ACADEMIC TEAM

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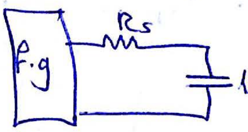
Exp 2+3+4 :-

- $X_L = \omega L$
- $X_C = \frac{1}{\omega C}$ } dependent of frequency
- R ⇒ Indp. of frequency



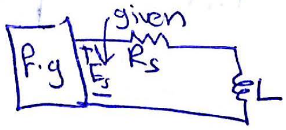
V_C given ⇒ $X_C = \frac{V_{C(p-p)}}{I_{(p-p)}}$

⇒ $X_L = \frac{V_{L(p-p)}}{I_{p-p}}$

- $V_{rms} = \frac{V_p}{\sqrt{2}} = \frac{V_{p-p}}{2\sqrt{2}}$

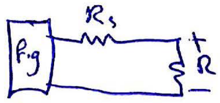
⇒ when f↑ ⇒ X_L↑ → V_L↑

- $V_{p-p} = 2\sqrt{2}\, V_{rms}$



- $V_p = \sqrt{2}\, V_{rms}$

- $R = \frac{V_{p-p}}{I_{p-p}}$



V given

سهل نطلع $I = \frac{V_{given}}{R}$ ونعوضها في R_s .

- $V_{source} = \sqrt{V_L^2 + V_R^2}$

⇒ f↓ → L :- short cct

f↑ → L :- open cct (high impedance)

مهم جدًا :-

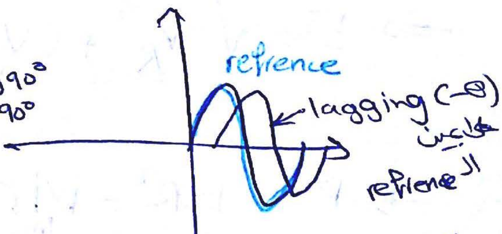
لما أوصل RL و R-C لازم اشيك ان E_s بساتها 4 (لو مثلا $E_s = 4$) وما زادت أو قلت عن ما كد .

Exp 5 :-

⇒ V, I, R inphase (صفر)

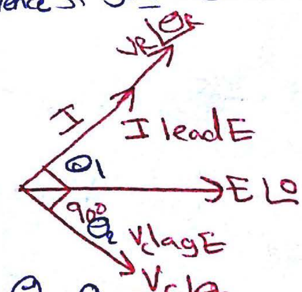
⇒ V, I, C out of phase ⇒ in R-C cct :- I lead E_s by 90°, V_C lag E_s by 90°

⇒ V, I, L out of phase



وإذا كانت عكس الـ refrence فـ leading (+θ)

- two methods to measure phase :-
  - Dual trace
  - Lissajouse (XY phase)



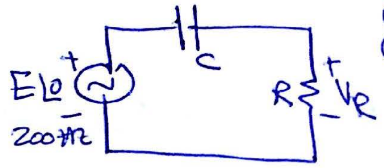
$\theta_1 + \theta_2 = 90°$

- SF : Scale factor $= \frac{360°}{T_o}$ (degrees / division)

- $\theta = \frac{D_{الصغيرة}}{P_{الكبيرة}} \times 360°$

$\theta = 0, 360°$ | $\theta = 270°, 90°$ | $\theta = 180°$ | $\theta = \sin^{-1}\frac{Y_o}{Y_m}$ (θ بالربع الأول أو الرابع) | $\theta = 180° - \sin^{-1}(\frac{Y_o}{Y_m})$ (θ بالربع الثاني أو الثالث)

R–C cct:-



$$V_R = \frac{ER}{R + X_C} = |V_R| \angle \theta_R \rightarrow \frac{ER}{\sqrt{R^2 + X_C^2}}$$

$-jX_C$ ← لازم أدخلها

$$V_C = \frac{E X_C}{\sqrt{R^2 + X_C^2}}$$

$$\theta_1 = \tan^{-1}\left(\frac{X_C}{R}\right) \leftarrow \text{magnitude.}$$

مهم جداً:- لازم أبدلها كي تكون مش ولد لا كراود البدي أقيسه

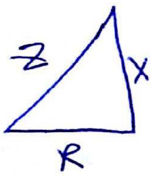
$$\theta_2 = -90^\circ + \tan^{-1}\left(\frac{X_C}{R}\right)$$

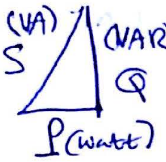
* $\% \text{ Diff} = \left| \frac{\text{calcu. (العملية)} - \text{measured (المقاسة)}}{\text{Calculated (العملية)}} \right| \times 100\%$

