



**VINAYAKA MISSION'S RESEARCH FOUNDATION**  
**AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR**



**CONTROL AND INSTRUMENTATION LAB**  
**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Controller for DC Motor-Generator
Purpose	To help the students to acquire knowledge about the operation of both Self and Separately excited DC Generator .
Scope	By using the parameters and conducting suitable tests Transfer function can be obtained.
Responsibility	Faculty Incharge of the facility, HOD/EEE

**STANDARD OPERATING PROCEDURE FOR OBTAINING THE TRANSFER FUNCTION OF SELF AND SEPARATELY EXCITED DC GENERATOR**

- The connections should be given as per the experiment to be performed referring to the lab manual.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- Keep the armature voltage control pot at its minimum position.
- Keep the ON/OFF switch at OFF position and also the variable field voltage pot at its maximum position.
- To perform the experiment supply mains have to be switched on.
- Experimental procedure to be followed as given in the manual.
- Upon completion of the experiment care should be taken to bring back the armature and field pots to be brought to their original position.
- Also switch off the ON/ OFF switch and then the main supply.

**PRECAUTIONS TO BE FOLLOWED**

- Care should be taken that the experiment is conducted at rated speed.
- The armature pot should not be disturbed after bring the set to rated speed.

**RECORD TO BE MAINTAINED**

- Laboratory Manual containing the experiments that can be performed with the equipment.
- Maintenance Record.

**Prepared by**

**Approved by**

**Principal**



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**CONTROL AND INSTRUMENTATION LAB**  
**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Controller for DC Motor-Generator
Purpose	To expose the students about the basic operations of electrical machines and help them to develop experimental skills.
Scope	By using the parameters and conducting suitable tests Transfer function can be obtained.
Responsibility	Faculty Incharge of the facility, HOD/EEE

**STANDARD OPERATING PROCEDURE FOR OBTAINING THE TRANSFER FUNCTION OF SELF AND SEPARATELY EXCITED DC GENERATOR**

- The connections should be given as per the experiment to be performed referring to the lab manual.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- Keep the armature voltage control pot at its minimum position.
- Keep the ON/OFF switch at OFF position and also the variable field voltage pot at its maximum position.
- To perform the experiment supply mains have to be switched on.
- Experimental procedure to be followed as given in the manual.
- Upon completion of the experiment care should be taken to bring back the armature and field pots to be brought to their original position.
- Also switch off the ON/ OFF switch and then the main supply.

**PRECAUTIONS TO BE FOLLOWED**

- Care should be taken that the experiment is conducted at rated speed.
- At the time of starting, the motor should be in no load condition.

**RECORD TO BE MAINTAINED**

- Laboratory Manual containing the experiments that can be performed with the equipment.
- Maintenance Record.



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**CONTROL AND INSTRUMENTATION LAB**  
**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	2 Phase AC Servomotor Speed control and Transfer function Trainer Module
Purpose	To know about the torque speed characteristic of a two phase AC servo motor and hence obtain the speed torque characteristic equation
Scope	By conducting suitable tests transfer function can be obtained.
Responsibility	Faculty Incharge of the facility, HOD/EEE
<b>STANDARD OPERATING PROCEDURE FOR TRANSFER FUNCTION OF AC SERVOMOTOR.</b>	
<ul style="list-style-type: none"><li>➤ The connections should be given as per the experiment to be performed referring to the lab manual.</li><li>➤ Connections thus given shall be verified by the course instructor or lab in-charge.</li><li>➤ Connect set position (SP) to error detector input.</li><li>➤ Connect position feedback (PV) to error detector (PV) input.</li><li>➤ Connect 12-0-12 V output of centre tapped transformer to input 12-0-12 V of power circuit.</li><li>➤ Connect output of power circuit to motor control winding (12 V).</li><li>➤ Experimental procedure to be followed as given in the manual.</li><li>➤ Upon completion of the experiment switch OFF the supply mains.</li></ul>	
<b>PRECAUTIONS TO BE FOLLOWED</b>	
<ul style="list-style-type: none"><li>➤ Check whether power ON/OFF switch is in OFF condition.</li><li>➤ Check whether 230V AC ON/OFF switch is in OFF condition.</li><li>➤ Check whether main winding voltage 230V AC is in OFF condition.</li><li>➤ Do not try to rotate the o/p by means of the knob by hand.</li></ul>	
<b>RECORD TO BE MAINTAINED</b>	
<ul style="list-style-type: none"><li>➤ Laboratory Manual containing the experiments that can be performed with the equipment.</li><li>➤ Maintenance Record.</li></ul>	

