Ex. No.:3 Date: 10.10.19

Response of RLC Series Circuit

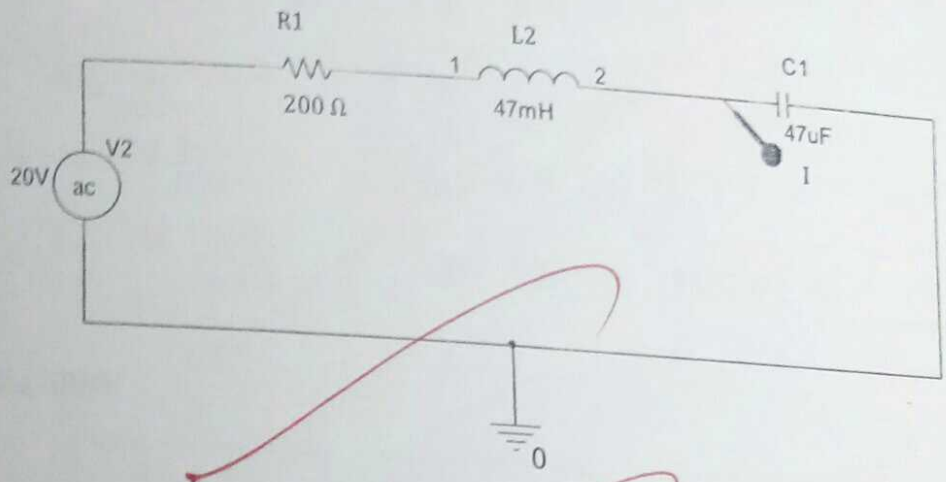
Aim: To determine and verify the resonant current and resonant frequency for the given series RLC circuit, theoritical and simulation values.

Apparatus/Tool required:

ORCAD / Capture CIS --> Analog Library – R, L & C
Source Library – Vac
Ground (GND) – 0 (zero)

Simulation Settings: Analysis Type – Transient (Time Domain)
Run to time: 20ms

Circuit Diagram:



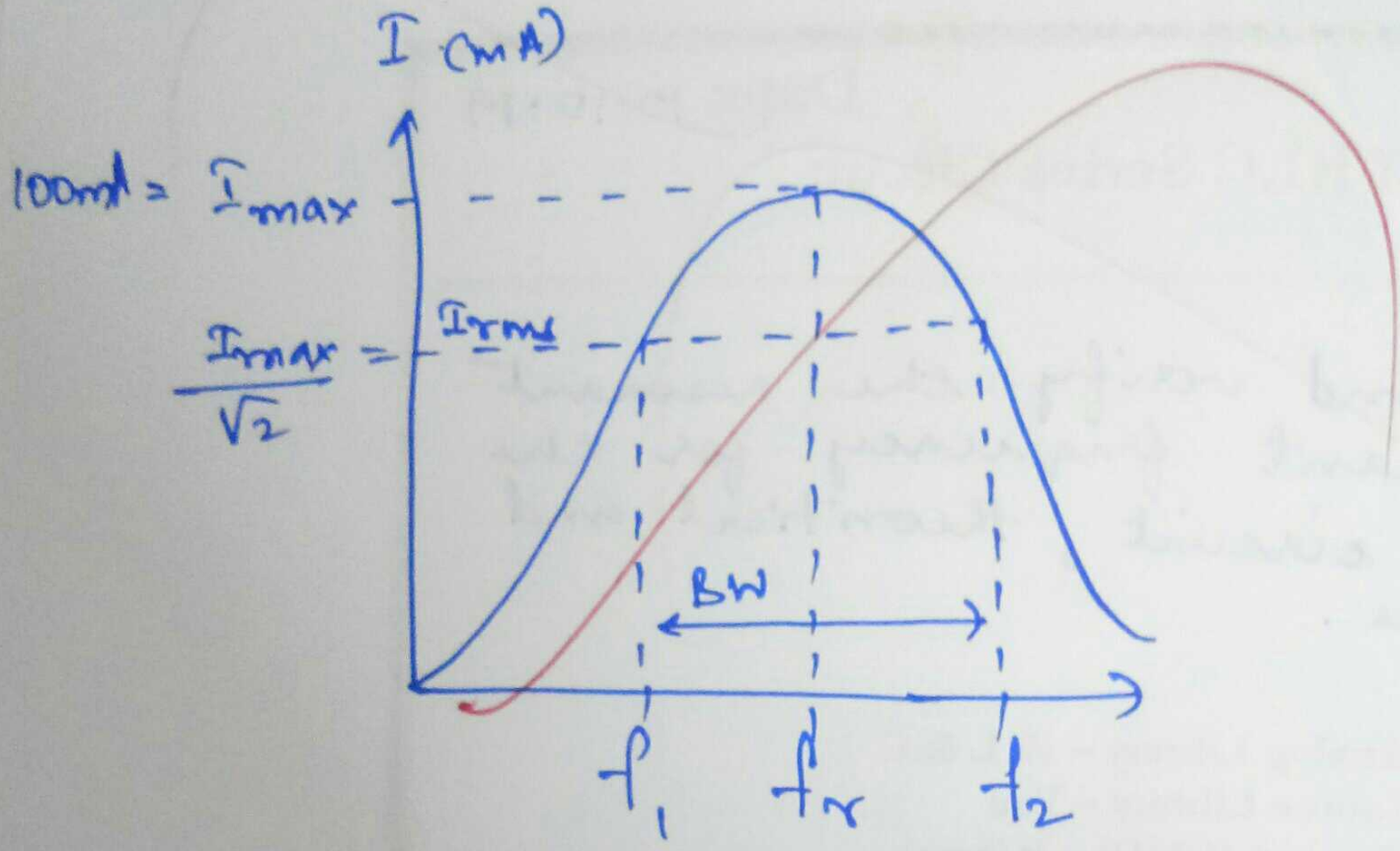
Theory:

$Z_r = R$

$I = V/Z = \frac{V}{R = (Z_r)}$

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$I = \frac{V}{Z}$



BW ⇒ Bandwidth.

Formulae : $X_{Lr} = X_{Cr}$

$$2\pi f_r L = \frac{1}{2\pi f_r C}$$

$$4\pi^2 f_r^2 CL = 1$$

$$f_r^2 = \frac{1}{4\pi^2 LC}$$

Calculation:

$$f_r = \frac{\sqrt{\cdot}}{\sqrt{4\pi^2 LC}} \quad ; f_r = \frac{1}{2\pi\sqrt{LC}}$$

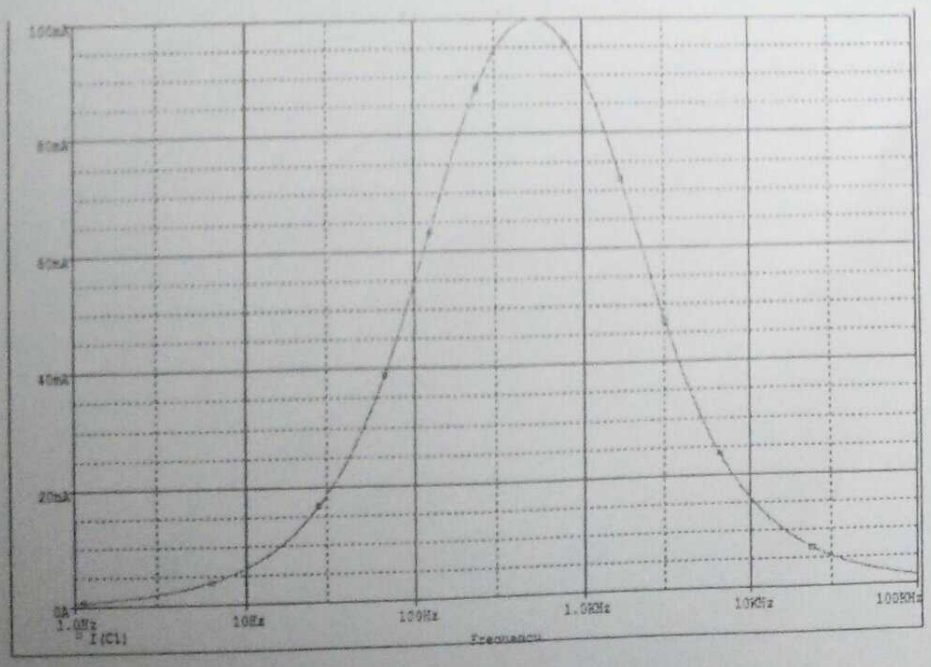
$$f_r = \frac{1}{2\pi\sqrt{47\times10^{-3}\times47\times10^{-6}}}$$

$$f_r = 107.1\ Hz$$

$$I_r = V/_Z = V/_{Z_r} = R$$

$$I_r = \frac{20}{200} = 0.1A = 100\ mA$$

Model Graph:

