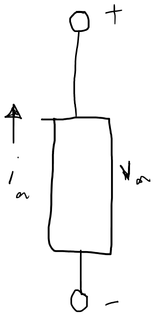
Homework 1

Sunday, September 6, 2020 11:41 AM

"I pledge my honor I have abided by the Stevens Honor system." -Alex Gaskins

P. 21

a.)



$v_a = -15\,V$

$i_a = 2\,A$

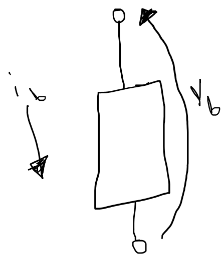
$p = vi$

$p = (-15)(-2)$

$p = 30$ Watts

Energy is being absorbed

b.)



$v_b = 10\,V$

$i_b = 3\,A$

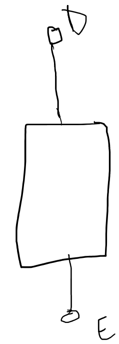
$p = vi$

$p = 10(3)$

$p = 30$ Watts

Energy is being absorbed

c.)



$V_{DE} = 20\,V$

$i_{ED} = 3A$

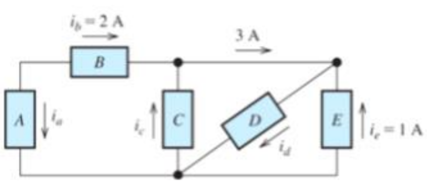
$p = vi$

$p = 20(-3)$

$p = -60$ Watts

Energy is being supplied

P. 37



A and B are in series

$i_b = -i_a$

$i_a = -2\,A$

$i_b + i_c - 3 = 0$

$2 + i_c = 3$

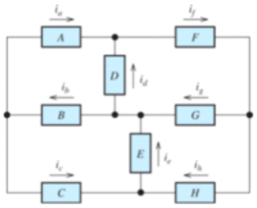
$i_c = 1\,A$

$3 + i_e - i_d = 0$

$i_d = 4\,A$

P. 38

*P1.38. Find the values of the other currents in **Figure P1.38** if $i_a = 2$ A, $i_b = 3$ A, $i_d = -5$ A, and $i_h = 4$ A.



$i_a + i_d - i_f = 0$

$i_a + i_d = i_f$

$2 - 5 = i_f$

$i_f = -3A$

$i_c + i_h - i_e = 0$

$i_e = i_c + i_h$

$i_e = 1 + 4$

$i_e = 5A$

$i_b - i_a - i_c = 0$

$i_b - i_a = i_c$

$i_c = 3 - 2$

$i_c = 1A$

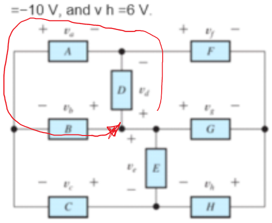
$i_e + i_g = i_b + i_d$

$5 + i_g = 3 - 5$

$i_g = -7A$

P. 43

P1.43. Solve for the other voltages shown in **Figure P1.43** given that $v_a = 5$ V, $v_b = 7$ V, $v_f = -10$ V, and $v_h = 6$ V.



$V_d - V_a - V_b = 0$

$V_d = V_a + V_b$

$V_d = 5 + 7$

$V_d = 12V$

$V_g - V_f - V_d = 0$

$V_g = V_f + V_d$

$V_g = 12 - 10$

$V_g = 2V$

$V_e - V_h - V_g = 0$

$V_e = V_h + V_g$

$V_e = 6 + 2$

$V_e = 8V$

$V_c + V_e - V_b = 0$

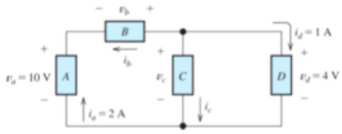
$V_c = V_b - V_e$

$V_c = 7 - 8$

$V_c = -1V$

P. 44

*P1.44. Use KVL and KCL to solve for the labeled currents and voltages in **Figure P1.44**. Compute the power for each element and show that power is conserved (i.e., the algebraic sum of the powers is zero).



$-V_a - V_b + V_d = 0$

$V_b = V_d - V_a$

$V_b = -6V$

$i_a = -i_b$

$i_b = -2A$

$V_c = V_d$ (Parallel)

$V_c = 4V$

$-i_c - i_b - i_d = 0$

$-i_c = i_b + i_d$

$i_c = -i_b - i_d$

$i_c = 2 - 1$

$i_c = 1A$

$P_A = V_A i_A$

$P_A = 10(-2)$

$P_A = -20W$

$P_B = V_B i_B$

$P_B = -6(-2)$

$P_B = 12W$

$P_C = V_C i_C$

$P_C = 4(1)$

$P_C = 4W$

$P_D = V_D i_D$

$P_D = 4(1)$

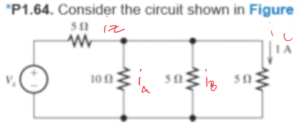
$P_D = 4W$

$P_A + P_B + P_C + P_D = 0$

$-20 + 12 + 4 + 4 = 0$

P. 64

*P1.64. Consider the circuit shown in **Figure P1.64**. Use Ohm's law, KVL, and KCL to find V_x.



$V = iR$

$V = 1(5)$

$V = 5V$

$5 = i(10)$

$i = \frac{1}{2}A$

$i_z = i_A + i_B + i_c$

$i_z = .5 + 1 + 1$

$i_z = 2.5$

$V_z = i_z R_z$

$V_z = 2.5(5) = 12.5V$

For any loop:

$12.5 + 5 = V_x$

$V_x = 17.5V$