RLC cct:-

RL cct

I lags V by 90°





$$Z^2 = R^2 + X^2$$
$$Z = R \pm jX$$

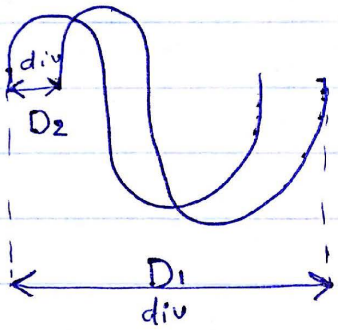
$\Rightarrow E = \sqrt{V_R^2 + (V_L - V_C)^2}$

$\Rightarrow P = I^2 R^2 = |V|_{rms} |I|_{rms} \cos(\theta)$, $\theta \rightarrow \theta_V - \theta_I$

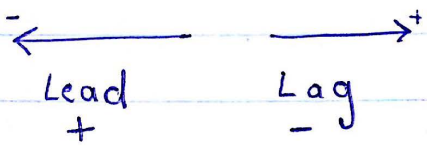
$\Rightarrow Z_{tot} = \frac{E}{I} = (R - jX_C + jX_L)$ I ← مع زاوية

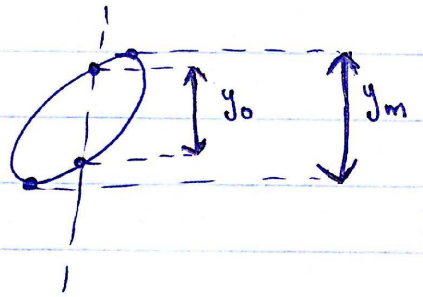
$\Rightarrow I = \frac{E}{Z_{tot}}$

مهم كثيراً:-
الجزء اللي بدي أقيس زاويته لازم يكون آخر جزء بالدارة



$$\theta = \frac{D_2}{D_1} * 360$$





$$\theta = \sin^{-1}\left(\frac{y_0}{y_m}\right)$$

$$\theta = 180 - \sin^{-1}\left(\frac{y_0}{y_m}\right)$$

$$X_C = \frac{1}{2\pi F C_T} \qquad X_L = 2\pi F L_T \qquad \omega = 2\pi f$$

$$(p\text{-}p) = rms * 2\sqrt{2}$$

$$rms = \frac{p\text{-}p}{2\sqrt{2}}$$

Name:

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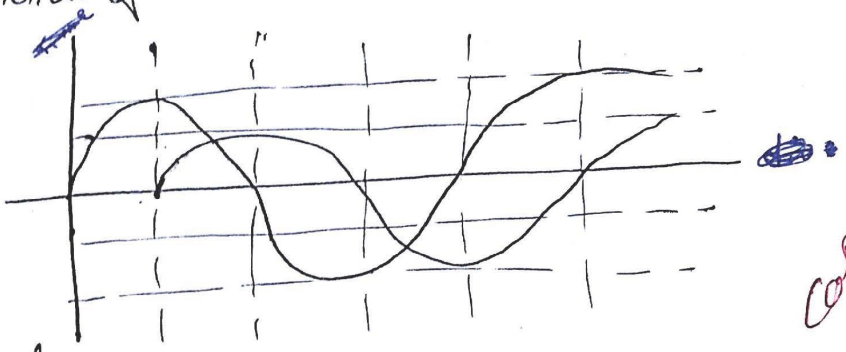
[1] find the following:.



copy from Nahedo, Yasmeen Layla

note that:

Time /div = 5 ms

$V_1 = 6$ volt p-p

$V_2 = 3$ volt p-p

a) find the phase angle between the two signals in details: (4 marks)

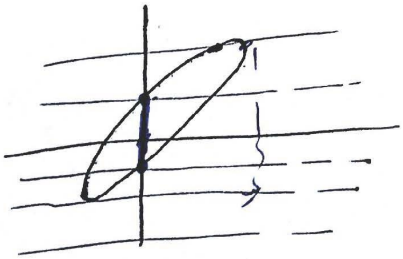
b) named the two ways to find the phase angle: (2 marks)

① Dual- trace method.

