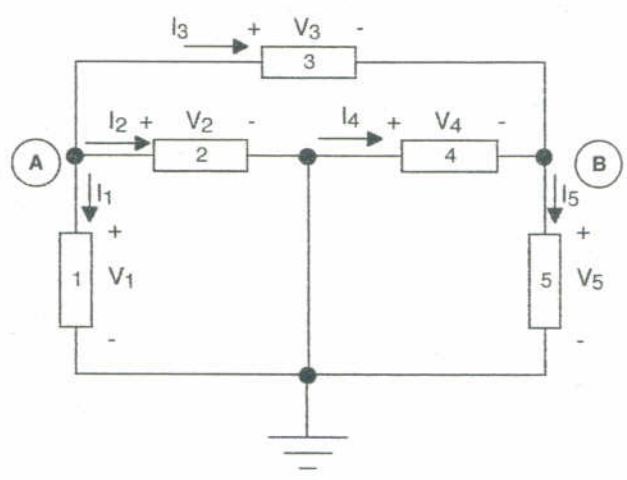Name : __Solution__   Section:_____   CWRU e-mail:_____

CASE WESTERN RESERVE UNIVERSITY
Case School of Engineering
Department of Electrical Engineering and Computer Science
ENGR 210. Introduction to Circuits and Instruments (4)

Quiz No. 1   1/21/05

PUT ANSWERS IN THE SPACE PROVIDED AND SHOW YOUR WORK IF APPROPRIATE

Problem 1 (10 points)

Consider the five element circuit shown above. You measure the electrical parameters shown below for each circuit element. . Complete this table and indicate whether each device is absorbing (**A**) or delivering (**D**) power. Current is defined to be positive when it flows into the positive terminal of the device.

Device	Voltage	Current	Power	A/D
1	+30 V	−10A	−300W	D
2	30V	4 A	+ 120 W	A
3	+50 V	6 A	+300 W	A
4	20V	4 A	+80 W	A
5	−20 V	10A	−200W	D

- $P = VI$
- $\Sigma P = 0$
- D if power is negative
- A if power is positive

Name : _Solution_____ Section:_____ CWRU e-mail:_____

Problem 2 (10 points)

(a) An automobile battery is charged at a constant rate of 10000 milliamperes for 20 kiloseconds. Assume the charger keeps the battery voltage at a constant 0.012 kilovolts . What is the total energy in megajoules supplied to the battery?

$I = 10000 \, mA = 10A$

$t = 20 \, \text{kilo-sec} = 20000s$ ANSWER: __2.4_____ megajoules

$V = 0.012 kV = 12V$

⑤ — 2 for P=VI
— 2 for equation
— 1 for answer

$P = VI$ $W_T = \int_{t_1}^{t_2} p \, dt = \int_{t_1}^{t_2} VI \, dt = \int_0^{20000} (10 \times 12) \, dt = 2400000J = 2.4MJ$

(b) An electrical power plant supplies 0.800kilovolts and 12000 milliamperes to operate an electric motor. The power plant is supplying how many kilowatts?

ANSWER: __9.6_____ kilowatts

⑤ — 2 for P=VI
— 2 for equation
— 1 for answer

$V = 0.800 kV = 800V$

$I = 12000 mA = 12A$

$P = VI = (800 \times 12) = 9600W = 9.6 kW$

✳ The Patriots will win the super bowl. Sorry Philadelphia. :|