ph40205midterm1 23/1/2009 9:36 http://physicsmatayom.spaces.live.com

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Let I=-Io*cos(theta)

question1 V_L=?

ans1 V_L=Ldi/dt

V_L=[-LIo]*dcos(theta)/dt

V_L=[-LIo]*[-sin(theta)[*d(theta)/dt]

V_L=[-LIo]*[-sin(theta)]*[w]

V_L=[+wL]*[Io]*[sin(theta)]

V_L=[X_L]*[Io]*[sin(theta)]

V_L=Vo*sin(theta)

question2 V_R=?

ans2 V_R=I*R

VR=[-Io*cos(theta)]*R

VR=-[Io*R]*cos(theta)

VR=-V_{Ro}*cos(theta)

question3 V_C=?

ans3 Let ; V_C=Vo*sin(theta+phase)

Q=C*V

i_C=dQ/dt=-Io*cos(theta)

d[+sin(theta)]/d(theta)=+cos(theta)

d[-sin(theta)]/d(theta)=-cos(theta)

i_C=[C][-Vo*dsin(theta)/dt]=-Io*cos(theta)

[wC][-Vo]cos(theta)]=-Io*cos(theta)

ωC*Vo=Io

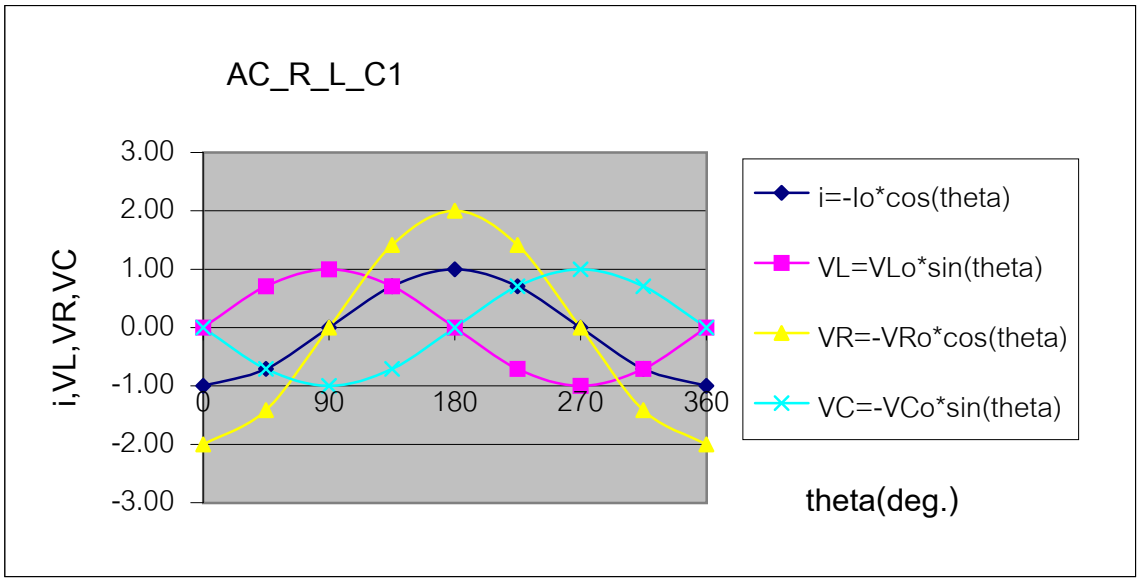
Vo/X_C=Io

X_C=1/ωC)=1/(2πfC)

Then V_C=-Vo*sin(theta)

	input ; io=	input;V_{Lo}	inputV_{Ro}=
input	1	1	2
theta(deg.)	i=-I_o*cos(theta)	V_L=V_{Lo}*sin(theta)	V_R=-V_{Ro}*cos(theta)
0.00	-1.00	0.00	-2.00

45.00	-0.71	0.71	-1.41
90.00	0.00	1.00	0.00
135.00	0.71	0.71	1.41
180.00	1.00	0.00	2.00
225.00	0.71	-0.71	1.41
270.00	0.00	-1.00	0.00
315.00	-0.71	-0.71	-1.41
360.00	-1.00	0.00	-2.00
x-axis	y1	y2	y3



item2 RL_serires

question	L(henry)=?=		X_L=2*pi()*f*L
Let1	I=5*sin(1000*t)		I=Im**sin(2*π*f*t)
no	var.	value	Excel_Code
1	f(Hz)=1000/(2*pi())	159.15	=1000/(2*PI())
2	I_{max}(A)=	5.00	=5
3	V_L,rms(V)=	70.70	=70.7
4	V_Lm=V_{rms}*sqrt(2)	99.98	=$C$66*SQRT(2)

