VINAYAKA MISSION'S RESEARCH FOUNDATION

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

STANDARD OPERATING PROCEDURE

Name of the Lab / Facility	POWER ELECTRONICS AND DRIVES
Name of the equipment	**IGBT CHOPPER**
Purpose	To give deep knowledge on the working of a Chopper with its relevant waveforms.
Scope	Chopper with best power semi conductor device will be identified and employed for various applications.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 04)
- Connect the power semi conductor terminals properly which is employed for chopper operation.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- To perform the experiment supply mains have to be switched on.
- Rated input voltage should be given for the chopper operation.
- Tabulate the readings, draw the waveform and analysis it for the output voltage, output current for various load.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON.

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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STANDARD OPERATING PROCEDURE

Name of the Lab / Facility	POWER ELECTRONICS AND DRIVES
Name of the equipment	**RESONANT DC TO DC CONVERTER**
Purpose	To give deep knowledge on the working of a resonant DC-DC with its relevant waveforms.
Scope	To acquire the knowledge on resonant converters working and its relevant waveforms.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 07)
- Switch ON the triggering module.
- Set the carrier wave switching frequency is equal to resonant frequency.
- Switch ON the power module.
- Observe the output voltage and current waveforms.
- By varying the reference signal the output voltage control is achieved.
- Switch OFF the trainer. Change the LC value and observe the voltage waveforms.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON.

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**CHARACTERISTICS KIT**
Purpose	To measure the characteristics of power semiconductor devices.
Scope	Based on the characteristics obtained, suitable power semiconductor device will be selected for Converter, Inverter, Chopper etc… circuits.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 01)
- Connect the power semi conductor terminals properly.
- Increase and decrease the voltage to the terminals of the power semiconductor devices based the ratings of the devices and follow the procedure to obtain the readings.
- Tabulate the readings and draw the characteristics of the respective power semi conductor device.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**CYCLOCONVERTER**
Purpose	To provide knowledge and working of Cycloconverter
Scope	Experimental training to the working of Cycloconverter and analysis of its relevant waveform.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 08)
- Patch the firing circuit unit.
- Switch on the Firing circuit unit through the power on Indicator switch providing the front panel.
- Then press soft start switch.
- Study and observe the various stages of waveform through the appropriate test point.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**SINGLE PHASE AC VOLTAGE CONTROLLER**
Purpose	To study the single-phase ac voltage controller.
Scope	Experimental training to the working of AC voltage control and analysis of its relevant waveform.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 09)
- Connections are given as per the circuit diagram
- Initially potentiometer kept at minimum position so lap does not glow at this instant.
- Note the voltage across the power semiconductor device.
- Potentiometer is now placed at medium and then to minimum position and their voltages were noted.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**VOLTAGE COMMUTATED CHOPPER**
Purpose	To study the operation of voltage commutated chopper and analysis of its relevant wave forms.
Scope	Voltage commutation of chopper and its advantages over current commutation will be identified.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 05)
- Connect the power semi conductor terminals properly which is employed for chopper operation.
- Connections thus given shall be verified by the course instructor or lab in-charge.
- To perform the experiment supply mains have to be switched on.
- Verify the unity and frequency of the triggering circuit using parts provided on the triggering circuit.
- After then switch ON the trigger OFF-ON position
- Switch ON the trainer then switch ON the input dc supply circuit breaker.
- Rated input voltage should be given for the chopper operation.
- Tabulate the readings, draw the waveform and analysis it for the output voltage, output current for various load.
- Connect the CRO probe across the commutated chopper.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON.

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**SINGLE PHASE PWM INVERTER**
Purpose	To give deep knowledge on the working of an inverter with its relevant waveforms.
Scope	Experimental training to the actual working of PWM based inverter using IGBT.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 06)
- Switch ON the mains supply of the controller unit.
- Press INC key to set the duty cycle. After setting the duty cycle and frequency, press RUN/STOP key
- Connect driver output signals to the Gate and Emitter of corresponding IGBTs.
- Switch ON the DC supply.
- Switch ON the driver outputs and observe the output voltage across the load.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**CONVERTER KIT**
Purpose	To give deep knowledge on the working of a converter with its relevant waveforms.
Scope	Proper converter will be selected and employed for applications.
Responsibility	Faculty i/c 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.
  (Power Electronics Lab - Experiment No : 02&03)
- Connect the power semi conductor terminals properly which is employed for converter operation.
- Rated input voltage should be given for the converter operation.
- Tabulate the readings, draw the waveform and analysis it for the output voltage, output current for various load.

PRECAUTIONS TO BE FOLLOWED

- Don't short circuit the terminals of power semiconductor devices.
- Check the fuse of the kit before switching ON.

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	POWER ELECTRONICS AND DRIVES
Name of the equipment	**INTELLIGENT POWER MODULE**
Purpose	To study the open loop and closed loop speed control of DC and AC motor
Scope	Control of dc motor and three phase induction motor using IGBT intelligent power module.
Responsibility	Faculty i/c of the facility, HOD/EEE

STANDARD OPERATING PROCEDURE

- The connections should be given as per the experiment to be performed referring to the lab.

  EXP.NO. 10 & EXP.NO. 11
- Connections thus given shall be verified by the course instructor or lab in-charge
- To perform the experiment supply mains have to be switched on.
- Power supply to the controller board to be switched on.
- Connect the terminals as per the control strategies.
- Switch ON the MICRO - 2812 DSP trainer kit.
- Power ON the Intelligent Power Module.
- Check whether shutdown LED "SD" glows or not. If 'SD' LED glows, press the Reset switch, the LED gets OFF.
- Download the program to the MICRO - 2812 Kit
- Apply load and perform the required control operation.

PRECAUTIONS TO BE FOLLOWED

- Don't connect the CRO probe at the output terminal of the IPM without isolation
- If user wants to see the high voltage waveform using CRO, please connect one isolation transformer between auto transformer and IPM otherwise remove the earth terminal of the CRO power card.
- If the protection circuit LED in the IPM is glow during the operation, user must reset the trainer kit first and then reset the power module.
- Please do not insert any add-on card while the trainer is powered ON.
- The headers should be used only with cables and not with wires soldered from the pins.

RECORD TO BE MAINTAINED

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

Prepared by

Approved by

Principal