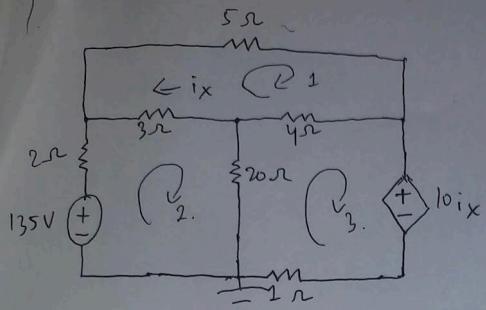


Tugas 3

Rafif Reinhart-A
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Gunakan metoda analisis mesh.

) KVL 1

$$5i_1 + 4(i_2 - i_3) + 3(i_1 - i_2) = 0 \\ 12i_1 - 3i_2 - 4i_3 = 0 \dots (1)$$

) KVL 2

$$3(i_2 - i_1) + 20(i_2 - i_3) - 135 + 2i_2 = 0 \\ -3i_1 + 25i_2 - 20i_3 = 135 \dots (2)$$

) KVL 3

$$4(i_3 - i_2) + 10i_x + 2i_3 + 20(i_3 - i_2) = 0$$

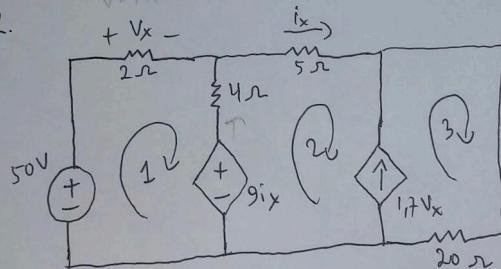
$$4i_3 - 4i_2 + 10i_x + 10i_2 + i_3 + 20i_3 - 20i_2 = 0 \quad | i_x = i_2 - i_1 \\ 6i_2 - 30i_2 + 25i_3 = 0$$

$$i_1 = 39A$$

$$i_2 = \frac{324}{5} A \\ i_2 = 64,8A$$

$$i_3 = \frac{342}{5} A \\ i_3 = 68,4A$$

2.



Gunakan metoda analisis mesh,
lalu tentukan total daya total
yang terdistribusi!

$$i_x = i_2$$

$$V_x = 2i_2$$

) KVL 1

$$2i_2 + 4(i_1 - i_2) + 9i_x - 50 = 0$$

$$6i_1 + 5i_2 = 50 \dots (1)$$

) Mesh 2 & 3

$$i_3 - i_2 = 1.7V_x$$

$$i_3 - i_2 = 3.4i_2$$

$$-3.4i_1 - i_2 + i_3 = 0 \dots (2)$$

→ KVL SUPERMESH 2 & 3

$$\begin{aligned} -9i_x + 4(i_2 - i_1) + 5i_2 + 20i_3 &= 0 \\ -9i_2 + 4i_2 - 4i_1 + 5i_2 + 20i_3 &= 0 \\ -4i_1 + 20i_3 &= 0 \dots (3) \end{aligned}$$

$$i_2 = -5 \text{ A}$$

$$i_2 = 16 \text{ A}$$

$$i_3 = -1 \text{ A}$$

$$\checkmark P_{50V} = i_2 \cdot V = 5 \cdot 50 = 250 \text{ W}$$

$$\checkmark P_{R2R} = i_2^2 \cdot R = (-5)^2 \cdot (2) = 50 \text{ W}$$

$$\checkmark P_{R4R} = (i_2 - i_1)^2 \cdot R = (-21)^2 \cdot 4 = 1764 \text{ W}$$

$$P_{R2R} = i_2^2 R = (-1)^2 \cdot (20) = 20 \text{ W}$$

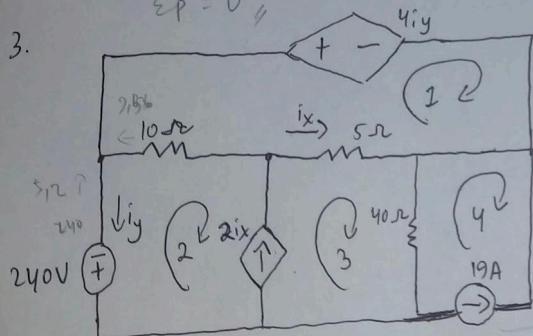
$$\checkmark P_{50V} = i_2^2 \cdot R = (16)^2 \cdot 5 = 1280 \text{ W}$$

$$\checkmark P_{9ix} = (i_2 - i_1) V_x = (16 - (-5)) \cdot 9(2) = 21 \cdot 144 = 3024 \text{ W}$$

$$P_{17Vx} = i_1 V_x = (i_3 - i_2) V_x = (-1 - 16) \cdot 20 = -340 \text{ W}$$

$$\therefore Eptot = (250 + 50 + 1764 + 1280 + 3024 - 340) \text{ W}$$

3.



