King Fahd University of Petroleum & Minerals
Electrical Engineering Department

EE204 Fundamentals of Electric Circuits

Semester 092

Final Exam
7:30 AM June 13, 2010 Sunday
Time : 2 hours and 30 minutes

Student Name	
Student ID	
Serial #	
Section # **(or circle your instructor's name)**	DR. M ABDUL HALEEM DR. AHMED MASOUD DR. HAMMI OUALID DR. AL-SAYYED AL-AKHDAR DR. AHMED YAMANI DR. K QURESHI
Lab Section number or Lab Instructor's Name	

Problem 1	**10**	
	10	
Problem 2	**10**	
	10	
Problem 3	**10**	
	10	
Problem 4	**10**	
Problem 5	**10**	
Problem 6	**10**	
	10	
Total	**100**	

Solve all problems

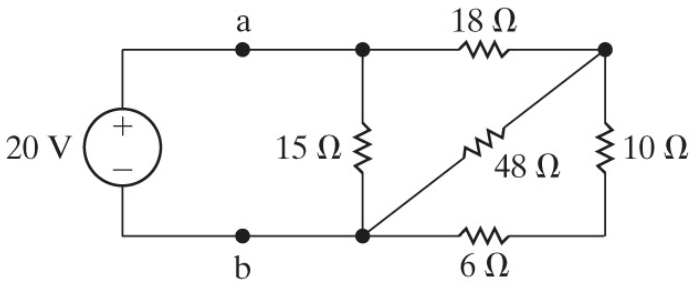
Put your final results in the provided text boxes

Organize and clearly show the steps of your work and results.

Problem 1:

a) For the given circuit find:

1. The equivalent resistance R_{ab} as seen by the voltage source .
2. The power delivered by the voltage source.

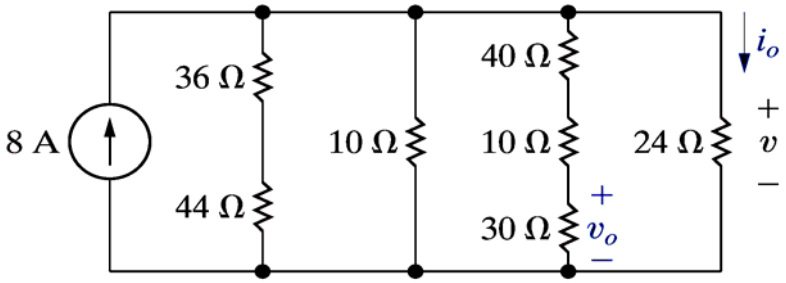


R_{ab} =

P_{20V}=

b) For the circuit shown,

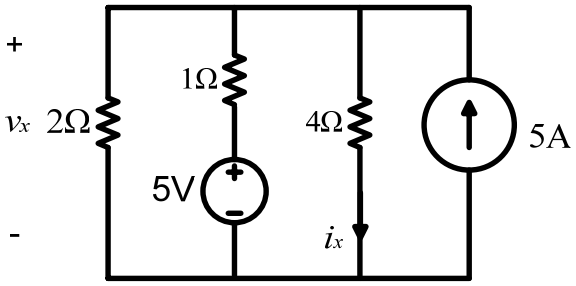
1. Use current division to find the current i_o
2. Use voltage division of v to find the voltage v_o.



$i_o =$
$v_o =$

Problem 2:

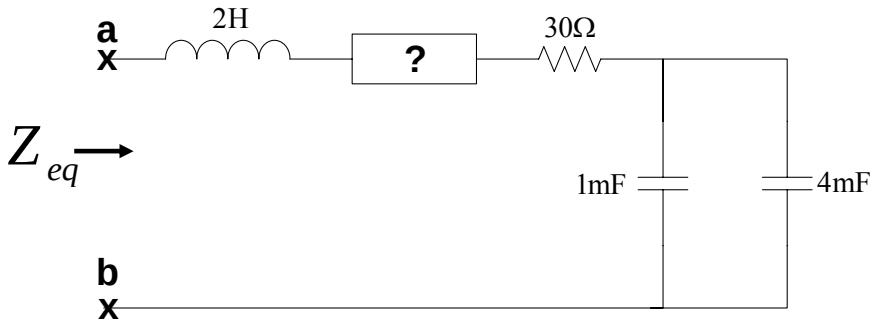
a) Determine the voltage v_x and the current i_x in the circuit shown using node-equation method.



v_x =

i_x =

b) In the circuit shown ω = 50 rad/s, and the equivalent impedance $Zeq = 30 + j76\ \Omega$. Find the type of the missing element indicated by the question mark (is it a resistor, a capacitor or an inductor) and its value.

