EET LAB EQUIPMENT
INTRODUCTION

Introduction

This guide is a reference for the following equipments

Equipments

• Lab bench
• DC machine
• Synchronous machine
• Induction motor
• Torque ring
• Rectifier
**LAB BENCH**

**Introduction**
Lyb-o-tec bench provides DC and AC power supplies. The multimeters, tool box and oscilloscope are put on the shelves of the bench.

**Functions**

(a). START button, power on the bench.

(b). STOP button, cut-off the power of the bench.

(c). Three-phase adjustable AC power supply (red, yellow and blue). Separate power switch is available.

(d). Single-phase adjustable AC power supply (blue, red). Separate power switch is available.
(e). Adjustable DC power supply. Separate power switch is available.

Instructions

- Please let your lab conductor check the connections before turning on the bench power.
- Press the STOP button to cut off the power if any emergency happens.
- Turn off the switches of all the power sources and all the multimeters at the end of each Lab. Disconnect all the wires from the lab bench and return the wires.

Block Diagrams

In Lab pre-work, the following block diagrams are used to represent the power sources for wiring.

DC Power supply

```
+   -
\   / DC
```

Single-phase AC power supply

```
AC
```

Three-phase AC power supply

```
AC
```
DC MACHINE

Introduction

The basic components of DC machine (Rotor, stator and brushes) are pre-assembled as shown below. Please do not dismantle it during the Lab.
Structure  (a). Stator. Four-pole stator needs to be connected.

(b). Rotor.

(c). Brush gear. The brush gear works together with the rotor commutators to keep the external current direction.

(d). Rotor connection ports.

Block Diagrams  In Lab pre-work, the following block diagrams are used to represent the components for wiring.

Stator  Below is only a diagram of the stator output ports. The connection methods of stator windings will be introduced during the lab.

```
  DC.S
```

Rotor  Below is only a diagram of the rotor output ports. The ports connect to the rotor winding through the brushed and commutators.

```
  DC.R
```

***** At least two students are required when you try to move or mount the DC machine with other equipments. The DC machine model is heavier than 20kg. Be careful!!
SYNCHRONOUS MACHINE

Introduction

Synchronous Machine (SM) is constructed by mainly three parts, stator, rotor and brushes. The empty motor frame is shown below. Please dismantle the machine and return the components at the end of each Lab.

Stator

A 3-phase, 4-pole stator is used to construct SM. Three different colours represent three phases, red, yellow and blue as shown below.
**Rotor**

A SM rotor is used to construct SM. Two slip-rings on the rotor will be used to connect to the brushes as shown below.

**Brush Gear**

There are output ports on the brush gear which connected to the rotor windings.
Block Diagrams  In Lab pre-work, the following block diagrams are used to represent the SM components for wiring.

Stator  Below is a diagram of the stator output ports. The connection methods of stator windings, delta or star, will be introduced during the lab.

Rotor  Below is a diagram of the SM rotor output ports. The ports are connected to the rotor slip-rings by the brush gear.
**Induction Motor**

**Introduction**

Induction Motor (IM) is constructed by mainly three parts, stator, rotor and brushes. The same motor frame is used as SM. Please dismantle the machine and return the components at the end of each Lab.

**Stator**

A 3-phase, 4-pole stator is used to construct IM same as that used for SM. Three different colours represent three phases, red, yellow and blue as shown below.
Rotor

A 3-phase IM rotor is used to construct IM. Three slip-rings on the rotor will be used to connect to the brushes as shown below.

Brush Gear

There are output ports on the brush gear which connected to the rotor windings.
**Block Diagrams**  
In Lab pre-work, the following block diagrams are used to represent the IM components for wiring.

**Stator**  
Below is a diagram of the stator output ports. The connection methods of stator windings, delta or star, will be introduced during the lab.

**Rotor**  
Below is a diagram of the IM rotor output ports. There are three phases on the rotor and the ports are connected to the rotor slip-rings by the brush gear.
TORQUE RING

Introduction
In EET Lab, torque ring is used to measure the output torque of the motor. It should be mounted between two machines the rotor shafts of which should be coupled together by hose piece coupling.

Scale
All the calculation of torque in lab report should be done in Nm. The effective radius of the torque ring is 150mm. The force is indicated on the dial gauge which is calibrated in ponds or in pond centi-Newton. 1 pond = 1grm. Wgt = 9.8 x 10^{-3} Newtons. Please transfer your readings to Nm.

Block Diagram
In lab pre-work, do not need to show the torque ring connection in the wiring diagram.
**RECTIFIER**

**Introduction**  
Sometimes additional DC power supply is required which should be rectified from the AC power source of the bench. The rectifier used in EET Lab is shown below.

**Block Diagram**  
In lab pre-work, the following diagram is used to represent a rectifier.