**Round 1**

**Experiment Electrical Measurements and Instrumentation Lab**

| **Discipline** | **Electrical Engineering/ Electrical and Electronics Engg.** |
| --- | --- |
| **Lab** | **Electrical Measurements and Instrumentation Lab** |
| **Experiment** | **Measurement of Power using CT and PT.** |

**1.Focus Area : Instrumentation and Practical Skills**

By this experiment we want students to understand the connections for measuring the power of the 3-phase circuit by using the current transformer (CT) and potential transformer (PT) by using 3-phase two element wattmeter. After that how to calculate total power consumed in 3-phase load and also % error in calculated power.

**2.Learning Objectives and Cognitive Level**

**Description:**

There will be a tentative circuit diagram shown in the theory part of the experiment. There will be block diagram of different instruments provided in the simulation and the same will be required to be connected as per the circuit diagram shown in the theoretical part by student while performing the experiment. After completing the circuit diagram students will record the reading of wattmeter by providing the inputs as per circuit diagram. Based on the reading students will calculate the power consumed by the load and finally the % error.

**Method:**

To achieve attainment of all the objectives the experiment is designed for different sets of input variables so that students can learn through performing.

| **Sr. No** | **Learning Objective** | **Cognitive Level** | **Action Verb** |
| --- | --- | --- | --- |
| 1. | User will be able to:  Understand CT, PT and wattmeter connection in 3-Phase circuit. | Understand | [Describe](http://vlabs.iitb.ac.in/vlabs-dev/document.php) |
| 2. | User will be able to:  Calculate the power consumed in a 3-Phase circuit using wattmeter reading. | [Apply](http://vlabs.iitb.ac.in/vlabs-dev/document.php) | [Calculate](http://vlabs.iitb.ac.in/vlabs-dev/document.php) |
| 3. | User will be able to: Calculate the % Error in power calculated and actual power consumed. | [Apply](http://vlabs.iitb.ac.in/vlabs-dev/document.php) | [Calculate](http://vlabs.iitb.ac.in/vlabs-dev/document.php) |

**3.Instructional Strategy**

Name of Instructional Strategy : Expository

Assessment Method: Formative assessment

**Description:**

Step by step instructions are provided at each level in the simulator to make it more user friendly.

**Scope:**

Various runs of the same experiment are possible by changing the different input variables.

**4.Task & Assessment Questions:**

Read the theory and comprehend the concepts related to the experiment. (LO1, LO2, LO3)

| **Sr. No** | **Learning Objective** | **Task to be performed by the student in the simulator** | **Assessment Questions as per LO & Task** |
| --- | --- | --- | --- |
| 1. | Understand CT, PT and wattmeter connection in 3-Phase circuit. | Students will make connections in the simulator. | How CT and PT are connected in the 3-Phase circuit for measurement of power?   1. parallel and series 2. series and series 3. parallel and parallel 4. **series and parallel** |
| 2. | Understand CT, PT and wattmeter connection in 3-Phase circuit. | Student will select the different input variables provided in the simulator. | What is the ratings of CT and PT?   1. **10/5 A and 440/220 V** 2. 20/5A and 440/200 V 3. 5/5A and 440/150 V 4. 100/5A and 440/100 V |
| 3. | Calculate the power consumed in a 3-Phase circuit using wattmeter reading. | After proper connection student will provide the input to the circuit and record the wattmeter reading in the observation table | 1 What is the formula for calculating the power of 3-Phase Load? **A. P=(CT Ratio\* PT Ratio\* Multiplying factor\*Wattmeter Reading)** B. (CT Ratio\* PT Ratio\* Multiplying)/ Wattmeter Reading C. (PT Ratio\* Multiplying factor\*Wattmeter Reading)/ CT Ratio  D. (CT Ratio \* Multiplying factor\*Wattmeter Reading)/ PT Ratio |
| 4. | Calculate the % Error in power calculated and actual power consumed. | Finally calculate the % Error | 1 What are the parameter to be recorded for calculating the % error? |

**5.Simulator Interactions:**

| **Sr.No** | **What Students will do?** | **What Simulator will do?** | **Purpose of the task** |
| --- | --- | --- | --- |
| 1. | Student click on the simulation tab. | Simulator screen of the experiment will open up. | To open the screen for performing the experiment. |
| 2. | Draw the circuit diagram according to the circuit provided in the theoretical part by using the different blocks of instrument. | Circuit is drawn accordingly in the simulator and various input switches are activated. | Circuit diagram is formed for which student have to provide input to calculate the power. |
| 3. | Then student will select the various input combinations. | According to the selected input output is shown on the Wattmeter reading. | This wattmeter reading helpful in calculating the 3-Phase power consumed by the load. |
| 4. | Repeat the step 3 and take different observation. | Wattmeter will show the power according to the selected input. | This wattmeter reading helpful in calculating the 3-Phase power consumed by the load. |

You can add more rows by copying the last row