

EXPERIMENT #4

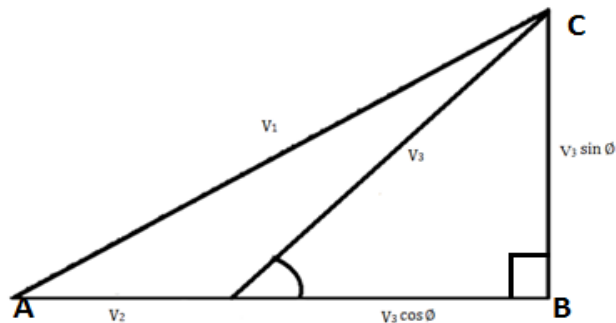
TO MEASURE THE POWER AND POWER FACTOR BY THREE

VOLTMETER METHOD

OBJECTIVE:

As we know, wattmeter is used for measurement of power in inductance AC circuits, but in some cases it is not possible to use wattmeter because of their incorrect readings. So in such cases three voltmeters or three ammeter method is used for measurement of power. The Supply voltage higher than normal voltage is required because an additional resistance R is connected in series with the load Z (inductive circuit). Even small errors in measurement of voltages may cause serious errors in the value of power determined by this method.

To find Power and Power factor:



MATHEMATICAL FORM:

By applying pathagoreous theorem on a triangle ABC we obtain;

$$V_1^2 = V_2^2 + V_3^2 + 2V_2V_3 \cos \phi$$

$$V_1^2 = V_2^2 + V_3^2 + 2(IR)V_3 \cos \phi$$

$$V_1^2 = V_2^2 + V_3^2 + 2R(V_3I \cos \phi)$$

$$(V_1)^2 - (V_2)^2 - (V_3)^2 = 2V_2V_3 \cos \phi$$

Power factor of the circuit is given by:

$$\cos \phi = \frac{V_1^2 - V_2^2 - V_3^2}{2V_2V_3}$$

From the obtained equation we can find the power factor for the provided circuit.

$$(V_1)^2 - (V_2)^2 - (V_3)^2 = 2(IR)V_3 \cos\Phi$$

$$\frac{(V_1)^2 - (V_2)^2 - (V_3)^2}{2R} = I V_3 \cos\Phi$$

Since Real Power is given as;

$$P = IV \cos(\text{angle})$$

$$P = \frac{(V_1)^2 - (V_2)^2 - (V_3)^2}{2R}$$

APPARATUS:

PROCEDURE:

CIRCUIT DIAGRAM:



OBSERVATIONS AND CALCULATIONS:

S.NO	V ₁	V ₂	V ₃	POWER $P = \frac{(V_1)^2 - (V_2)^2 - (V_3)^2}{2R}$	POWERFACTOR $\cos \phi = \frac{V_1^2 - V_2^2 - V_3^2}{2V_2V_3}$
1					
2					
3					

CONCLUSION:
