Serial #

King Fahd University of Petroleum & Minerals
Electrical Engineering Department
EE205: Electric Circuits II (031)

Major Exam I
Oct. 22, 2003 7:30PM-9:00PM, Building 19-416

Name: ID# Sec. ( )01 ( )02

Q1. (4 Points: Short Questions)

a) What are the advantages of using capacitor banks to supply the magnetizing vars for the inductive loads? (mention two) **(1 point)**

b) An amplifier circuit is supplied by a dc source that has a value of ±5 V, the amplifier has a voltage gain of 100, what is the output voltage? If the input voltage is 10mV, -100mV? **(1 point)**

c) We would like to design an RLC circuit that would never exceed its final value. What type of response should we design for? (Overdamped, Critically damped, Underdamped) **(1 point)**

d) In a balanced three-phase circuits the power is invariant with time. Is this good or bad for motors ? Explain (no more than three lines) **(1 point)**

Q2. (10 Points)

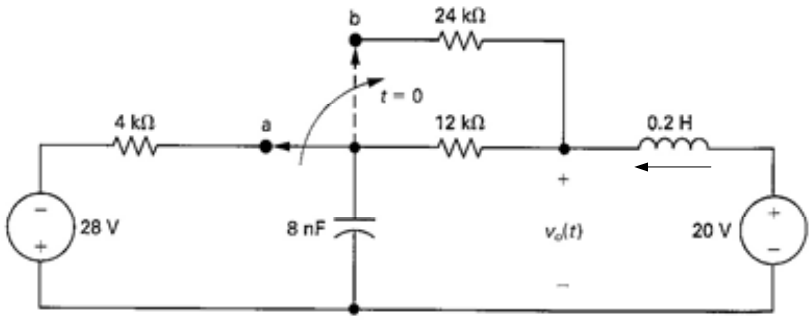
A balanced three-phase Δ-connected load has an impedance of $480+j135\ \Omega/\text{Ø}$. The load is connected to the Y connected ideal source through a three phase line that has an impedance of $1+j2\ \Omega/\text{Ø}$. The voltage at the terminal of the load is 13.8 kV. The phase sequence is negative. Use $\mathbf{V_{AB}}$ as the reference

a) Calculate the three phase currents of the load. **(1.5 points)**
b) What is the load power factor? **(1point)**
c) Calculate the total load real and reactive power. **(2 points)**
d) Calculate the three line currents **(1.5 points)**
e) Find the magnitude of the line voltage at the sending end of the line **(2 points)**
f) Find the total loss taken by the line, and the percentage efficiency of the distribution line with respect to average power **(2 points)**

Q3. (10 Points)

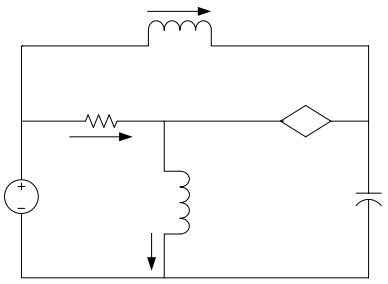
The switch in the circuit below has been in position **a** for a long time. At t=0, the switch moved instantaneously to position **b.** Find

a) $v_o(0^-)$, $i_o(0)$, $v_c(0)$ **(1.5 points)**
b) $dv_c(0^+)/dt$, $di_o(0^+)/dt$, $v_o(0^+)$ **(1.5 points)**
c) $\alpha, \omega_0, s_1, s_2$ and type of response for $t \geq 0$ **(3 points)**
d) $v_c(t)$ for $t \geq 0$ **(3 points)**
e) How can we find $i_o(t)$ for $t \geq 0$, from $v_c(t)$? write down the relation (do not carry out the solution) **(0.5 point)**
f) How can we find $v_o(t)$ for $t \geq 0$, from $v_c(t)$ and $i_o(t)$? write down the relation (do not carry out the solution) **(0.5 point)**



Q4. (6 Points)

a) Write the matrix state equation for the circuit shown in the figure **(5 points)**
b) Use Euler's method (Numerical analysis) to find approximate value for i_1 at t=0.001s, use Δt=0.001s, assume $i_1(0)$=0.9 A, $i_2(0)$=0.2 A, $v_c(0)$= 10 V, and $v_s(0)$= 30V, **(1 point)**



Good luck
Dr. Ali Muqaibel