



**DEPARTMENT OF BIOMEDICAL ENGINEERING
BIOSENSORS AND MEASUREMENT DEVICES LAB
STANDARD OPERATING PROCEDURE**

Name of the Lab	Biosensors and measurement devices lab
Purpose	To obtain the ECG Waveform of the Subject and view the same using DSO and understand the working methodology of various modules.
Scope	Acquisition of Electro Cardio Gram.
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE FOR ECG TRAINER KIT

This section should describe how to use the device ECG Trainer Kit

- Connect the instrument to the mains.
- Instrument ON by mains Switch, the switch will be lighted.
- Connect the DSO to the instrument.
- Connect the electrodes to system and Select the required Lead by selector switch.
- Now clean the skin where the electrode connects & apply small amount of conductive gel on electrodes and connect the electrodes to human body or ECG simulator.
- Now vary the Gain knob of amplifier or Voltage / Div knob of DSO as per requirement, also vary Time / Div as per requirement.
- Now change position of lead selector switch & see the output or on the test point.
- If any noise is found on DSO, check the Ground. If Ground or electrodes are not proper the signal gets distorted.

PRECAUTIONS TO BE FOLLOWED

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- ECG amplifier is a very sensitive electronic instrument. The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out with water and soap after each use.
- The instrument should be protected from damage due to accidental spray from liquids. If liquid spilled over the instrument, they will short circuit or damage components and other surfaces.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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STANDARD OPERATING PROCEDURE**

Name of the Lab	Biosensors and measurement devices lab
Purpose	To obtain the EEG Waveform of the Subject and view the same using DSO and understand the working methodology of various modules.
Scope	Acquisition of Electro Encephalo Gram.
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed.

STANDARD OPERATING PROCEDURE FOR EEG ELECTRODE

- Connect the instrument to the mains.
- Instrument ON by mains Switch, the switch will be lighted.
- Connect the DSO to the instrument.
- Connect the electrodes to system and Select the required Lead by selector switch.
- Connect the electrodes to system, Put Mode switch at Left position & Left channel selector Switch at No 1 position.
- Clean the skin where the electrode place & apply small amount of conductive gel or use disposable electrodes.
- Now connect the electrodes and acquire the signal on the DSO and make eyes activity up or down, left or right.
- Now vary the Gain knob of amplifier or Voltage / Div knob of DSO as per requirement, also vary Time / Div as per requirement.
- If any noise is found on DSO, check the Ground. If Ground or electrodes are not proper the signal gets distorted.

PRECAUTIONS:

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- EEG amplifier is a very sensitive electronic instrument. The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out with water and soap after each use.
- The instrument should be protected from damage due to accidental spray from liquids. Protect instrument from fluids and if spilled over the instrument, they will short circuit or damage components and other surfaces.
- Do not use damaged power cord, Electrodes, connector & other peripherals.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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STANDARD OPERATING PROCEDURE**

Name of the Lab	Biosensors and measurement devices lab
Purpose	To obtain the EMG Waveform of the Subject and view the same using DSO and understand the working methodology of various modules.
Scope	Acquisition of Electro MyoGram.
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE FOR EMG TRAINER KIT

- Connect the instrument to the mains.
- Instrument ON by mains Switch, the switch will be lighted.
- Connect the DSO to the instrument.
- Connect the electrodes to system.
- Clean the skin where the electrode place & apply small amount of conductive gel or use disposable electrodes.
- Now connect the electrodes and acquire the signal on the DSO and make some muscle activity voluntarily or by external stimulations.
- Now vary the Gain knob of amplifier or Voltage / Div knob of DSO as per requirement, also vary Time / Div as per requirement.
- If any noise is found on DSO, check the Ground. If Ground or electrodes are not proper the signal gets distorted.

PRECAUTIONS:

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- EMG amplifier is a very sensitive electronic instrument. The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out with water and soap after each use.
- The instrument should be protected from damage due to accidental spray from liquids. If liquid spilled over the instrument, they will short circuit or damage components and other surfaces.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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STANDARD OPERATING PROCEDURE

Name of the Lab	Biosensors and measurement devices lab
Purpose	To obtain the Electrical changes in the Resistance of Skin (Galvanic Skin Response)
Scope	Acquisition of GSR.
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE FOR GSR TRAINER KIT

- Connect the instrument to the mains.
- Instrument ON by mains Switch, the switch will be lighted.
- Connect the DSO to the instrument.
- Connect the electrodes to system.
- Clean the skin where the electrode place & apply small amount of conductive gel or use disposable electrodes.
- Now connect the electrodes and acquire the signal on the DSO.
- Make some movements and identify the fluctuations in the Skin Resistance. Note that the gain should not be adjusted during these stages.
- If any noise is found on DSO, check the Ground. If Ground or electrodes are not proper the signal gets distorted.