Gunakan metoda analisis mesh
dan tunjukkan total daya yang dibangkitkan
sama dengan total daya terdistribusi

$$i_3 = i_4$$

$$i_x = i_3 - i_2$$

$$i_4 = -19 \text{ A} \rightarrow \text{ditelpi letaknya}$$

→ KVL 1

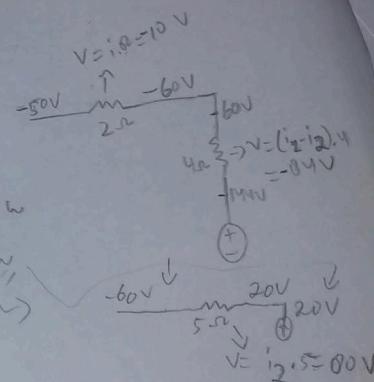
$$5i_y + 5(i_2 - i_3) + 10(i_2 - i_1) = 0$$

$$15i_1 - 14i_2 - 5i_3 = 0 \dots (i)$$

→ mesh 2 & 3

$$i_3 - i_2 = 2i_x$$

$$2i_2 - i_2 - i_3 = 0 \dots (1)$$



Rafif Reinhardt, A

mesh 2 & 3

$$240 + 10(i_2 - i_1) + 5(i_3 - i_2) + 40(i_3 - i_4) = 0$$

$$10i_2 - 10i_1 + 5i_3 - 5i_2 + 40i_3 - 40i_4 = -240$$

$$-15i_2 + 10i_1 + 45i_3 + 760 = -240$$

$$-15i_2 + 10i_1 + 45i_3 = 1.000 \dots (3)$$

$i_1 = 18 \text{ A}$

$i_2 = 10 \text{ A}$

$i_3 = 26 \text{ A}$

$P_{4i_4} = i_4 \cdot V = 18 \cdot (-10) = -180 \text{ W (out)} \quad [D] \quad V = I \cdot R$
 $P_{10R} = (i_2 - i_1)^2 \cdot R = (10 - 18)^2 \cdot 10 = 640 \text{ W (in)} \quad [B] \quad D = \text{dissipasi}$
 $P_{240V} = i_2 \cdot V = (-10)(240) = -2400 \text{ W (out)} \quad [D] \quad B = \text{Bangkit}$
 $P_{5R} = (i_3 - i_2)^2 \cdot 5 = (26 - 18)^2 \cdot 5 = 320 \text{ W (in)} \quad [B]$
 $P_{2i_1} = -2(i_3 - i_2) \cdot V = -2(26 - 18) \cdot 320 = -5.120 \text{ W (out)} \quad [D]$
 ↓
 Karena ada rambatan $10\Omega \Rightarrow V = (i_2 - i_1) \cdot R = 80V$
 $\therefore -240 - 80 = -320 \text{ V}$

$P_{40R} = (i_4 - i_3)^2 \cdot 40 = (-18 - (-26))^2 \cdot 40 = 1960 \text{ (in)} \quad [B]$
 $P_{19A} = (-19) \cdot (-26) = 5.320 \text{ W (in)} \quad [B]$

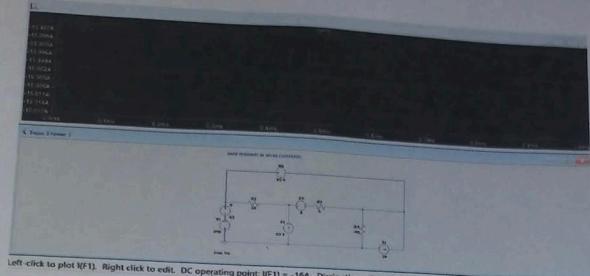
∴ $P_{in} = P_{out}$

$$640 + 320 + 1960 + 5.320 = -720 - 2400 - 5.120$$

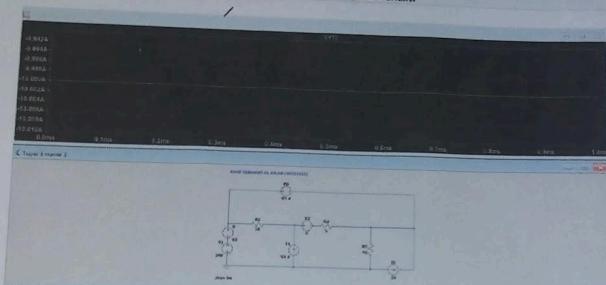
$$8.240 \text{ W} = -8.240 \text{ W} \quad \checkmark$$