5	X_L(Ohm)=V_{Lm}/Im	20.00	=$C$68/$C$65
6	L(Henry)=X_L/(2*pi*f)	0.02	=$C$69/(2*PI()*$C$64)

item3	RC_series		Note
Let1	V_R(V)=0.15*sin(500*t)		V_R(V)=0.15*sin(2*pi()*f*t)
question	$V_{C.max}$=?		$V_{C.max}$=I_{max}*Xc
no.	var.	val	excel_code
1	R(Ohm)=	30	=30
2	C(μF)=	2	=2
3	V_R,(V),max=	0.15	=0.15
4	f(Hz.)=500/(2*pi)	79.57747155	=500/(2*PI())
6	X_C(ohm)=1/(2*pi()*f*C)	1000	=1/(2*PI()*$C$81*$C$79*1E-6)
7	I_{max}(A)=$V_{R,max}$/R	0.005	=$C$80/$C$78
8	$V_{C.max}$(V)=Imax*Xc	5	=$C$83*$C$82

item4	RLC_series	
Question1	C=?	
condition1	IF X_L=X_C	resonance frequency
condition2	2*pi()*f*L=1/[2*pi()*f)*C]	
condition3	f_{res}.=1/[2π*sqrt(L*C)]	
condition4	ω^2=1/(L*C)	

no.	var.	value	Excel_code
1	angular speed,ω(rad/s)=2πf	1.00E+07	=1e+7
2	L(H)=	1.00E-04	=100e-6
3	C(F,farad)=1/[L*ω.2)]	1.00E-10	=1/($C$96*$C$95^2)
4	C(pF)=	1.00E+02	=$C$97*1e+12

item5 RLC_series

question	V_{RLC},rms(V)=Irms*Z_{RLC}		Ohm's law
no.	var.	value	Excel_code
1	R(OHM)=	12	=12
2	X_L(OHM)=	36	=36
3	X_C(OHM)=	20	=20
4	$V_{R,rms}$(V)=	6	=6
7	Z_{RLC}^2=R^2+(XL-XC)^2	400	=$C$107^2+($C$108-$C$109)^2
8	Z_{RLC}=sqrt(R^2+(XL-XC)^2)	20	=SQRT($C$111)
9	Irms=V_R,rms/R	0.5	=$C$110/$C$107
10	V_{RLC},rms(V)=Irms*Z_{RLC}	10	=$C$113*$C$112

item6	(RLC_series)//V5V.AC	X_C(Ohm)=?	Question
	V_{RLC}^2=V_R^2+(V_L-V_C)^2	Phase_vector_Addition	
no.	var	value	Excel_code
1	$V_{R,rms}$(V)=	4	=4
2	$V_{L,rms}$(V)=	6	=6
3	R(Ohm)=	8	=8
4	V_{RLC}(V)	5	=5
5	V_C=V_L-sqrt(V_{RLC}^2-V_R^2)	3	=$C$121-SQRT($C$123^2-$C$120^2)
6	I_{rms}(A)=$V_{rms,R}$/R	0.5	=D120/$C$122
7	X_C(ohm)=$V_{C,rms}$/I_{rms}	6	=$C$124/$C$125
8	X_C(kohm)=	0.006	=D126/1000