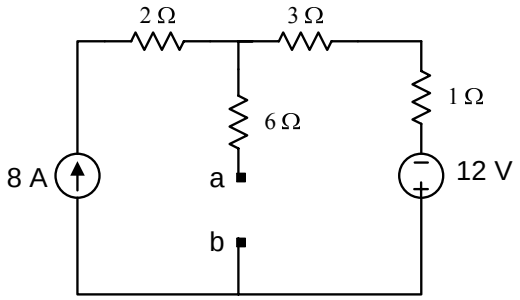


Answer:

Problem 3:

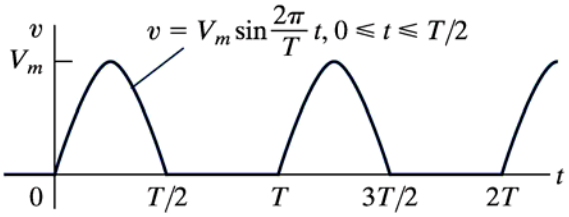
a) For the following circuit,

1. Find the resistor to be connected between terminals a-b that gets the maximum power transfer.
2. Calculate the maximum power absorbed by the resistor found in part 1.



$R_{TH} =$
$P_{max} =$

b) Calculate the effective (RMS) value for the periodic voltage waveform shown.

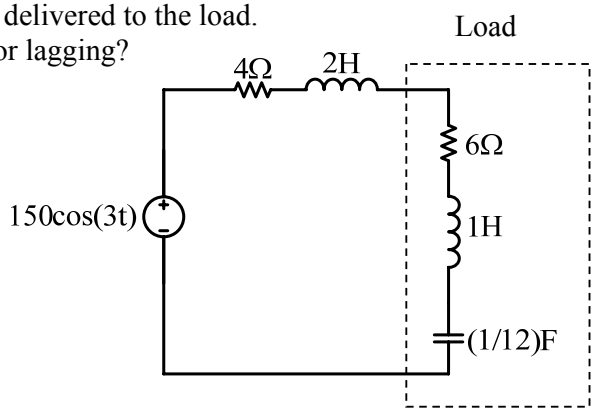


$V_{rms} =$

Problem 4:

For the circuit shown

1. Calculate the average power and the reactive power delivered to the load.
2. Calculate the power factor of the load. Is it leading or lagging?



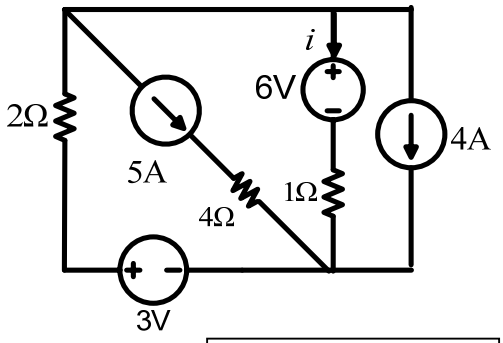
P_{av} =

Q =

pf =

Problem 5:

Find the current *i* in the circuit shown using superposition principle.

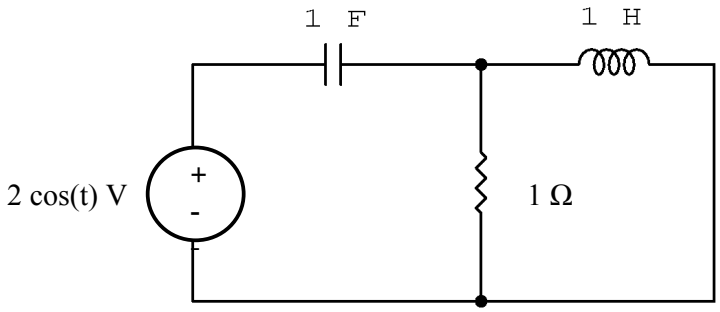


i =

Problem 6:

a) For the following circuit **use mesh-currents equation method** to:

1- compute the power dissipated by the 1Ω resistor
2- compute the power factor at the voltage source.
3- compute the complex power absorbed by the circuit connected to the source.

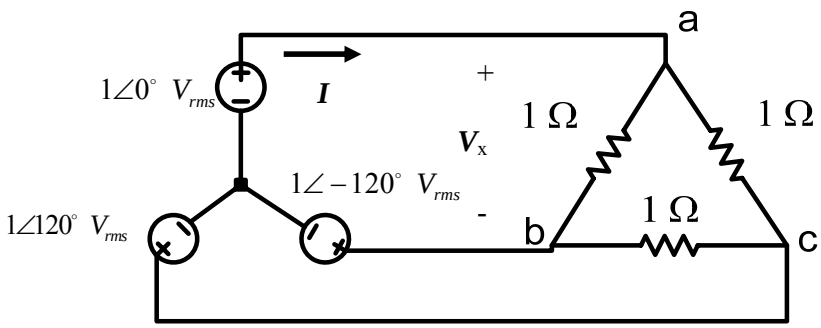


$P_{1\Omega} =$

$pf =$

$\hat{P} =$

b) Compute $\boldsymbol{I}$ and $\boldsymbol{V_x}$ in the three-phase circuit shown.



$\boldsymbol{I} =$

$\boldsymbol{V} =$