② Lissajous - pattern

[2] determine the phase angle in the following figures: (4 marks)

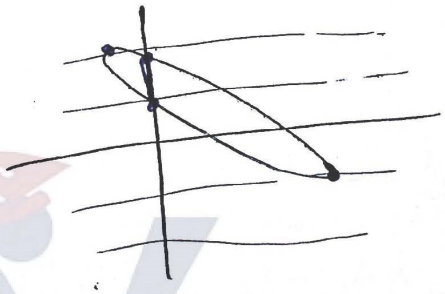
a)



volt /div = 3

$\theta = \sin^{-1}\left(\frac{2}{4}\right) \Rightarrow \theta = 30°$

b)



volt /div = 2

$\theta = 180 - \left(\sin^{-1}\left(\frac{1}{3}\right)\right)$

$= 180 -$

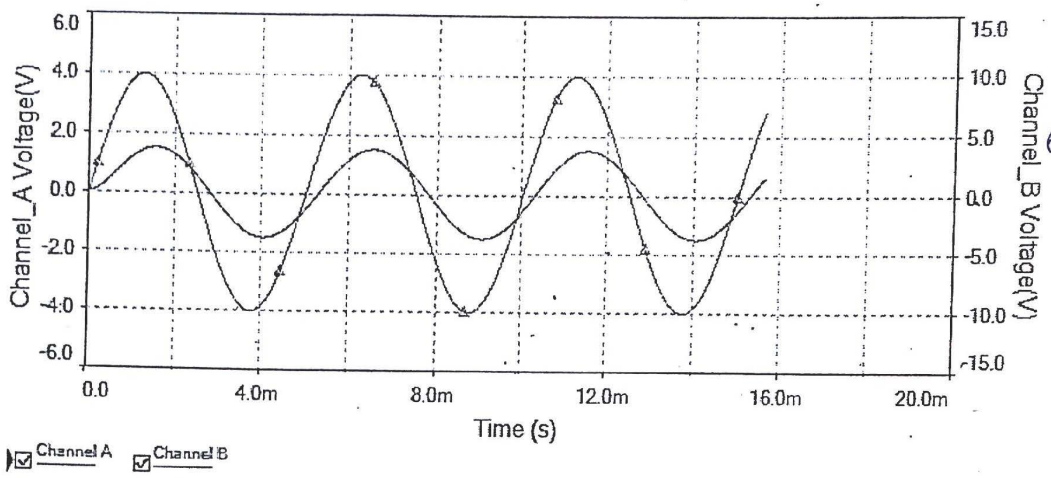
$\sin^{-1}\left(\frac{2}{4}\right)$

Good Luck

Eng. Aseel H. Abu Abbas

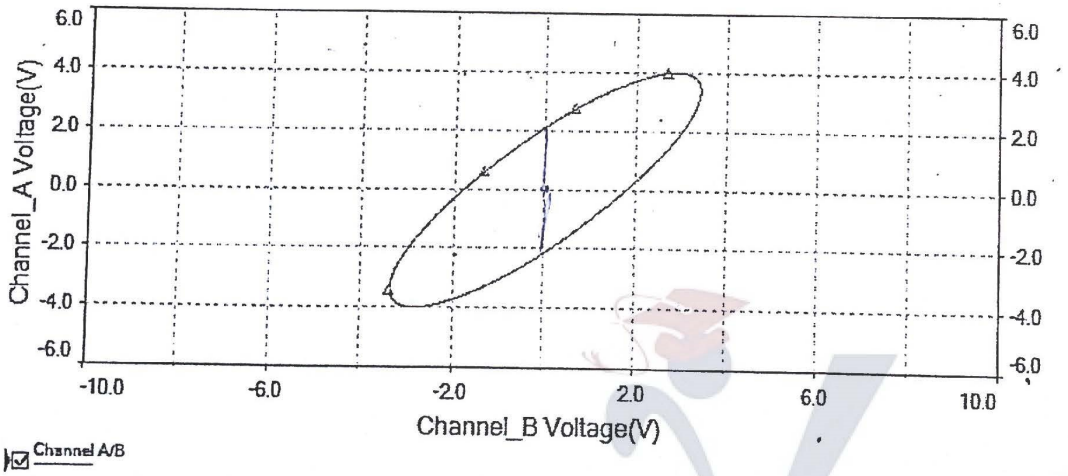
1.5/10

Q1: Assume that the pattern in the following figures appear on an oscilliscope screen ,calculate the phase angle θ



$\theta = \frac{D_2}{D_1} 360.$

$\theta = \sin^{-1}\frac{y_o}{y_m} = \sin^{-1}\left(\frac{2\times10^{-3}}{2.4}\right) = 0.0477^\circ$ ✗



$\sin^{-1}\frac{y_o}{y_m}$

$\theta = \frac{D_2}{D_1} 360^\circ = \frac{2}{4} 360^\circ = 180^\circ$ ✗

$D_2 = 2$

$D_1 = 4$

Q2:Complete the table below if u given that the Freq=500Hz and C=0.1μF

R	Xc	Θ
1000Ω	$-j3183.1$ ✓	
2000Ω	$-j3183.1$ ✓	
4000Ω	$-j3183.1$ ✓	

1.5

Q3: Draw the Lassijous-pattern phases for these ranges of Θ:

