EXPERIMENT:

AIM: Measure voltage, current, & power in RL series circuit.

APPARATUS:

Sr. No.	EQUIPMENT	SPECIFICATION	QUANTITY
1	Lamp Load	5 Amp	1 No.
2	Chock coil	10A, 250 V variable	1 No.
3	Volt meter	0-250 Volt	3 No.
4	Ammeter	0-10 Amp	1 No.
5	single phase Variac	10 Amp, 0-250 Volt	1 No.
6	Wattmeter	2.5 kw, Dynamometer	1 No.

THEORY:

In R-L series circuit, as shown in fig 4.1that resistance of R ohm and inductor of L Henry are connected in series across V volt ac supply. Let current of I ampere be drawn from the mains. So voltage is dropped across resister and inductor. Voltage drop across the resister is $V_R = IR$ and inductor is $V_L = IX_L$ and it leads the vector by 90°. Vector sum of OA and AB is equal to OB which shows applied voltage V. The current is same phase with voltage in case of resister, where as in case of inductor current lags by Ø.

$$(OB)^2 = (OA)^2 + (AB)^2$$
$$(V)^2 = (V_R)^2 + (V_L)^2$$
$$V = [(IR)^2 + (IX_L)^2]^{1/2}$$
$$V/I = [(R)^2 + (X_L)^2]^{1/2}$$
$$Z = [(R)^2 + (X_L)^2]^{1/2}$$

Z is called impedance.

So, the power consumed in R-L series circuit also depends upon this lagging angle Ø.

$$P = VI \cos Ø$$

Fig 3.2 is showing the vector diagram of RL series circuit.

CIRCUIT DIAGRAM:

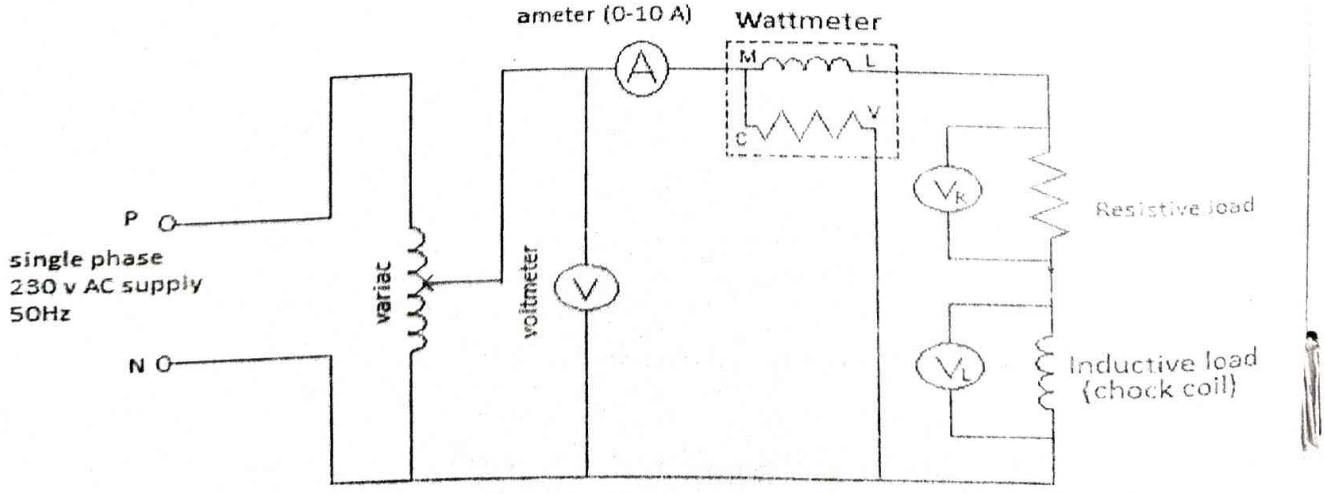

FIG 3.1 (R-L Series Circuit)

PROCEDURE:

1) Connect the circuit diagram as shown in circuit diagram.
2) Keep the switches of the lamps off.
3) Switch on the supply, switch on certain lamps and take the readings of ammeter, Supply voltage, voltage drop across resistor & inductor.
4) Vary the current by changing the no of lamps & take readings.
5) Switch off the supply & disconnect the circuit.
6) Draw vector diagrams & make necessary calculations.

OBSERVATION TABLE:

Sr. No.	Supply Voltage Vs volts	Current I Amp	Voltage drop across resistor V_R	Voltage drop across inductor V_L	Power (watt)
1					
2					
3					

COMPUTATION TABLE:

Sr. No.	$R=(V_R/I)$	$X_L=V_L/I$	$Z=[R^2+X_L^2]^{1/2}$	$L = X_L/2\pi f$	$COS\emptyset=R/Z$	$P = V_R I COS\phi$
1						
2						
3						

PHASER DIAGRAM:

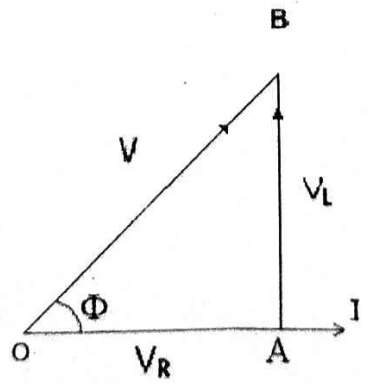

FIG 3.2 (VECTOR DIAGRAM)

CONCLUSION: