 DIT UNIVERSITY IMAGINE ASPIRE ACHIEVE	TWO WATTMETER METHOD	Issue No.: 01	Date: 7 th July 2000
		Rev No.: 5.2	Rev. Date: 20 th July 2018
		Clause: Nil	Page: 1 of 3

Objective: Measurement of Power & Power factor in 3- ϕ load by 2- wattmeter method.

Apparatus Used: One 3- ϕ Load, One 3- ϕ Auto transformer, 2-wattmeters (cc-10A, pc-500V), One voltmeter (0-500V), One Ammeter (0-10 A), connecting wires.

Theory:

Power in 3- ϕ Load

$$P = \sqrt{3} V_L I_L \cos \phi$$

$$= 3 V_p I_p \cos \phi$$

Let W_1 = Reading of wattmeter 1 (including M.F).

W_2 = Reading of wattmeter 2 (including M.F).

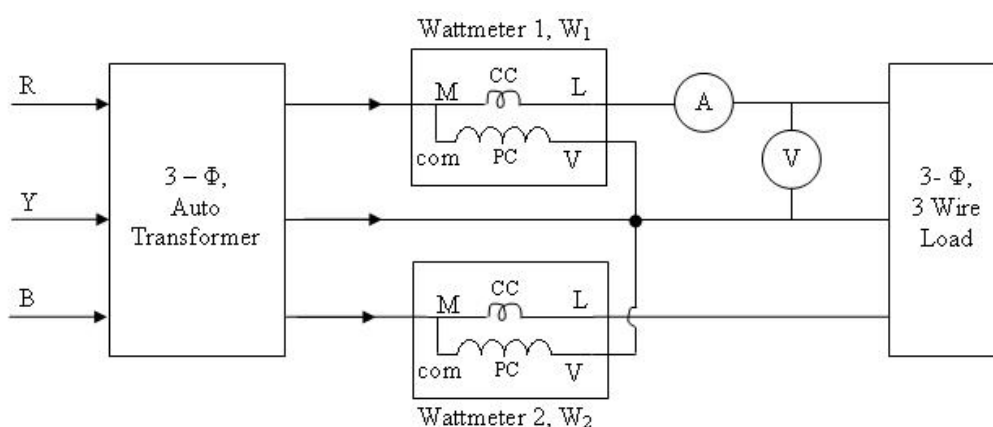
The total power is given as the sum of two wattmeter reading W_1 & W_2 .

So, $P = W_1 + W_2$


Power factor

$$\cos \phi = \cos \tan^{-1} \frac{\sqrt{3}(W_1 - W_2)}{(W_1 + W_2)}$$

Circuit Diagram-



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		Rev No.: 5.2	Rev. Date: 20 th July 2018
		Clause: Nil	Page: 2 of 3

Observation Table:

S.N o	V (Volts)	I (Amp)	W ₁ (Watt)	W ₂ (Watt)	P=W ₁ +W ₂ (Watt)	$\cos \phi = \cos \tan^{-1} \frac{\sqrt{3}(W_1 - W_2)}{(W_1 + W_2)}$

Calculation:-

Multiplying factor of wattmeter1 = $(V I \cos \phi) / \text{Full scale deflection.}$


Multiplying factor of wattmeter2 = $(V I \cos \phi) / \text{Full scale deflection}$

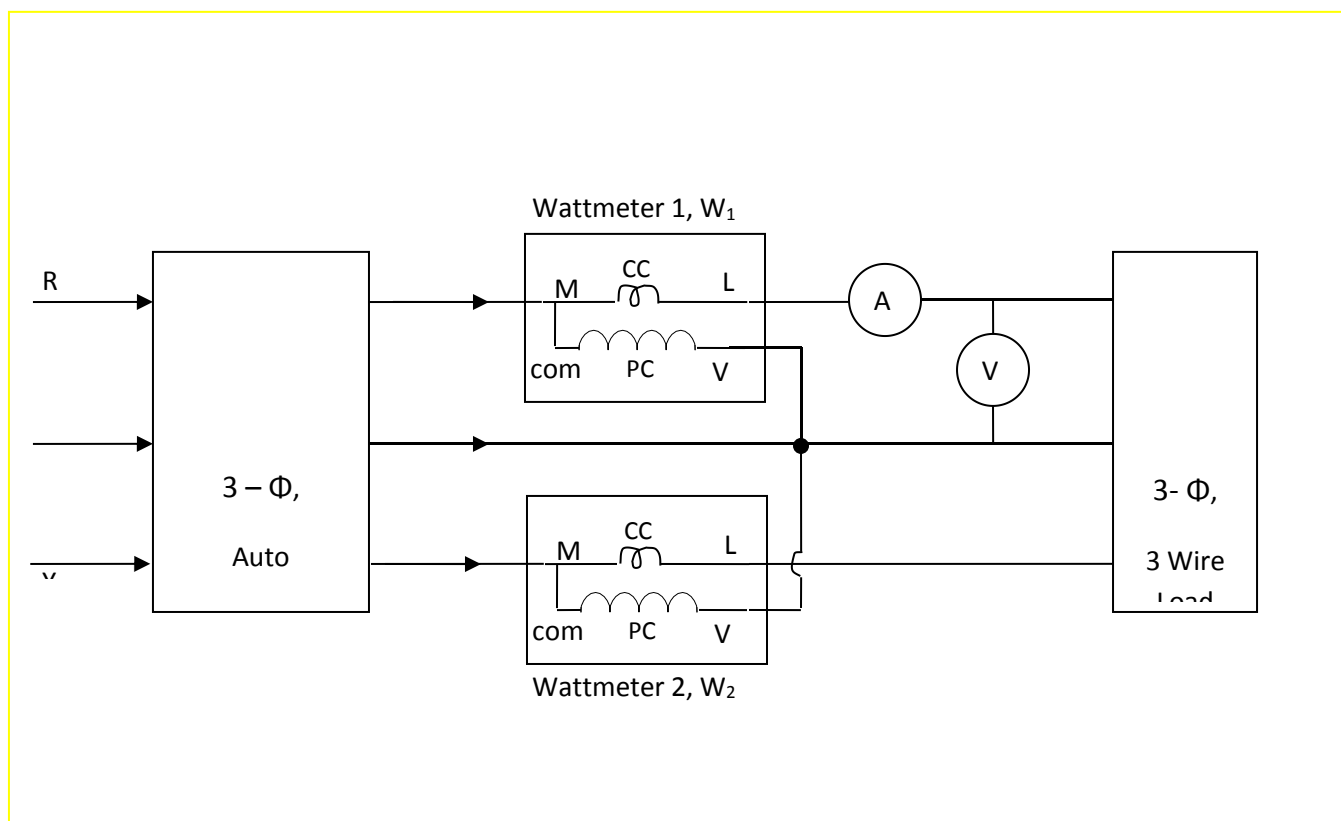
Result: - Power and power factor of resistive load had been calculated at different load

Precaution:

1. Make sure that auto transformer is at zero position.
2. The main switch should be off before doing the connections.
3. All connection should be tight and clean.
4. The reading in instruments should not exceed from their permissible limit.
5. Don't touch the necked terminals as voltage is high.
6. Always wear shoes when working in the lab. Avoid wearing loose clothes, hanging chains etc.

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		Rev No.: 5.2	Rev. Date: 20 th July 2018
		Clause: Nil	Page: 3 of 3



Answer the following questions:

Q1. Write the formulae of power in DC, single phase AC and three phase AC. Also write the relation in between phase and line values of voltage and current in delta & star.

Q2. Which connection consume more power i.e. star or delta.

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