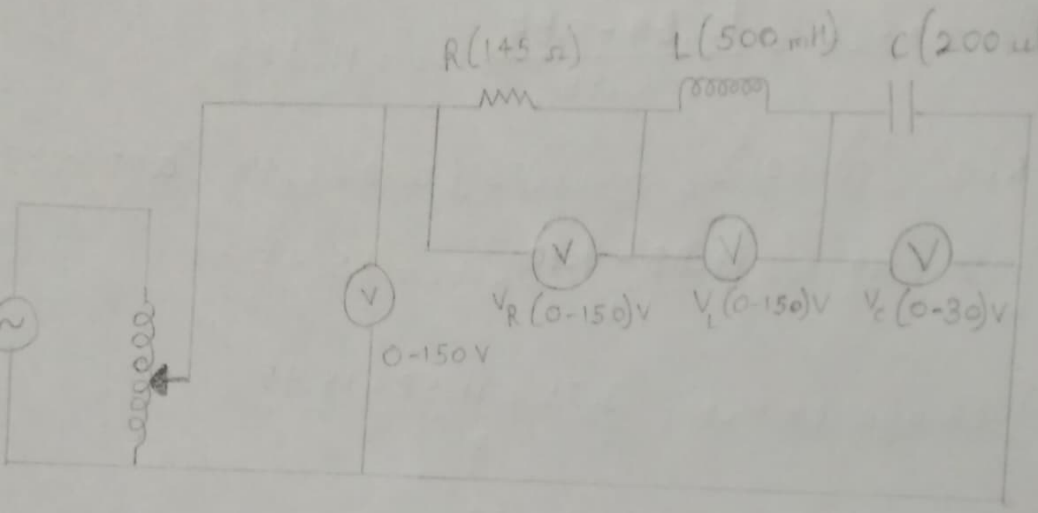
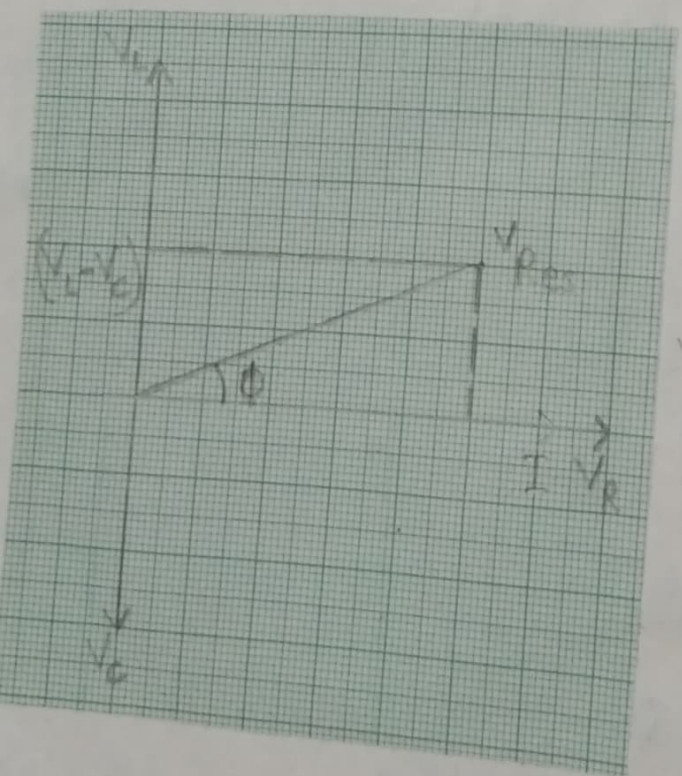
Circuit Diagram :-



Phasor Diagram :-



$V_{Res} = \sqrt{V_R^2 + (V_L - V_C)^2}$

where,

V_{Res} = Resultant voltage

V_R = Voltage diffes via resistor

V_L = Voltage diffes via inductor

V_C = Voltage diffe via capacitor

Experiment No.-2

Object :- To draw the phasor diagram of R.L.C. series circuit.

Apparatus :-

• A.C. Voltmeter	0-150 V	1 No.
• A.C. Voltmeter	0-30 V	1 No.
• Resistance	145 Ω	1 No.
• Inductance	500 mH	1 No.
• Capacitance	200 μf	1 No.
• 1 ϕ auto Transformer	220 V/0-260 V	1 No.
• Connecting leads		

Theory :- Consider an AC circuit containing resistance of R Ω, inductance of L Henry and Capacitance of C Farads connected in series. Let current flowing through the circuit be I amperes and supply frequency be f Hz.

Voltage drop across resistance $V = IR$ in phase with I

Voltage drop across inductance $V_L = I\omega L$ leading with I by $\frac{\pi}{2}$ radian or 90°

Voltage drop across capacitance $V_c = \frac{I}{\omega C}$ lagging behind I by $\frac{\pi}{2}$ radians or 90°.

Observation Table:-

S.No.	V_S	V_R	V_L	V_C
1.	84	52	54	2.60
2.	94	58	60	3.00
3.	100	60	64	3.20

The applied voltage V being equal to the phasor sum V_R, V_L and V_c is given magnitude by

$$V = \sqrt{V_R^2 + (V_L - V_c)^2}$$

Phase angle (ϕ) between current and voltage is given by

$$\phi = \tan^{-1}\left(\frac{(V_L - V_c)}{V_R}\right)$$

Formula Used :-

$$V_{Res} = \sqrt{V_R^2 + (V_L - V_c)^2}$$

Calculation :-

① $V_{Res} = \sqrt{(52)^2 + (54 - 2.60)^2} = \sqrt{2704 + 2641.96} = \sqrt{5345.96}$

$= 73.12$

% error $= \frac{|73.12 - 84|}{84} \times 100 = 13.24$ %

② $V_{Res} = \sqrt{(58)^2 + (60 - 3.00)^2} = \sqrt{3364 + 3249} = \sqrt{6613} = 81.32$

% error $= \frac{|81.32 - 94|}{94} \times 100 = 13.49$ %

③ $V_{Res} = \sqrt{(60)^2 + (64 - 3.20)^2} = \sqrt{3600 + 3696.64} = \sqrt{7296.64}$

$= 85.42$

% error $= \frac{|85.42 - 100|}{100} \times 100 = 14.58$ %

Average error $= \frac{13.24 + 13.49 + 14.58}{3}$

$= \frac{41.31}{3}$

$= 13.77$ %

TUTORIAL / PRACTICAL NO.

Result :- The phasor diagram of R.L.C. series circuit is shown in the diagram (graph) with an error of approx. 13.77 %.

Precautions :-
1. All the connections should be tight
2. Proper care should be taken while connecting to the terminal of a voltmeter.
3. All apparatus should be taken of suitable range and rating
4. Reading should be taken correctly.

4/2/22