Midterm I EEE 117 Date 02/24/2022 (1:30 - 3:00 p.m.)

SOLUTION

Q-1 Use phasor method to add the following sinusoidal: **(20 points)**

$V_1 = 25 \text{ Sin } (4000t + 45^o)$

$V_2 = 72 \text{ Sin } (4000t + 27^o)$

$V_3 = 150 \text{ Cos } (4000t - 87^o)$

$V_4 = 10 \text{ Cos } (4000t - 143^o)$

V(t) =	242.897	cos	(	4000	t +	-78.06)

Q-2 A 90 Ω resistor, a 32 mH inductor, and a 5uF capacitor are connected in series across the terminals of a sinusoidal voltage source. The steady-state expression for the source voltage is 750 cos (5000t + 30º) V. (Note: 750 is Max^m Value)

Calculate the steady-state current *i*(t) by the phasor method. **(20 points)**

ω	=	5000	rad/sec
Vi	=	750	V
Phase	=	30	deg.
R	=	90	ohm
L	=	32	mH
XL	=	160	ohm
C	=	5	uf
XC	=	40	0hm

Vs	649.5191	+ j	375	=	750	L	30	
R	90	+ j	0	=	90	L	0	
ZL	9.8E-15	+ j	160	=	160	L	90	
ZC	2.45E-15	+ j	-40	=	40	L	-90	
ZT	90	+ j	120	=	150	L	53.1301	
I	4.598076	+ j	-1.9641	=	5	L	-23.1301	= 5 Cos (5000 t + -23.13 º)

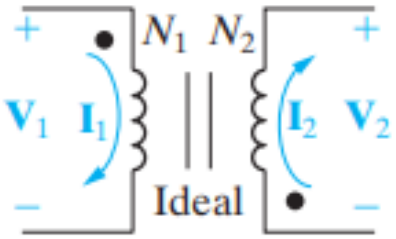
Q-3 For the following ideal transformer, Find V_2 and I_2: **(20 points)**

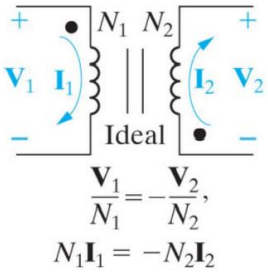
if $N_1 = 5$

$N_2 = 25$

$V_1 = 3V$

$I_1 = 1.5$ A





$V_2 = (-3*25)/5 = -15$ V

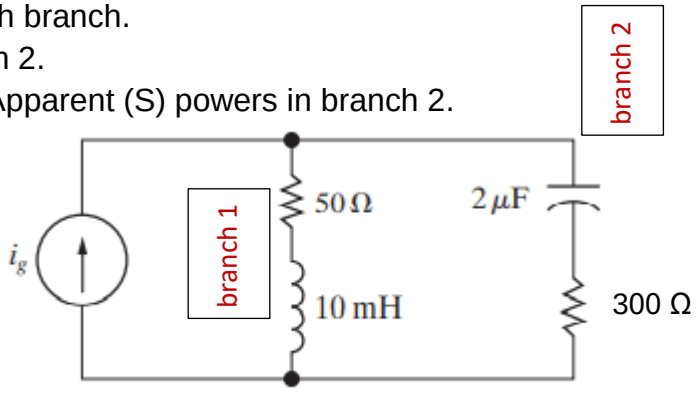
$I_2 = -5*1.5/25 = -0.3$ A

Q-4 Analyze the circuit and find: **(40 points)**

a) Currents and voltages for each branch.
b) Complex power "**S2**" in branch 2.
c) Active (P), Reactive (Q) and Apparent (S) powers in branch 2.

$\dot{I}g = 100 \cos 10000t$ mA

(100 is Max^m Value)



I (branch 1)	0.082 + j -0.0260000
V (branch 1)	6.7 6.9000000
I (branch 2)	0.018 0.0260000
V (branch 2)	6.7 + j 6.9000000

I (conj) (branch 2)	0.018 + j -0.0260000
S2=1/2*V*I(conj)	0.15 + j -0.0250000

P = 0.15 watt

Q= - 0.025 VAR

S = 0.152 VA