item7 power factor=cosϕ

no $P_{effective}$=I_{rms}.$V_{rms.}$cosϕ

1 power factor=cosϕ=R/Z

2 Z=sqrt(R^2+(X_L-X_C)^2) RLC_series

3 IF X_L=X_C resonace frequency

4 Z=sqrt(R^2+(0)^2) resonace frequency

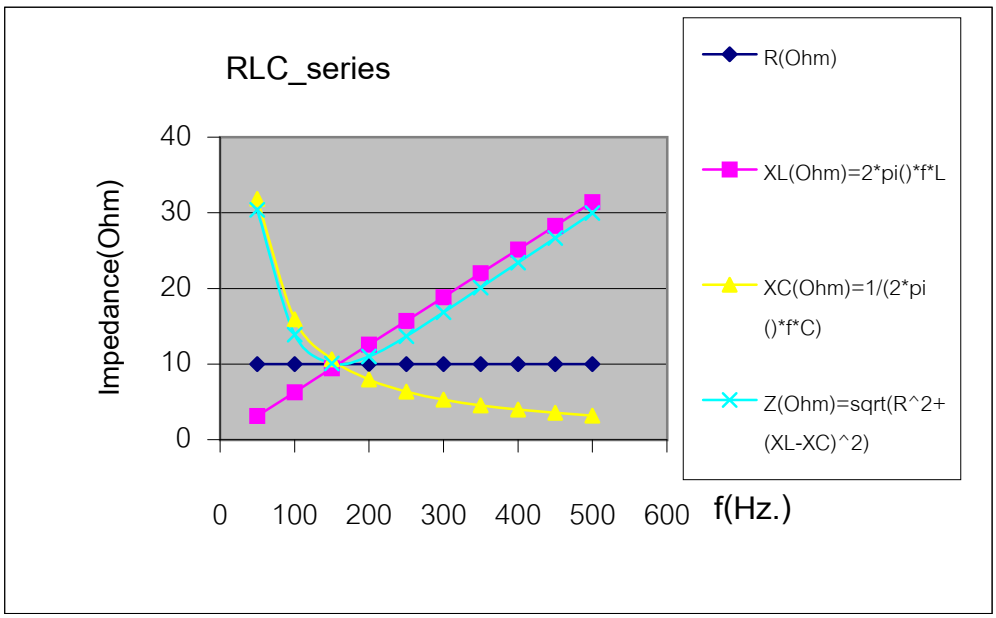
5 Z=R resonace frequency

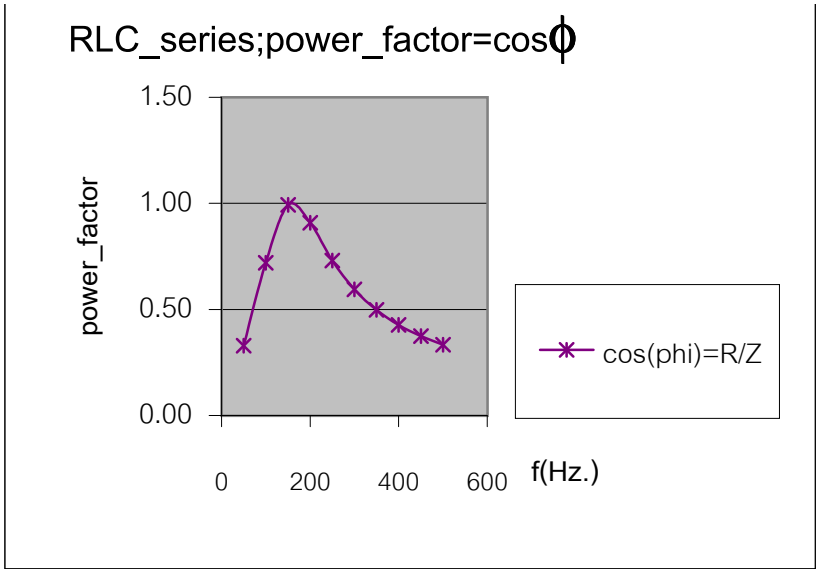
6 cosϕ=R/Z=R/R=1 resonace frequency

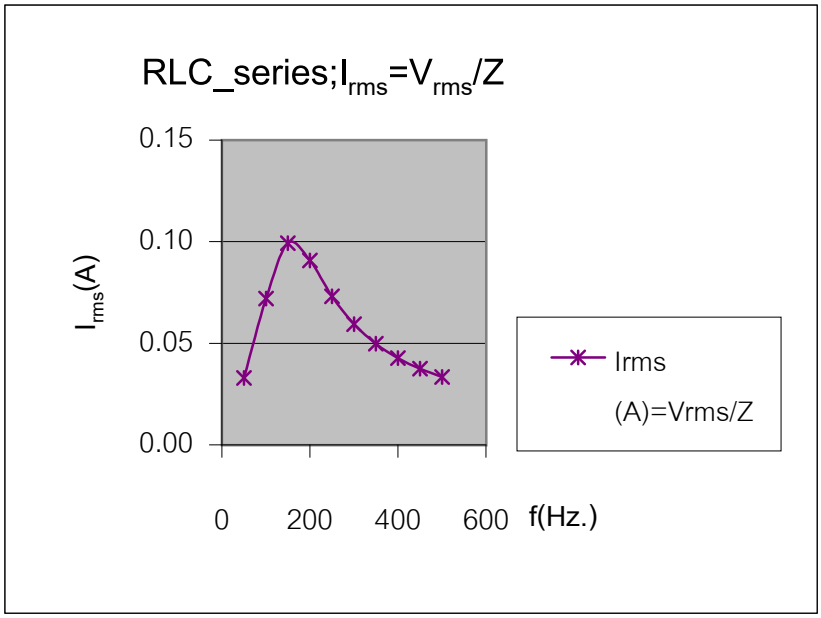
7 1/Z=sqrt[(1/R)^2+(1/X_C-1/X_L)^2 RLC_parallele

