



**DEPARTMENT OF BIOMEDICAL ENGINEERING  
STANDARD OPERATING PROCEDURES (SOP)**

<b>Name of the Lab/Faculty</b>	<b>Bio Transducer lab</b>
<b>Purpose</b>	To provide training to the students to practice the basic theories of Transducers and its characteristics with the hands on experience using the trainer kits.
<b>Scope</b>	This course provides to understand the purpose of measurement, principle of transduction, classifications and the characteristics of different transducers and study its biomedical applications
<b>Responsibility</b>	Faculty i/c of the Lab, HOD/BME
<p><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF TEMPERATURE TRANSDUCER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment. The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> The display indicates the room temperature. Note down the temperature and voltage at the test point T5.</li> <li><input type="checkbox"/> Dip the RTD sensor into the water bath.</li> <li><input type="checkbox"/> Switch on the water bath.</li> <li><input type="checkbox"/> Dip the thermometer into the water bath.</li> <li><input type="checkbox"/> Note down the actual temperature in the thermometer, display temperature and voltage at T5 for every 10 degrees.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <p>The trainer kit is switched on only after checking the connections. After completing the experiment, the trainer kit is switched off and the connections are disconnected.</p> <p><b>RECORD TO BE MAINTAINED</b></p> <ol style="list-style-type: none"> <li>1. Laboratory manual that contains the various experiments that can be performed with the trainer kit.</li> <li>2. An observation record.</li> </ol>	

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**STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF TEMPERATURE MEASUREMENT USING THERMISTOR AND ITS LINEARIZATION CHARACTERISTICS**

- The connections should be given in the trainer kit as per the experiment.
- The connections are to be verified by the instructor before switching on the trainer kit.
- The display indicates the room temperature.
- Note down the temperature and voltage at the test point T5.
- Dip Thermistor sensor into the water bath.
- Switch on the water bath.
- Dip the thermometer into the water bath.
- Note down the actual temperature in the thermometer, voltage at T5 for every 10 degrees and display temperature
- After completing the experiment, the trainer kit is switched off and the connections are removed.

**PRECAUTIONS TO BE FOLLOWED**

- The trainer kit is switched on only after checking the connections.
- After completing the experiment, the trainer kit is switched off and the connections are disconnected.

**RECORD TO BE MAINTAINED**

- Laboratory manual that contains the various experiments that can with the trainer kit.
- An observation record

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Responsibility	Faculty i/c of the Lab, HOD/BME
<p><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF HALL EFFECT TRANSDUCER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Bring the magnet near to the Hall Effect transducer</li> <li><input type="checkbox"/> Note down the voltage &amp; current. Connect the various loads like buzzer, motor &amp; LED &amp; note down the change in current. .</li> <li><input type="checkbox"/> Note down the voltage &amp; current.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections. After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can be performed with the trainer kit. An observation record.</li> </ul>	

