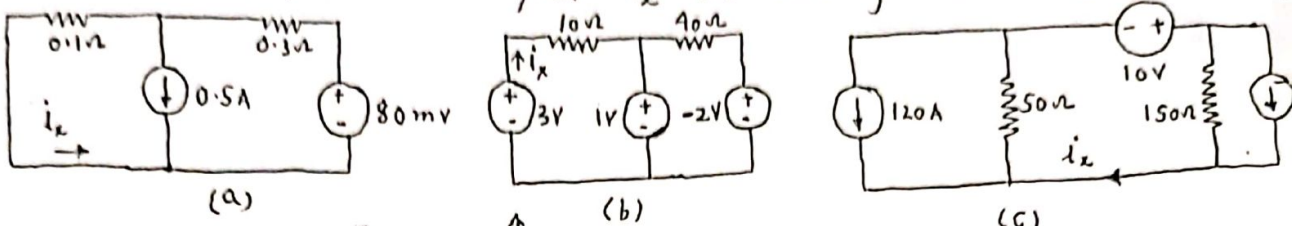
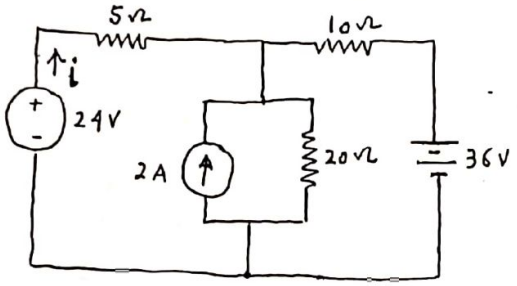
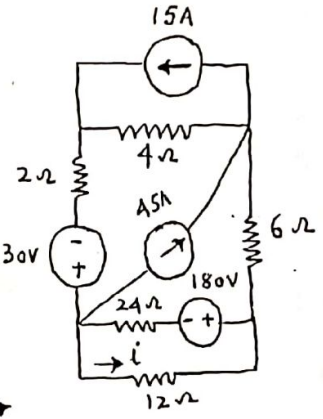


Fig P2.16

[-175mA, 200mA, 50mA]

P2.17 → Use the Superposition theorem on the circuits shown in Fig P2.17 to find i in each case.





[-1.142
-9A

Fig P2.17

P2.18 → Replace the active network to the left of terminals ab in Fig P2 by a Thevenin's equivalent. [80V, 50Ω]

P2.19 → Replace the circuit in Fig P2.19 with its Norton's equivalent

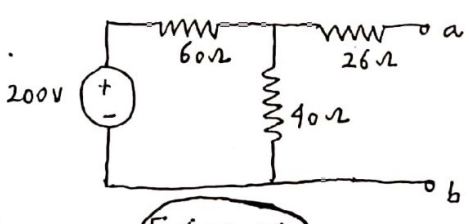


Fig P2.18

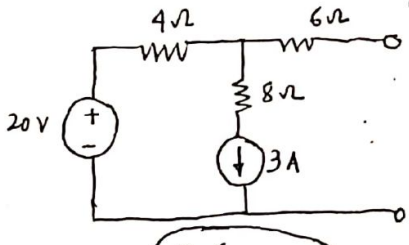
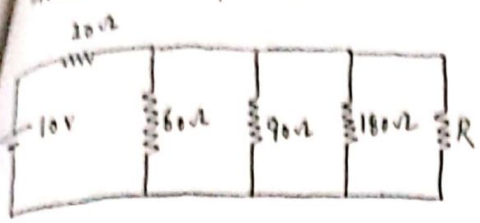
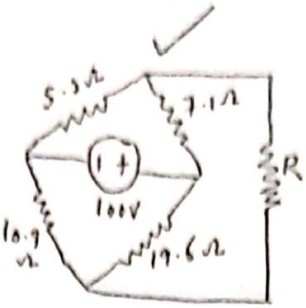


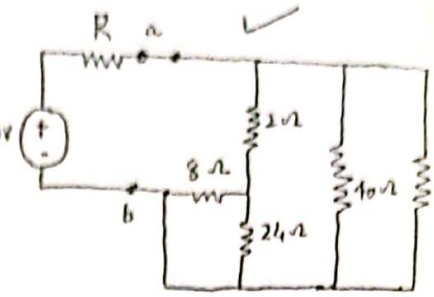
Fig P2.19

[0.8A, 10.0

... that will receive maximum power. Determine the value of this maximum power







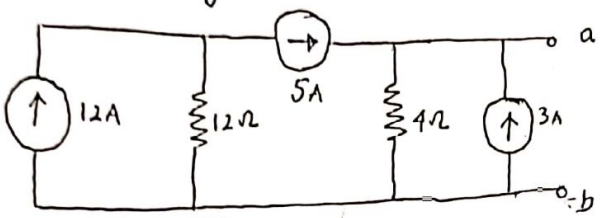
Fig' P 2.20

[12Ω, 0.75W
10Ω, 1.09W
6Ω, 4.167W]

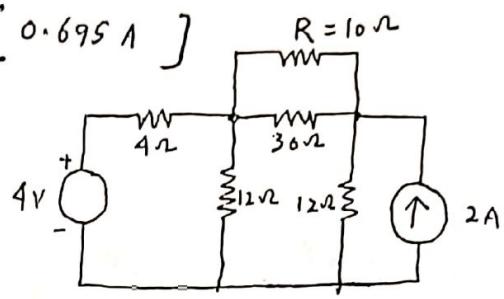
P2.21 Determine the Thevenin's and Norton's equivalent circuits as seen at the terminals a-b for the network of Fig' P 2.21.

[37V, 4Ω, 8A]

P2.22 For the circuit of Fig' P2.22, find the current flowing through R = 10Ω, using Thevenin's theorem [0.695 A]



Fig' P2.21



Fig' P 2.22

P2.23 A circuit has an arrangement of circuit elements as depicted in Fig' P2.23.

a) Find the Thevenin's equivalent circuit considering R_4 as the variable load resistance.

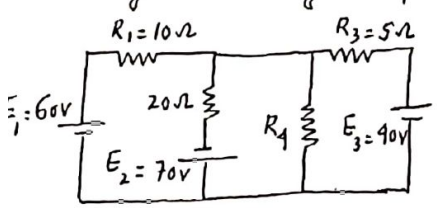
b) Find the current through R_4 when it has values of $\frac{4}{7}\Omega$ and $\frac{40}{7}\Omega$.

[(30V, $\frac{20}{7}\Omega$), 8.75A, 3.5A]

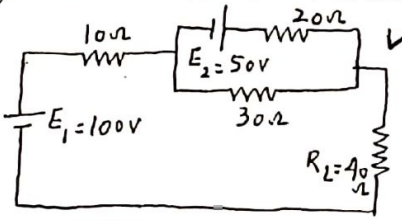
P2.24 Assuming R_L in Fig' P2.24 is the load resistor, find the Thevenin's equivalent circuit.

[130V, 22Ω]

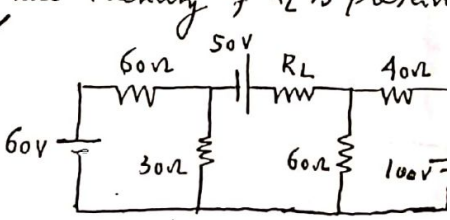
P2.25 Use Thevenin's theorem to replace the three-loop circuit of Fig' P2.25 by a single loop equivalent circuit in which the identity of R_L is preserved



Fig' P 2.23



Fig' P 2.24



Fig' P 2.25

[10V, 44Ω]