

FINAL EXAM

Name (print) Zhurkov Name (signed) _____

Discussion Instructor (circle): Brown Chakhbazian Condella Portnoi Zhukov

Discussion Section # _____

SHOW ALL WORK!!!!

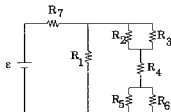
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

Given the circuit shown.

- (a) Find the current in R_5 .
 (b) Calculate the potential across R_2 .
 (c) Determine the power being dissipated in R_4 .

- $\mathcal{E} = 175 \text{ V}$
 $R_1 = 450 \text{ ohms}$
 $R_2 = 85 \text{ ohms}$
 $R_3 = 65 \text{ ohms}$
 $R_4 = 120 \text{ ohms}$
 $R_5 = 270 \text{ ohms}$
 $R_6 = 350 \text{ ohms}$
 $R_7 = 150 \text{ ohms}$



$$R_{23} = \frac{R_2 R_3}{R_2 + R_3} = \frac{85 \cdot 65}{85 + 65} = \frac{5525}{150} = 36.83 \Omega$$

$$R_{56} = \frac{R_5 R_6}{R_5 + R_6} = \frac{270 \cdot 350}{270 + 350} = \frac{94500}{620} = 152.42 \Omega$$

$$R_{23,4,56} = 36.83 + 152.42 + 120 = 309.25 = R_{23} + R_4 + R_{56} \Omega$$

$$R_{1-6} = \frac{R_1 R_{23-6}}{R_1 + R_{23-6}} = \frac{450 \cdot 309.25}{450 + 309.25} = \frac{139162.5}{759.25} = 183.29 \Omega$$

$$R_{\text{eff}} = R_{1-6} + R_7 = 183.29 + 150 = 333.29 \Omega + 15$$

$$I_7 = \frac{\mathcal{E}}{R_{\text{eff}}} = \frac{175}{333.29} = 0.525 \text{ A}$$

$$V_{1-6} = I_7 \cdot R_{1-6} = 0.525 \cdot 183.29 = 96.24 \text{ V}$$

$$I_4 = \frac{V_{1-6}}{R_{23-6}} = \frac{96.24}{309.25} = 0.311 \text{ A}$$

$$V_5 = I_4 \cdot R_{56} = 0.311 \cdot 152.42 = 47.43 \text{ V}$$

$I_5 = \frac{V_5}{R_5} = \frac{47.43}{270} = 0.175 \text{ A}$

$V_4 = I_4 R_4 = 0.311 \cdot 120 = 37.32 \text{ V}$

$P = I_4^2 R_4 = 0.311^2 \cdot 120 = 11.60 \text{ W}$

-1 left
-1 right