



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



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 ARMATURE AND FIELD CONTROLLED DC MOTOR	
<ul style="list-style-type: none">➤ 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	
<ul style="list-style-type: none">➤ 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	
<ul style="list-style-type: none">➤ Laboratory Manual containing the experiments that can be performed with the equipment.➤ Maintenance Record.	


Prepared by


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Principal



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

STANDARD OPERATING PROCEDURE FOR PID CONTROLLERS

- 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.
- Set the process Fast/Slow switch (SW4) in fast position and controller fast/Slow switch(SW3) in slow position.
- Apply a Square wave of $2V_{p-p}$ at around 50HZ.
- Patch I and I' and adjust the integral time until steady state deviation is Zero.
- Note down the number of overshoots before the system settles.
- Connect D and D' and slowly increase the derivative time and note down the effect of this, in system response.

PRECAUTIONS TO BE FOLLOWED

- Do not touch any of the terminals while the power is being supplied. Doing so may result in electric shock.
- 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	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

STANDARD OPERATING PROCEDURE FOR WARD LEONARD SYSTEM OF SPEED CONTROL OF DC MOTOR

- 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.
- Switch on the control power supply to the trainer module.
- Release gating signals to ac regulator.
- The field of generation is connected to variable field voltage.
- Connect the rotor field to fixed dc in front panel.
- Upon completion of the experiment switch OFF the supply mains.

PRECAUTIONS TO BE FOLLOWED

- Make Sure that your connection are correct.
- Do not touch the live wire.
- Take observation carefully.

RECORD TO BE MAINTAINED

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


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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING



STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	LVDT (Linear variable differential transformer)
Purpose	To help the students to acquire knowledge about the operation of Linear Variable Differential Transformer
Scope	Linear variable differential transformer (LVDT) is an inductive transducer used to translate the linear motion into electrical signals
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- Supply is switched on.
- Adjust the micrometer to read 200m. This position is called as end of transducer position.
- Adjust the span adjustment pot to read 10mm.
- Now adjust the micrometer. This position is called negative end of transducer position.
- No need to adjust any further for this as the displacement automatically reads -10.
- Repeat above two steps repeatedly till we get the absolute value.

PRECAUTIONS TO BE FOLLOWED

- Care should be taken that the experiment is conducted under end of transducer position.

RECORD TO BE MAINTAINED

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

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STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	ANDERSON'S BRIDGE
Purpose	To help the students to acquire knowledge about the use of ANDERSON'S BRIDGE for measuring the value of inductance
Scope	The value of unknown inductance can be measured by using the resistance parameters of different values in the bridge circuit close to ± 2 %
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- Switch on the trainer kit & connect the unknown inductance in the arm marked R_1 .
- Observe the sine wave at the secondary of the isolation transformer by using CRO.
- Vary the resistance R from minimum position in a clockwise direction.
- Connect the CRO between the ground & the output point and check for the balance condition.
- For further fine balance vary the resistance r_1 which will compensate for the resistive component of the inductor.
- Remove the wiring and measure the values of R and r_1 using DMM.
- The above steps are repeated for different values of unknown inductance.
- On completion of the experiment, kit should be switched off and the connections should be removed.

PRECAUTIONS TO BE FOLLOWED

- Care should be taken that the experiment is conducted under balance condition.

RECORD TO BE MAINTAINED

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

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STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	SCHERING BRIDGE
Purpose	To help the students to acquire knowledge about the A.C use of SCHERING BRIDGE for measuring the value of unknown capacitance
Scope	The value of unknown capacitance can be measured by using the resistance of different values in the bridge circuit and hence the quality factor can be calculated
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- Set the value of given capacitance.
- Set the fixed resistance R2.
- Vary the resistance value or R1.
- Switch off the kit and remove the terminals from R1 and measure R1.
- Calculate the value of capacitance and quality factor.
- The above steps are repeated for different values of unknown inductance.
- On completion of the experiment, kit should be switched off and the connections should be removed.

RECORD TO BE MAINTAINED

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

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STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	WHEATSTONE BRIDGE
Purpose	To help the students to acquire knowledge about the use of DC WHEATSTONE BRIDGE for measuring the value of the resistance
Scope	To find the value of the resistance by suitable bridge connections and compare it with the value measured by the multimeter.
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- The unknown resistance R_x is connected.
- The variable resistance is varied to show the galvanometer zero to make the bridge under balanced condition.
- After getting null indication, switch off the supply and find the variable resistance value using multimeter.
- Repeat the same steps for various resistance values.
- On completion of the experiment, kit should be switched off and the connections should be removed.

PRECAUTIONS TO BE FOLLOWED

- Care should be taken that the experiment is conducted under balance condition i.e there should be no current flow through the galvanometer

RECORD TO BE MAINTAINED

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


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STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	KELVIN'S DOUBLE BRIDGE
Purpose	To help the students to acquire knowledge about the KELVIN'S DOUBLE BRIDGE for measuring the value of low resistance
Scope	Kelvin's double bridge provides more accuracy in measurement of low value of resistances.
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- Supply is switched on.
- The bridge becomes unbalanced when unknown resistance R is connected.
- The bridge is balanced by varying standard resistance.
- Unknown resistance is calculated using balance equation.
- The above steps are repeated for various values of unknown resistance.
- On completion of the experiment, kit should be switched off and the connections should be removed.

PRECAUTIONS TO BE FOLLOWED

- Care should be taken that the experiment is conducted under balance condition.

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STANDARD OPERATING PROCEDURE

Name of the Lab./facility	Control and Instrumentation Lab
Name of the equipment	THERMO COUPLE
Purpose	To help the students to acquire knowledge about the THERMO COUPLE for measuring the value of temperature
Scope	THERMO COUPLE is used in measurement of temperature
Responsibility	Faculty Incharge of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- 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.
- Supply is switched on.
- The temperature is controlled for various values.
- Hence the temperature increases the voltages
- Equivalent values of temperature and voltage reading are noted.
- The graph is plotted between the voltage and temperature values
- On completion of the experiment, supply should be switched off and the connections should be removed.

PRECAUTIONS TO BE FOLLOWED

- Care should be taken that the experiment is conducted with gradual increase in voltage as the temperature is increased .

RECORD TO BE MAINTAINED

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

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