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Responsibility	Faculty i/c of the Lab, HOD/BME
<b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF OPTICAL TRANSDUCERS</b>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Connect module G13 to unit TY13/EV.</li> <li><input type="checkbox"/> Set the switch of the Phototransistor conditioner block to the position A.</li> <li><input type="checkbox"/> Set the multimeter for current measurements and connect it between terminal 23 and ground.</li> <li><input type="checkbox"/> Connect module G13 to all necessary supplies.</li> <li><input type="checkbox"/> Set the lamp to the maximum distance with the slide.</li> <li><input type="checkbox"/> With the Set-point positioned at the maximum value which corresponds to a light of 370 lux, set the PID controller proportional knob to the maximum.</li> <li><input type="checkbox"/> Move the lamp near the light transducer with the slide and in correspondence to the divisions shown on the panel, read the current value indicated by the multimeter and report them in the table.</li> <li><input type="checkbox"/> Plot a graph with illumination on x-axis and current on y-axis and draw the points detected.</li> <li><input type="checkbox"/> The characteristic curve of the transducer is obtained by joining these points.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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Responsibility	Faculty i/c of the Lab, HOD/BME
<p><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF LVDT</b></p>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Connections are given as per the circuit diagram.</li> <li><input type="checkbox"/> The screw gauge is adjusted for minimal voltage.</li> <li><input type="checkbox"/> The core is moved in clockwise direction with the help of screw gauge.</li> <li><input type="checkbox"/> The output voltage for each 1 mm displacement was added and noted.</li> <li><input type="checkbox"/> The displacement core was brought to initial position and moved in anticlockwise direction.</li> <li><input type="checkbox"/> Again the output voltage for each 1 mm displacement was noted.</li> <li><input type="checkbox"/> A graph is plotted between displacement and output voltage (Eo).</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul>	
<p><b>PRECAUTIONS TO BE FOLLOWED</b></p>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections. are disconnected.</li> </ul>	
<p><b>RECORD TO BE MAINTAINED</b></p>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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Responsibility	Faculty i/c of the Lab, HOD/BME
<p align="center"><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF STRAIN GAUGE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Connect the multimeter to the strain gauge as shown.</li> <li><input type="checkbox"/> Verify the system and check if it is calibrated .</li> <li><input type="checkbox"/> Measure the output voltage for empty pan.</li> <li><input type="checkbox"/> Add 100 gram of weight and measure the output voltage and record it.</li> <li><input type="checkbox"/> Repeat the above process.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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Responsibility	Faculty i/c of the Lab, HOD/BME
<p><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF POTENTIOMETER TRANSDUCER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Connections are given as per the circuit diagram.</li> <li><input type="checkbox"/> RPS is switched ON and 10 V is supplied to the potentiometer.</li> <li><input type="checkbox"/> The wiper position of potentiometer is varied in steps of 2 cm and corresponding voltmeter readings are noted down.</li> <li><input type="checkbox"/> The load rheostat is connected across the potentiometer.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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<b>Responsibility</b>	Faculty i/c of the Lab, HOD/BME
<b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF PRESSURE TRANSDUCERS</b>	
<ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Slowly rotate the screw rod in clockwise direction with the help of handle until flange lift up (so that pressure is developed up to applied load).</li> <li><input type="checkbox"/> Now observed the digital reading.</li> <li><input type="checkbox"/> If it is not showing zero then make it zero by rotating ZERO knob. Now instrument is calibrated.</li> <li><input type="checkbox"/> Apply the load up to 10Kgs one by one on the flange and give pressure by rotating the screw rod such that the dial gauge reads 1 to 10 with respect to load applied.</li> <li><input type="checkbox"/> Note down the readings of dial gauge and pressure indicator, simultaneously in every step.</li> <li><input type="checkbox"/> Calculate the error and % error.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> <li><input type="checkbox"/></li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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<p><b>STANDARD OPERATING PROCEDURE FOR CHARACTERISTICS OF PIEZOELECTRIC TRANSDUCERS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The connections should be given in the trainer kit as per the experiment.</li> <li><input type="checkbox"/> The connections are to be verified by the instructor before switching on the trainer kit.</li> <li><input type="checkbox"/> Connect vibration pickup cable to the vibration analyser sensor socket.</li> <li><input type="checkbox"/> Power on: SPDT switch supplied AC mains into indicator.</li> <li><input type="checkbox"/> Allow the instrument is ON position for 10 minutes for initial warmup</li> <li><input type="checkbox"/> Adjust the Zero balance pot so that the display reads 000</li> <li><input type="checkbox"/> Gently tap the plate on which the sensor is mounted at regular interval with a small metal or wooden piece.</li> <li><input type="checkbox"/> You can notice the display increasing by varying the frequency continually.</li> <li><input type="checkbox"/> Also by taking at various forces you can notice the display value increase as the force increases.</li> <li><input type="checkbox"/> Apply dynamic force on the sensor the display will show the parameter selected depending on the force applied.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are removed.</li> </ul> <p><b>PRECAUTIONS TO BE FOLLOWED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> The trainer kit is switched on only after checking the connections.</li> <li><input type="checkbox"/> After completing the experiment, the trainer kit is switched off and the connections are disconnected.</li> </ul> <p><b>RECORD TO BE MAINTAINED</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Laboratory manual that contains the various experiments that can with the trainer kit.</li> <li>➤ An observation record</li> </ul>	

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