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**Approved by**

**Principal**



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**CONTROL AND INSTRUMENTATION LAB**  
**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	LEAD LAG SIMULATOR
Purpose	It helps to know about the Compensator networks which are implemented in electrical circuits in the feed forward path of a control system.
Scope	By designing a passive RC Lag-lead compensating network for the given specifications we can obtain the frequency response.
Responsibility	Faculty Incharge of the facility, HOD/EEE
<b>STANDARD OPERATING PROCEDURE FOR FREQUENCY RESPONSE OF LAG-LEAD NETWORK</b>	
<ul style="list-style-type: none"><li>➤ The connections should be given as per the experiment to be performed referring to the lab manual.</li><li>➤ Connections thus given shall be verified by the course instructor or lab in-charge.</li><li>➤ Give the Sinusoidal input 2-3 volts peak to peak.</li><li>➤ Vary the Frequency from 5000HZ to 10kHz and measure the amplitude and phase angle.</li><li>➤ Experimental procedure to be followed as given in the manual.</li><li>➤ Upon completion of the experiment switch OFF the supply mains.</li></ul>	
<b>PRECAUTIONS TO BE FOLLOWED</b>	
<ul style="list-style-type: none"><li>➤ Check for loose connections.</li><li>➤ Input to channel 1 of the CRO should be sine wave.</li></ul>	
<b>RECORD TO BE MAINTAINED</b>	
<ul style="list-style-type: none"><li>➤ Laboratory Manual containing the experiments that can be performed with the equipment.</li><li>➤ Maintenance Record.</li></ul>	

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CONTROL AND INSTRUMENTATION LAB

**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	
Purpose	To know about the performance characteristics of a DC motor angular position control system.
Scope	
Responsibility	Faculty Incharge of the facility, HOD/EEE
<b>STANDARD OPERATING PROCEDURE FOR DC POSITION CONTROL SYSTEM</b>	
<ul style="list-style-type: none"><li>➤ The connections should be given as per the experiment to be performed referring to the lab manual.</li><li>➤ Connections thus given shall be verified by the course instructor or lab in-charge.</li><li>➤ Check whether the pulse release switch is in OFF position. If it is in ON position kept it in OFF position.</li><li>➤ Switch on the unit.</li><li>➤ Set the motor at any position by varying the set position (SP) knob.</li><li>➤ Notice the input position in digital display by toggling the SPDT switch on mode.</li><li>➤ Notice the output position in the digital display.</li></ul>	
<b>PRECAUTIONS TO BE FOLLOWED</b>	
<ul style="list-style-type: none"><li>➤ Please do not cross zero degree position by moving POT P1 i.e. do not operate between 350 deg and zero deg.</li><li>➤ Do not try to rotate output POT by hand .this may damage the potentiometer</li></ul>	
<b>RECORD TO BE MAINTAINED</b>	
<ul style="list-style-type: none"><li>➤ Laboratory Manual containing the experiments that can be performed with the equipment.</li><li>➤ Maintenance Record.</li></ul>	

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**CONTROL AND INSTRUMENTATION LAB**

**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Strain Measurement Trainer Module
Purpose	In order to measure strain with a bonded resistance strain gauge.
Scope	By measuring the change in resistance of an object, the amount of stress can be calculated.
Responsibility	Faculty Incharge of the facility, HOD/EEE

**STANDARD OPERATING PROCEDURE FOR STRAIN GAUGE**

- The connections should be given as per the experiment to be performed referring to the lab manual.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- Fix the weight pan to the beam.
- Adjust the sensitivity control to read some value.
- Experimental procedure to be followed as given in the manual.
- Upon completion of the experiment switch OFF the supply mains.

**PRECAUTIONS TO BE FOLLOWED**

- Do not connect the lead directly to the power supply.
- Check for loose connections.

**RECORD TO BE MAINTAINED**

- Laboratory Manual containing the experiments that can be performed with the equipment.
- Maintenance Record.