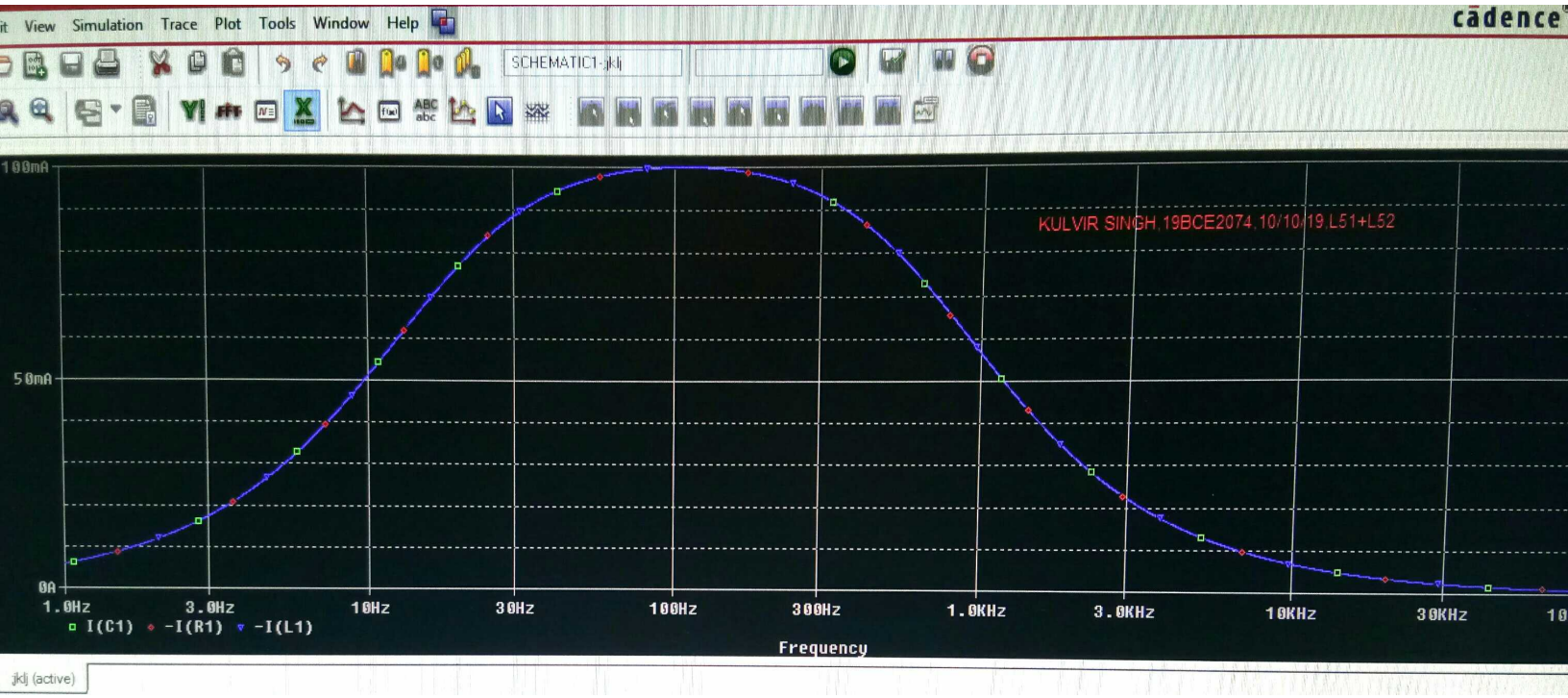


Result:- The series resonance RLC circuit have been performed in simulation (CIS captured) and the following theoritical and simulation values have been tabulated.

Parameter	Theory value	Simulation values.
I_R	100 mA	100 mA
f_r	107.1 Hz	107.1 Hz

Inference:-

Reg. No: 19BCE2014 Name: Kulvir Singh Date: 10/10/19


it View Simulation Trace Plot Tools Window Help
cadence
SCHEMATIC1-jkl
100mA
50mA
0A
KULVIR SINGH,19BCE2074,10/10/19,L51+L52
1.0Hz
3.0Hz
10Hz
30Hz
100Hz
300Hz
1.0KHz
3.0KHz
10KHz
30KHz
I(C1) -I(R1) -I(L1)
Frequency
jkl (active)

KULVIR SINGH,19BCE2074,10/10/19,L51+L52