UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Sekolah Pendidikan
Profesional dan
Pendidikan Berterusan
(SPACE)

JABATAN KEJURUTERAAN ELEKTRIK
PUSAT PENGAJIAN DIPLOMA (PPD), SPACE
UNIVERSITI TEKNOLOGI MALAYSIA
KUALA LUMPUR

ELECTRICAL ENGINEERING LABORATORY 2

(DDWE 2701)

CIRCUIT THEORY 2

THEORY & PRELIMINARY LABORATORY 3

SERIES RLC AND RESONANCE

Student name	**:**
Lecturer	**:**
Date	**:**

No.	PO	CO	Student Marks	Marks
1	PO1	CO1		/20

Submit the completed preliminary report in the lecturer in the lab before the lab session starts.

THEORY

Inductive reactance, X_L and capacitive reactance, X_C, are frequency dependent. The inductive reactance increases with frequency according to the following equation;

$$X_L = 2\pi fL$$

On the other hand, the capacitive reactance decreases with frequency and can be calculated as follows;

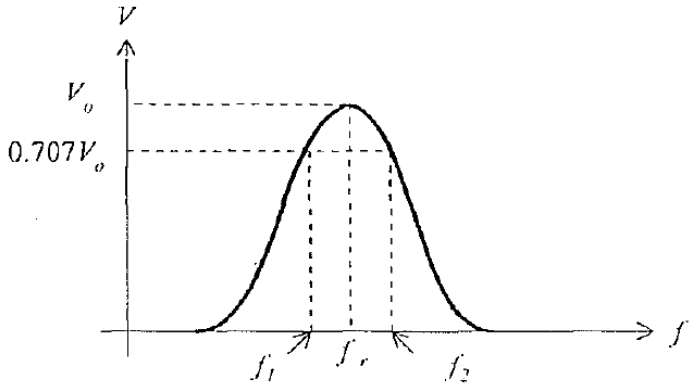
$$X_C = \frac{1}{2\pi fC}$$

There is a frequency at which the inductive reactance is equal 10 the capacitive reactance. This frequency is called resonant frequency, f_1 and can be determined using the following equation;

$$f_1 = \frac{1}{2\pi\sqrt{LC}}$$

Figure 1 shows the response of series resonant circuit f_1, is the resonant frequency while f_1 and f_2 are located at 70.7% of the maximum value of the graph. The frequency f_1 is known as the lower cutoff frequency while f_2 is the upper cutoff frequency. Both f_1 and f_2 are called the half-power points and the frequency separation between them is called the bandwidth (BW) of the circuit. The bandwidth can be obtained from the following equation,

$$BW = f_2 - f_1$$



PRELIMINARY WORK

1. Given a series RLC circuit as shown in Figure 2.

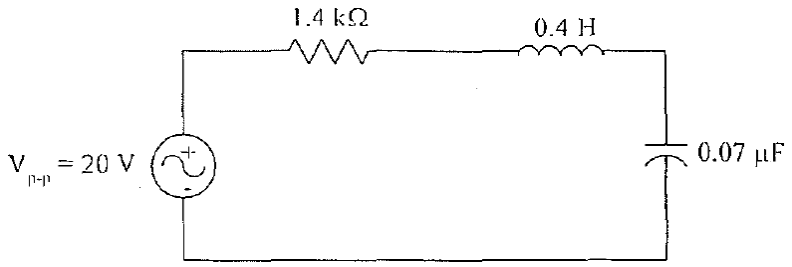


Figure 2

2. Calculate the resonant frequency, f_r.

PO1	CO1	.....	/2m

3. Using the frequency, f_r obtained in (2), calculate

i. the inductive reactance, X_L.

PO1	CO1	.....	/2m

ii. the capacitive reactance, X_C.

PO1	CO1	.....	/2m

iii. the total impedance of the circuit. Z.

PO1	CO1	.....	/2m

iv. the total current in the circuit, I.

PO1	CO1	..... /2m

v. the voltage across the resistor (V_R), inductor (V_L) and capacitor (V_C).

PO1	CO1	..... /6m

vi. draw the phasor diagram for V_R, V_L, V_C and I.

PO1	CO1	..... /4m