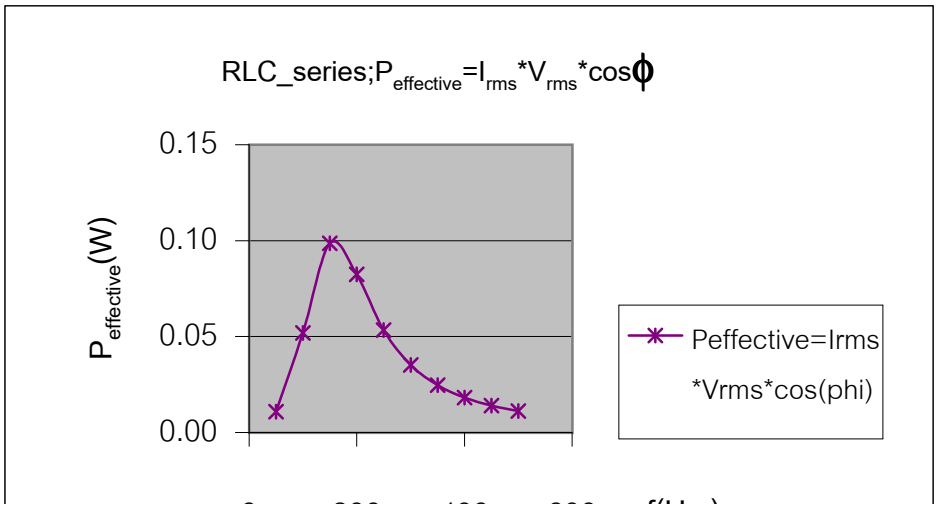
8 1/Z=sqrt[(1/R)^2+(1/X_C-1/X_L)^2]

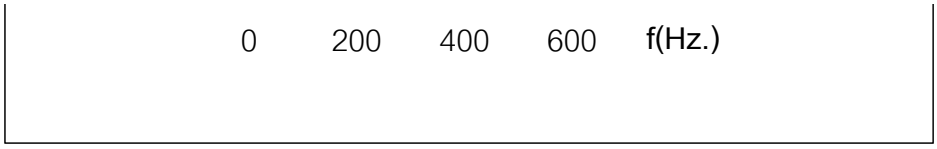
			L(mH)
			10
no._RLC_s	f(Hz)	R(Ohm)	X_L(Ohm)=2*pi()*f*L
1	50	10	3.14
2	100	10	6.28
3	150	10	9.42
4	200	10	12.57
5	250	10	15.71
6	300	10	18.85
7	350	10	21.99
8	400	10	25.13
9	450	10	28.27
10	500	10	31.42
	X-axis	y1	y2




RLC_series;power_factor=cosϕ
power_factor
1.50
1.00
0.50
0.00
0
200
400
600
f(Hz.)
cos(phi)=R/Z


RLC_series;I_rms=V_rms/Z
I_rms(A)
0.15
0.10
0.05
0.00
0
200
400
600
f(Hz.)
Irms (A)=Vrms/Z


