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UNIVERSITI TEKNOLOGI MALAYSIA

**SCHOOL OF ELECTRICAL ENGINEERING**  
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**SKEE 3732**  
**BASIC POWER LABORATORY**  
**AC POWER**

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## **EXPERIMENT: AC POWER**

### **INTRODUCTION:**

In AC circuit there are two types of power, which is real power and reactive power. The values of these powers depend on the combination of load elements which are resistor, inductor and capacitor. Energy consumption are charged differently for real power and reactive power. Hence, certain combination of load elements is more favorable to the customer.

### **LEARNING OBJECTIVES:**

After completing this lab, you will be able to:

1. Differentiate the active and reactive power flow direction in three-phase circuits consisting different combinations of RLC loads.
2. Improve the power factor of an inductive load.

### **EQUIPMENT:**

Power supply module.

R, L, and C load banks.

AC metering module.

Three phase Watt-Varmeter module.

Induction machine.

### **Precautions**

- 1) *High voltages are present in this laboratory experiment. Do not make any connections with the power ON.*
- 2) *The leads coming from the source must be connected to the 3-phase Watt/Varmeter terminals in the order of their phase sequence*
- 3) *Always ask supervisor or laboratory technician to check the experiment connection before SWITCHING ON the power supply.*

### **PROCEDURE:**

415 V three phase source, voltmeters, ammeters, three phase Watt/Varmeter, three types of balanced three phase load (R, L and C) and induction motor; are available for use.

### **EXPERIMENT 1:**

- 1) Set up a circuit based on the block diagram in Figure 4(b) of the preparatory work.
- 2) Measure the phase voltages, phase currents, active and reactive power.
- 3) Observe the direction of power flow in the circuit.
- 4) Calculate the apparent power and power factor.
- 5) Repeat for different load element and various combinations of load elements.

### **EXPERIMENT 2:**

- 1) Connect the induction motor as load to the system. Using suitable circuit element, improve the power factor of the system to a value of greater than 0.85.

### **DISCUSSION AND CONCLUSION:**

1. Results must be presented in appropriate tables or/and figures.
2. Discussion on the findings must consider the following items:
  - a. Difference in real and reactive power for different types and sizes of load.
  - b. Direction of real and reactive power flow, apparent power and power factor; for different size and types of load.
  - c. Whether the switching in and out of inductive or capacitive loads affects the real and reactive power.
  - d. The effect of power factor correction.

### **LONG REPORT.**

Your long report must cover all the results and the discussion in the experiments. In addition, the results should be verified using suitable software. You must also relate your findings and discussion with the real power system operation.