PRECAUTIONS:

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- Medical amplifier is a very sensitive electronic instrument. The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out with water and soap after each use.
- The instrument should be protected from damage due to accidental spray from liquids. If liquid spilled over the instrument, they will short circuit or damage components and other surfaces.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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STANDARD OPERATING PROCEDURE

Name of the Lab	Biosensors and measurement devices lab
Purpose	To acquire the vital signs like ECG, SpO2, NIBP and temperature of the subject and evaluate its variation based on several conditions of the subject.
Scope	Acquire and Analyse the vital signs like ECG, SpO2, NIBP and temperature of the subject
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE FOR PATIENT MONITORING SYSTEM

- Connect various probes and sensors to the device.
- Switch ON the instrument and wait for the instrument to get ready after completing the self test.
- Now clean the skin where the electrode connects & apply small amount of conductive gel (if required) on electrodes and connect the electrodes to human body.
- Acquire the signals in the instrument and analyse the trends of the same.
- Repeat the above procedures for different patient conditions and observe the variations and the source of variations.

PRECAUTIONS:

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- Patient Monitor is a very sensitive electronic instrument. The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out after each use.
- The instrument should be protected from damage due to accidental spray from liquids. Protect instrument from fluids and if spilled over the instrument, they will short circuit or damage components and other surfaces.

Do not use damaged power cord, Electrodes, connector & other peripherals.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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STANDARD OPERATING PROCEDURE**

Name of the Lab	Biosensors and measurement devices lab
Name of the Equipment	Digital pH Meter
Purpose	To Measure the pH Value and temperature of any sample solution.
Scope	Measure the pH value and Temperature
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE DIGITAL pH METER

- Connect various probes and sensors to the device.
- Switch ON the instrument and wait for the instrument to get ready after completing the self test.
- Now clean the electrode and place in the solution whose pH and temperature is to be measured.
- Wait for the value to stabilise.
- Repeat the procedure for different solutions.
- Calibrate the equipment whenever necessary.

PRECAUTIONS:

- The handling of patient electrodes and the controls of this instrument must always be entrusted only to qualified biomedical person.
- The quality signals are easily affected by the use of unclean badly connected or improperly placed electrodes. Electrodes must also be cleaned out after each use.
- The instrument should be protected from damage due to accidental spray from liquids. Protect instrument from fluids and if spilled over the instrument, they will short circuit or damage components and other surfaces.
- Do not use damaged power cord, Electrodes, connector & other peripherals.
- Do not stir the solution using the pH Electrode.

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**DEPARTMENT OF BIOMEDICAL ENGINEERING
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Name of the Lab	Biosensors and measurement devices lab
Name of the Equipment	INSTRUMENTATION AMPLIFIER
Purpose	To achieve the highest CMRR (Common Mode Rejection Ratio), high-precision resistors are used (0.1 % tolerance or better)
Scope	<ul style="list-style-type: none"> • They are used extensively in Bio-medical applications like ECG's and EEG's. • Instrumentation Amplifiers are used where long-term stability is essential like Industrial applications that includes automation.
Responsibility	Faculty In Charge of the Lab – Monitoring if the students are following the SOP & recommending revisions wherever needed

STANDARD OPERATING PROCEDURE INSTRUMENTATION AMPLIFIER

- This has been the industry standard, high performance, low cost amplifier.
- It is completely monolithic available in both 8-lead DIP and SOIC packages. The user can obtain any desired gain from 1 to 1000 using a single external resistor.
- By design, the fixed resistor values for gains of 10 and 100 are standard 1% metal film resistor values.

PRECAUTIONS:

- A common mistake in using these versatile amplifiers is to fail to provide a path for input bias current.
- It sounds as if it is laboratory equipment like an oscilloscope or spectrum analyzer, complete with ready-to-use inputs. Well, that's almost true but it requires a bit more care.
- Each input connects directly to the base of a bipolar transistor gate of a FET. The bipolar transistor requires base current to operate.
- The floating thermocouple voltage source does not provide a path for that current. Without this current path the input will saturate creating an invalid output voltage.

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