Θ=360

✗

Θ=90

✗

Θ=180

✗

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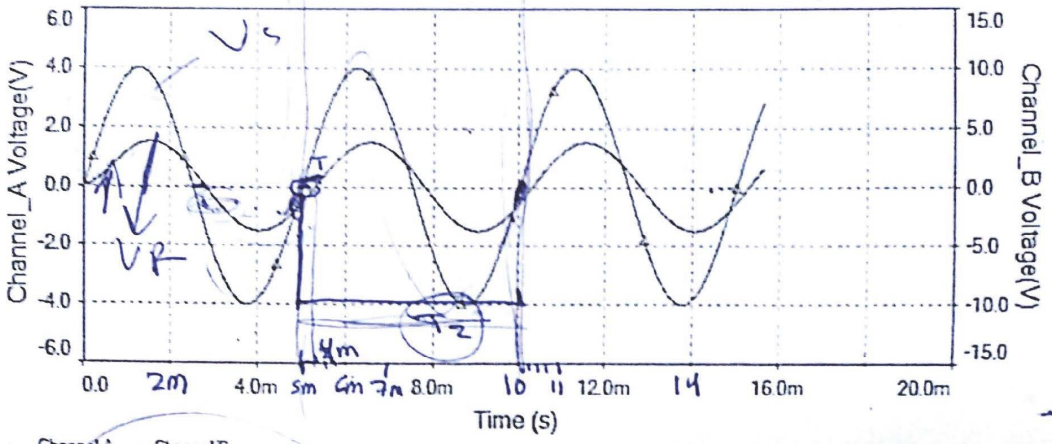
Q1: Assume that the pattern in the following figures appear on an oscilliscope screen ,calculate the phase angle θ

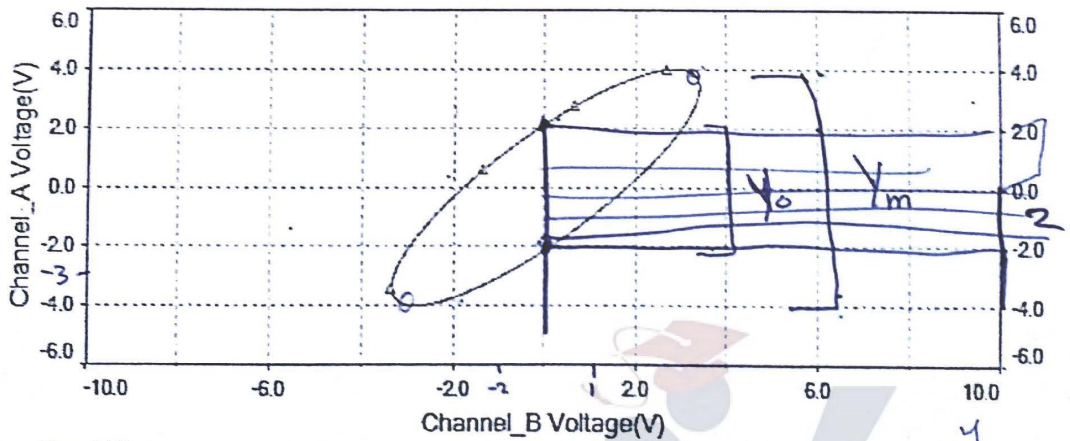
-5.0



$\theta = \frac{T_{small}(1)}{T_{large}(2)} \times 360^\circ = \frac{4m}{5m} \times 360^\circ = \frac{0.4\,m}{5m} \times 360^\circ = 28.8^\circ$

D1 D2

2



$\theta = \sin^{-1}\left(\frac{Y_o}{Y_m}\right) = \sin^{-1}\left(\frac{4.2}{8}\right) = 31.67^\circ$

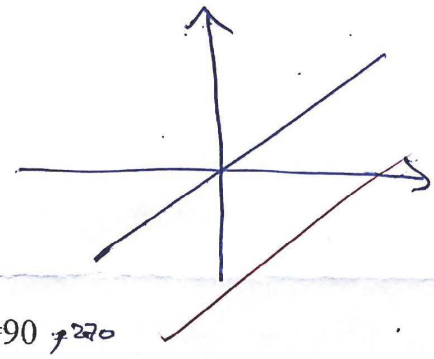
Q2:Complete the table below if u given that the Freq=500Hz and C=0.1μF