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**CONTROL AND INSTRUMENTATION LAB**  
**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Process Control Simulator
Purpose	To achieve a better control action in feedback control systems by modifying the error signal and also change the transient response and steady state error of the system.
Scope	Real time disturbances which occur can be measured and the robustness of the controller may be checked.
Responsibility	Faculty Incharge of the facility, HOD/EEE
<b>STANDARD OPERATING PROCEDURE FOR PID CONTROLLERS</b>	
<ul style="list-style-type: none"><li>➤ The connections should be given as per the experiment to be performed referring to the lab manual.</li><li>➤ Connections thus given shall be verified by the course instructor or lab in-charge.</li><li>➤ Set the process Fast/Slow switch (SW4) in fast position and controller fast/Slow switch(SW3) in slow position.</li><li>➤ Apply a Square wave of <math>2V_{p-p}</math> at around 50HZ.</li><li>➤ Patch I and I' and adjust the integral time until steady state deviation is Zero.</li><li>➤ Note down the number of overshoots before the system settles.</li><li>➤ Connect D and D' and slowly increase the derivative time and note down the effect of this, in system response.</li></ul>	
<b>PRECAUTIONS TO BE FOLLOWED</b>	
<ul style="list-style-type: none"><li>➤ Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.</li><li>➤ Check for loose connections.</li></ul>	
<b>RECORD TO BE MAINTAINED</b>	
<ul style="list-style-type: none"><li>➤ Laboratory Manual containing the experiments that can be performed with the equipment.</li><li>➤ Maintenance Record.</li></ul>	

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CONTROL AND INSTRUMENTATION LAB

**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Synchro Transmitter Receiver
Purpose	To know about the performance characteristics of synchros .
Scope	Can be applied for automatic correction of changes due to disturbance in the angular position of the load.
Responsibility	Faculty Incharge of the facility, HOD/EEE

**STANDARD OPERATING PROCEDURE FOR SYNCHROS**

- The connections should be given as per the experiment to be performed referring to the lab manual.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- Power 'ON' the ON/OFF Switches.
- Connect the mains supply to the system with the help of cable provided, do not connect any patch cords to the terminals marked S1, S2, and S3.
- Switch ON sw1 and Sw2 and the main supply.
- Experimental procedure to be followed as given in the manual.
- Upon completion of the experiment switch OFF the supply mains.

**PRECAUTIONS TO BE FOLLOWED**

- Handle the pointers for both the rotors in a gentle manner.
- Do not attempt to pull out the pointers.
- Do not short rotor or stator terminals.

**RECORD TO BE MAINTAINED**

- Laboratory Manual containing the experiments that can be performed with the equipment.
- Maintenance Record.

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**CONTROL AND INSTRUMENTATION LAB**

**STANDARD OPERATING PROCEDURE**

Name of the Lab / Facility	Control and Instrumentation Lab
Name of the equipment	Ward Leonard Speed Control system Transfer Function Study Trainer
Purpose	To obtain the transfer function of speed control of dc motor by conducting Various tests.
Scope	smooth speed control of the DC motors over a wide range in both the directions can be obtained.
Responsibility	Faculty Incharge of the facility, HOD/EEE
<b>STANDARD OPERATING PROCEDURE FOR WARD LEONARD SYSTEM OF SPEED CONTROL OF DC MOTOR</b>	
<ul style="list-style-type: none"><li>➤ The connections should be given as per the experiment to be performed referring to the lab manual.</li><li>➤ Connections thus given shall be verified by the course instructor or lab in-charge.</li><li>➤ Switch on the control power supply to the trainer module.</li><li>➤ Release gating signals to ac regulator.</li><li>➤ The field of generation is connected to variable field voltage.</li><li>➤ Connect the rotor field to fixed dc in front panel.</li><li>➤ Upon completion of the experiment switch OFF the supply mains.</li></ul>	
<b>PRECAUTIONS TO BE FOLLOWED</b>	
<ul style="list-style-type: none"><li>➤ Make Sure that your connection are correct.</li><li>➤ Do not touch the live wire.</li><li>➤ Take observation carefully.</li></ul>	
<b>RECORD TO BE MAINTAINED</b>	
<ul style="list-style-type: none"><li>➤ Laboratory Manual containing the experiments that can be performed with the equipment.</li><li>➤ Maintenance Record.</li></ul>	

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