RLC_series;P_effective=I_rms*V_rms*cosϕ
P_effective(W)
0.15
0.10
0.05
0.00
Peffective=Irms *Vrms*cos(phi)



item8 I=5*sin(1000*t) I=Im*sin(2*pi()*f*t)=sin(ω*t)

question1 Pavg(W)=? Peffective(W)=Irms.Vrms*cosϕ

question2 VRL,max(V)=Imax*Z

no._RL_ser	var	value	EXCEL_COPDE
1	L(H)=	0.03	=0.03
2	R(Ohm)=	40.00	=40
3	Im(A)=	5.00	=5
4	angular speed(ω,rad/s)=	1000.00	=1000
5	f(Hz.)=1000/(2*pi())	159.15	=$C$205/(2*PI())
7	X_L(Ohm)=2*pi()*f*L	30.00	=2*PI()*$C$206*$C$202
8	Z=sqrt(R^2+XL^2)	50.00	=SQRT($C$203^2+$C$207^2)
9	$V_{RL,max}(V)=I_{max}*Z$	250.00	=$C$204*$C$208
10	power_factor=cosϕ=R/Z	0.80	=$C$203/$C$208
11	$I_{rms}(A)=I_{max}/sqrt(2)$	3.54	=$C$204/SQRT(2)
12	$V_{rms}(V)=V_{max}/sqrt(2)$	176.78	=$C$209/SQRT(2)
13	$P_{effective}(W)=I_{rms}.V_{rms}*cos\phi$	500.00	=$C$211*$C$212*$C$210

item9 PH40205,P187

http://sathaporn.exteen.com/20070517/m6062550g2

item10 Vector_v=Vector_ExVector_B=

cross vector product

	I	j
	Ex	Ey
	Bx	By

Vector_v=Vector_ExVector_B=

I	j
0	0
-Bx	0

Vector_v=Vector_ExVector_B= +i*[(0*0-0*Ez)]-j*[(0*0-(-Bx)*(+Ez)]+k*(0*0-(-Bx)*(0)]

Vector_v=Vector_ExVector_B= +i*[0]-j*[+[(Bx*Ez)]+k*[0]

Vector_v=Vector_ExVector_B= -j*(Bx*Ez)

Note

VL_definition

dcos(theta)/d(theta)=-sin(theta)

d(theta)/dt=w

$X_L=\omega L=2\pi fL$

Ohm's Law

$V_{Lo}=X_L*I_o$

Note

Ohm's Law

$V_{RO}=I_o*R$

Hypothesis

LHS=RHS

Ohm's Law

input Vco=
1
$V_C=-V_{Co}*\sin(\text{theta})$
0.00

-0.71
-1.00
-0.71
0.00
0.71
1.00
0.71
0.00
y4

SELF_TEST	ans(TRUE=1,FALSE=0)	mark	sum_mark	pass_mark
159.15	TRUE	1	1	4.2
	FALSE	0		
	FALSE	0		
	FALSE	0		

	FALSE	0		
	FALSE	0		

Self_test	check_ANS	mark	sum_mark	summary_pass
30	TRUE	1	1	not_pass
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		

Self_test	check_ANS	mark	sum_mark	sum_mark%
1.00E+07	TRUE	1	1	25%
	FALSE	0		
	FALSE	0		
	FALSE	0		

SELF_TEST	CHECK_ANS	MARK	SUM_MARK	PASS_or_NOT?
12	TRUE	1	1	NOT_PASS
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		

self_test	check_ANS	mark	sum_mark	sum_mark%
4	TRUE	1	1	13%
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		
	FALSE	0		

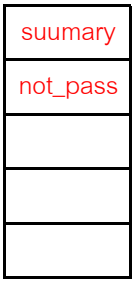
C(μF)	fresonace(Hz.)=1/[2*pi()*sqrt(L*C)]		Vrms(V)	
100	1.59E+02		1	
X_C(Ohm)=1/(2*pi()*f*C)	Z(Ohm)=sqrt(R^2+(X_L-X_C)^2)	cos(phi)=R/Z	I_{rms}(A)=V_{rms}/Z	$P_{effective}$=I_{rms}*V_{rms}*cos(phi)
31.83	30.38	0.33	0.03	0.01
15.92	13.88	0.72	0.07	0.05
10.61	10.07	0.99	0.10	0.10
7.96	11.01	0.91	0.09	0.08
6.37	13.68	0.73	0.07	0.05
5.31	16.84	0.59	0.06	0.04
4.55	20.11	0.50	0.05	0.02
3.98	23.40	0.43	0.04	0.02
3.54	26.68	0.37	0.04	0.01
3.18	29.95	0.33	0.03	0.01
y3	y4	y5	y6	y7

SELF_TEST	mark(true=1,false=0)	mark
0.03	TRUE	1
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
	FALSE	0
		1
		sum_mark
		8%
		sum_mark%

not_pass

k
Ez
Bz

k
+Ez
0


suumary
not_pass