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4655 4192

EECB 215 HW2

13. $I_1 + I_2 = 2$

$I_4 + 7 = I_3$

$2 = I_4 + 4$

$3 + 4 + I_3 = I_1$

$7 + I_3 = I_1$

$7 + 7 + I_4 = I_1$

$14 + (-2) = I_1 = 12$

$12 + I_2 = 2$

$I_2 = -10$

$12 - 7 = I_3 = 5$

$I_4 = -2$

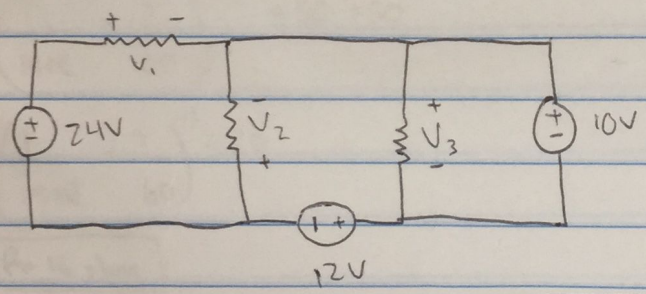
$I_1 = 12\,A$

$I_2 = -10\,A$

$I_3 = 5\,A$

$I_4 = -2\,A$

17.



$24V - V_1 + V_2 = 0$

$24V - V_1 - V_3 - 12V = 0$

$24V - V_1 - 10V - 12V = 0$

$2 - V_1 = 0$

$V_1 = 2$

$24 - 2 + V_2 = 0$

$-22 = V_2$

$24 - 2 - V_3 - 12 = 0$

$V_3 = 10$

$V_1 = 2V$

$V_2 = -22V$

$V_3 = 10V$

25. ~~$V = IR = 0.005 \cdot 10000 = 50V$~~

$V = 0.01(V_0) = 0.5V$

$I = V/R = 0.025\,mA$

~~$P = IV =$~~ $12.5\,\mu W$

* On last page

32. $I_1 = \frac{-50}{250} \cdot 16 = -3.2\,A$

$I_2 = \frac{-200}{250} \cdot 16 = -12.8\,A$

$I_3 = \frac{-40}{100} \cdot 16 = -6.4\,A$

$I_4 = \frac{-60}{100} \cdot 16 = -9.6\,A$

41. $R_{12} = \left(\frac{1}{12} + \frac{1}{12} + \frac{1}{12}\right)^{-1} = \left(\frac{3}{12}\right)^{-1} = \left(\frac{1}{4}\right)^{-1} = 4\,ohm$

$\left(\frac{1}{14+R} + \frac{1}{60}\right)^{-1} + 30 = 50$

$\left(\frac{1}{14+R} + \frac{1}{60}\right)^{-1} = 20$

$R = 16\,ohm$

44. $R_{eq} = \left(\left(\left(\frac{1}{20} + \frac{1}{30}\right)^{-1} + 8\right)^{-1} + \frac{1}{30}\right)^{-1}$

$= \left(\frac{1}{20} + \frac{1}{30}\right)^{-1} = 12\,ohm$

25. $V_0 = IR = 5\,mA \cdot 10\,kohm = 50V$

$i_0 = 0.01 \cdot 50 = 0.5A$

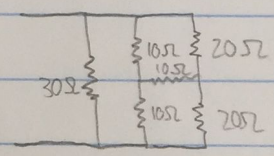
$R_{eq} = \left(\frac{1}{5kohm} + \frac{1}{20kohm}\right)^{-1} = \left(\frac{5}{20\,kohm}\right)^{-1} = 4kohm$

$V = IR = 2kV$

$i = V/R = 2kV/20\,kohm = 0.1A$

$power = iV = 0.2kW$

51. a.



Since top and bottom resistors are equal, potential across 10ohm in middle is zero

$R_{eq} = \left(\frac{1}{30} + \frac{1}{20} + \frac{1}{40}\right)^{-1} = \left(\frac{13}{120}\right)^{-1} = \frac{120}{13}\,ohm$

59. $P = \frac{V^2}{R}$; $R = \frac{V^2}{P}$

$R_{40} = 110^2/40 = 302.5\,ohm$

$R_{60} = 110^2/60 = 201.7\,ohm$

$R_{100} = 110^2/100 = 121\,ohm$

$R_{eq} = 302.5 + \left(\frac{1}{201.7} + \frac{1}{121}\right)^{-1} = 378.1\,ohm$

$I = V/R = 220/378.1 = 0.582A$; $V_{40} = IR = 176.1V$; $V_{60} = V_{100} = 220 - V_{40} = 43.9V$

$P_{40} = I^2R = 102.5W$ Bulb will burn out when turned on

$P_{60} = V^2/R = 43.9^2/201.7 = 9.6W$ Bulb will be dim when turned on

$P_{100} = V^2/R = 43.9^2/121 = 16W$ Bulb will be dim when turned on

If the 100W bulb is wired in series with the other two connected in parallel