CAIRO UNIVERSITY FACULTY OF ENGINEERING		ELECTRONICS AND COMMUNICATION DEPT. 2nd Year
Series Resonance	ELECTRIC CIRUITS	Sheet (2)

[1] Draw the normalized resonance curves for the current in a series resonance circuit having a quality factor $Q_s = 20$ in the narrow band near resonance (for $\delta = +1\%$, $+2\%$, ..., $+5\%$) . Plot the phase angle of the current in the same band and show the effect of increasing Q_s .

[2] In a series resonance circuit $L = 65\ mH$, $C = 1.56\ nF$ and $R = 5.1\ \Omega$, calculate the resonance frequency , the quality factor of the circuit , the bandwidth and the impedance of the circuit at frequencies 1 % and 10 % above resonance .

[3] For the circuit shown in Fig. 1 , calculate the frequency at which series resonance occurs (the input impedance is real) . At what value of the conductance G will it be impossible to obtain resonance ?

[4] A generator is connected to a series oscillating circuit has a frequency of 250 KHz . The oscillating circuit has a constant $L = 600\ \mu H$, $R = 30\ \Omega$ and a variable capacitor C . For which value of the capacitor C will the circuit be at resonance ? and for which value of frequency will the current flowing through the circuit decrease to one fourth of its value at resonance .

[5] The cutoff frequencies of a series resonance circuit are 5600 and 6000 Hz :
a) Calculate the B.W. of the circuit and Q_s .
b) If the resistance of the circuit is $2\ \Omega$, calculate X_L , X_C , L and C at resonance .

[6] A series resonance circuit has a resonance frequency of 10KHz . The resistance of the circuit is $5\ \Omega$ and X_C at resonance is $200\ \Omega$, find :
a) The Bandwidth and the cutoff frequencies .
b) Q_s of the circuit .
c) The voltage across the coil and the capacitor at resonance and at a frequency 10% below resonance if the input voltage is $30\ \angle 0$.
d) The power dessipated in the circuit at resonance and at a frequency 4% above resonance .

[7] Design a series resonance circuit with an input voltage $5\ \angle 0^\circ\ V$ to have the following specifications :
a) A peak current of 500 mA .
b) A Bandwidth of 120 Hz .
c) A resonance frequency of 8400 Hz .

Calculate the circuit elements and the cutoff frequencies .

[8] A series resonance circuit of L , C and R is required to be at resonance at a frequency of 1 MHz . Its Bandwidth is 5 KHz and its input impedance at resonance is 50 Ω . Calculate L , C and R .

[9] Make the necessary derivations to sketch the magnitude of the current I shown in Fig.2 in amperes against frequency in Hertz showing its value at the resonance frequency F_s and the cutoff frequencies F_1 and F_2 , hence , prove that : $F_s = \sqrt{F_1 F_2}$.

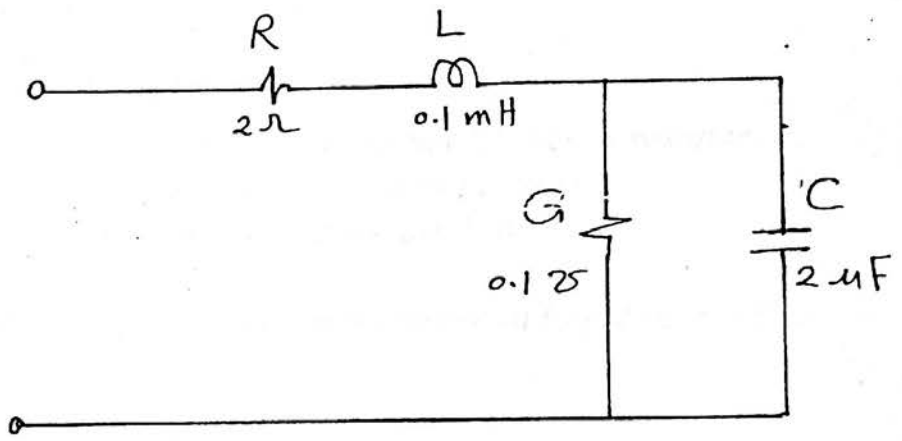

Fig.1

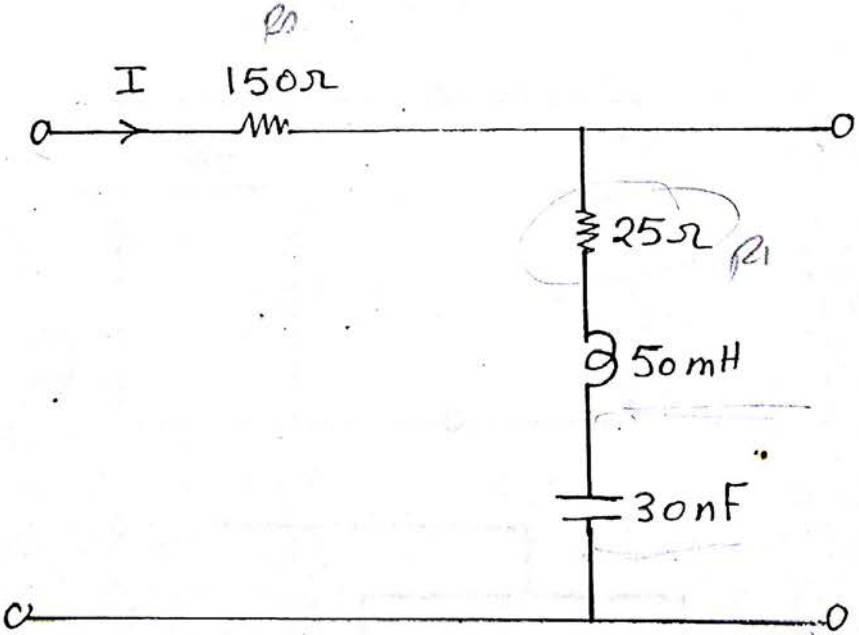

Fig.2