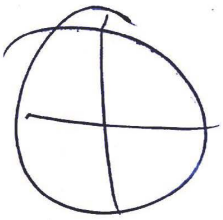
R	Xc	Θ
1000Ω	$\frac{1}{2\pi FC}$ = 3183.1	$\tan^{-1}(\frac{Xc}{R})$ = 72.56°
2000Ω	3183.1	57.86°
4000Ω	3183.1	38.5°

3

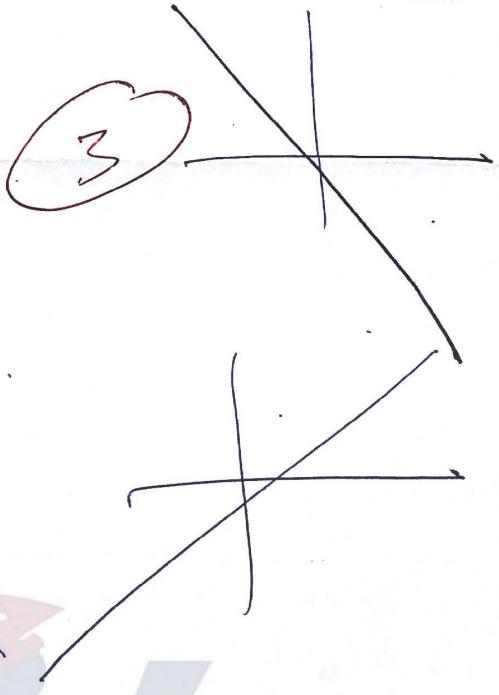
Q3: Draw the Lassijous-pattern phases for these ranges of Θ:

Θ=360,0

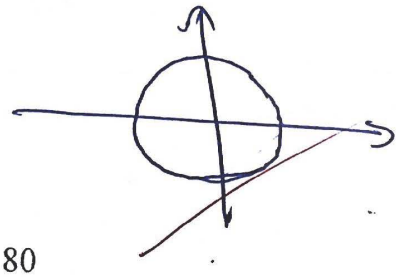




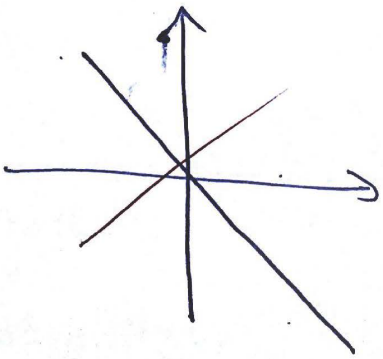
3



Θ=90 ,270



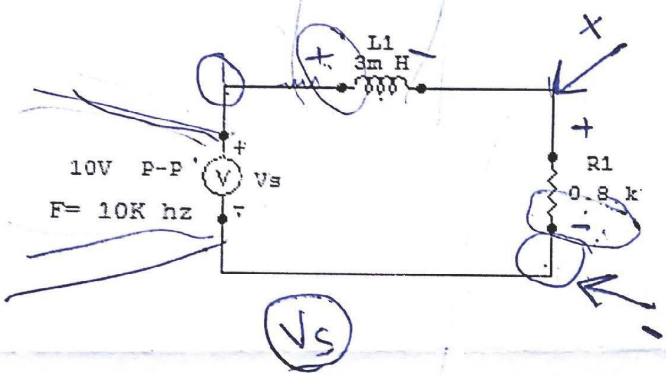
Θ=180



Yarmouk University
Hijjawi Faculty for Technological Engineering
Power Engineering Department
Second Semester 2014
Electric Circuit Lab___Mid Exam

*****Note: You must show your calculations .*****

Q.1 Construct the circuit shown in the following Fig.



*1.measure the following quantities :

RL= 5.3 Ω	VL(p-p)= 1.4 V	VR(0.8k)= 3.6 V	$I_{(rms)}$ = 3.9 mA

*2. Do VR and VL (increase or decrease or stay constant and Explain why ??

F (hz)	10	15	20
VR *rms*	3.81	4.01	1.792
V_L *rms*			

$V_{R(rms)} = \frac{V_{R(P.P)}}{2\sqrt{2}} = \frac{3.6}{2\sqrt{2}} = 3.4$ V

$I_{rms} = \frac{3.04}{0.8}$ =

*3. Measure the phase angle between Vs and VL (ONLY USE ONE METHOD):

*4..Find:
a.XL calculated :
b. XL measured ***(show all required measurements and calculations) :***

$X_L = 2\pi f L = 2\pi$

$X_L = V/I$

Best wishes

Eng. Asmaa Talal