**Development of Virtual lab :Round 3 -Lab Manual - Template (Worksheet)**

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**Round 2**

1. **Aim and Objective:**

To measure power factor and study the improvement of power factor.

1. **Theory:**

Power in a single-phase AC circuit with inductive load (by combining

Inductance and resistance) is given by:

**P = I2R**

Where P= power consumed by load in watt.

R= resistance

I= load current in amps.

For the circuit consisting of wattmeter, voltameter and ammeter to

values of power consumed by the load, voltage across the load and

current drawn by the load, the power factor can be calculated as:

**POWER FACTOR= COSΦ = P / V I**

**POWER FACTOR ANGLE OF LOAD:**

**Φ**= **COS-1= P / V I**

Active power P = V I CosΦ watts

Reactive Power Q = V I SinΦ VAR

Apparent power S = √P2 + Q2

Power Factor = P / S

By adding capacitor in parallel with some of the reactive power is

supplied by the capacitor depending upon value of capacitance added

in parallel with the load resulting in reduction in apparent power (S)

supplied by the source and hence power factor being

cos Φ = P / S increases

Resulting in improvement of power factor.

1. **Procedure:**
2. Make the circuit.
3. Switch on the supply by keeping variac in minimum position and rheostat in maximum position.
4. Increase the voltage to some extent and adjust the value of resistance.
5. Record the value of ammeter, voltameter and wattmeter as P and calculate the value of power supply.
6. Connect capacitor in parallel with load.

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| **S NO.** | **V (volts)** | **P (watts)** | **Is (amps)** | **Cos Φ = (P / Is Vl)** |
| 01. |  |  |  |  |
| 02. |  |  |  |  |
| 03. |  |  |  |  |
| 04. |  |  |  |  |
| 05. |  |  |  |  |

1. Record the values of ammeter as Is , Il voltameter and wattmeter and calculate the value of power factor.
2. Record the values of ammeter as Is , Il and Ic  voltameter as Vl and wattmeter as P and calculate the value of load power factor.

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| --- | --- | --- | --- | --- | --- | --- |
| **S NO.** | **Vl (volts)** | **P (watts)** | **IS (Amp)** | **Il (Amp)** | **Ic (Amp)** | **Cos Φ = (P / Is Vl)** |
| 01. |  |  |  |  |  |  |
| 02. |  |  |  |  |  |  |
| 03. |  |  |  |  |  |  |
| 04. |  |  |  |  |  |  |
| 05. |  |  |  |  |  |  |

1. Compare the power factor calculated in both the cases and calculate improvement in power factor.

**4.Pre test Assessments:**

1. Power factor is the ratio between

**a. true power and apparent power**

b. current and impedence

c. voltage and impedence

d. none of these

2. In capacitive circuit the actual power will be always:

1. Equal to reactive power
2. Equal to apparent power
3. **Larger than reactive power**
4. Lesser than reactive power

5. **Post test Assessments:**

1. The wattles component is

1. I cos Φ
2. **I sin Φ**
3. I
4. None of these
5. If the load current decreases, the power factor
6. Decreases
7. **Increases**
8. Remains unchanged
9. None of these