$$V = 14$$

$$I_{y,y} = -16 \text{ A}$$

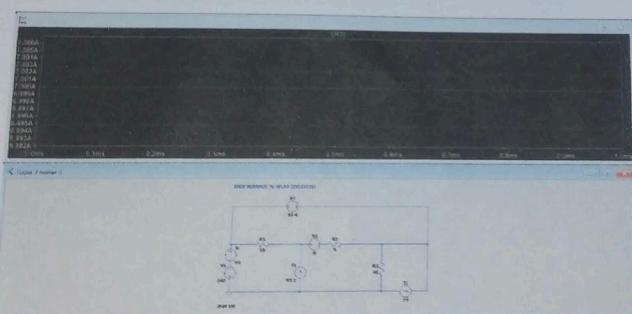


Left-click to plot $I(V_1)$. Right click to edit. DC operating point: $I(V_1) = -16\text{A}$ Dissipation=5.12KW



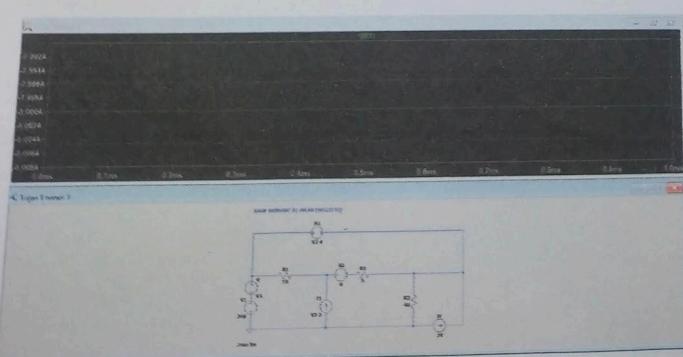
Left-click to plot $I(V_1)$. Right click to edit. DC operating point: $I(V_1) = -10\text{A}$ Dissipation=2.4KW

$$I_{\text{tegangan}} = -10 \text{ A}$$



Left-click to plot $I(R_3)$. Right click to edit. DC operating point: $I(R_3) = 7\text{A}$ Dissipation=1.96KW

$$I_{R_3} = 7 \text{ A}$$

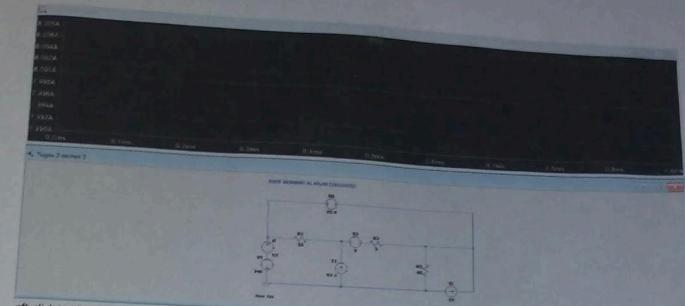


$$I_{R_1} = -8 \text{ A}$$

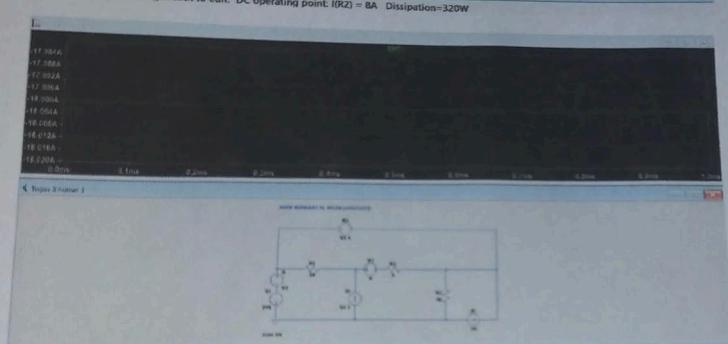
Left-click to plot $I(R_1)$. Right click to edit. DC operating point: $I(R_1) = -8\text{A}$ Dissipation=640W

$$\begin{cases} V = 1 \\ \pm \end{cases}$$

$$I_{R2} = 8A$$



$$I_x = -18A$$



$$I_{PHUS} = 19A$$

