



Course Title:	<b>Fundamentals of Sensors Technology</b>	Semester	I
Course Code:	<b>BETCK105K/205K</b>	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory (ETC-I)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P: S)	2:2:0:0	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

### Course Learning Objectives

**CLO 1.** The student will come to know the various stimuli that are to be measured in real life instrumentation.

**CLO 2.** The student will be able to select the right process or phenomena on which the sensor should depends.

**CLO 3.** The student will be aware of the various sensors available for measurement and control applications.

**CLO4.** To discuss the working of different types and classification of sensors and transducers.

**CLO5.** To discuss the recent trends in sensor technology.

### Teaching-Learning Process

- Adopt different types of teaching methods to develop the outcomes through
- Power Point presentations and Video demonstrations or Simulations.
- Arrange visits to show the live working models other than laboratory topics.
- Adopt collaborative (Group Learning) Learning in the class.
- Adopt Problem Based Learning (PBL), which foster students' Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

### Module-1 Sensors and transducers (8 hours)

Introduction to sensors and transducers. Need for sensors in the modern world. Different fields of sensors based on the stimuli - various schematics for active and passive sensors. Classification of Transducers. Advantages and Disadvantages of Electrical Transducers. Requirements and Specifications of electrical transducers.  
(RBT Level: L<sub>1</sub>, L<sub>2</sub>, L<sub>3</sub>)

### Module-2 Sensors and transducers (Continued)

Strain Gauges-types, Load Cells, Proximity Sensors, Pneumatic Sensors, Light Sensors, Tactile Sensors, Smart Sensors, Fiber Optic Transducers, Digital Transducers- Frequency domain transducers, Digital Encoders, Digital Pressure transducers, Recent Trends – Smart Pressure Transmitters, Selection of Sensors, Rotary Variable Differential Transformer (RVDT), Synchros and Resolvers, Induction Potentiometers.  
(RBT Level: L<sub>2</sub>, L<sub>3</sub>)

### Module-3 Measurement of Non – Electrical Quantities (8 hours)

Temperature Measurement- RTD, Thermistors, Thermocouple thermometers, Radiation pyrometers, Optical pyrometers. Wire Anemometers. liquid flow meters.  
(RBT Level: L<sub>2</sub>, L<sub>3</sub>)

### Module-4 Measurement of Non – Electrical Quantities (continued (8 hours)

Measurement of Displacement, Measurement of Velocity/Speed, Measurement of Acceleration- Piezoelectric accelerometer, LVDT, Measurement of Torque, Measurement of Shaft Power, Measurement of Humidity, Gas analyzers  
(RBT Level: L<sub>2</sub>, L<sub>3</sub>)

**Module-5 Recent Technologies (8 hours)**

Film sensors, Micro-electromechanical sensors, Nano-sensors. Applications of Sensors–On-board Automobile sensors, home appliance sensors, Aerospace sensors, Sensors for manufacturing, medical diagnostic sensors, Sensors for Environmental Monitoring. ( RBT Level:L<sub>2</sub>,L<sub>3</sub>)

**Course outcome (Indicative)**

At the end of the course the student will be able to:

1. Understand different types of sensors and transducers for electrical quantities.
2. Apply suitable technology, related to various sensors and transducers
3. Analyze the Measurement of Non-electrical quantities

**Course Assessment and Evaluation Details (both CIE and SEE)****Continuous Internal Evaluation: 50 marks**

Theory Assessment Tool	Marks	Reduced marks
IAT-1	25	25
IAT-2	25	
Assessment -1	25	25
Assessment-2(activity based)	25	

**Semester End Examination (SEE) : 50 marks**

SEE	Marks	Reduced marks
Course end examination (Answer any one question from each unit – Internal choice)	100	50

**Suggested Learning Resources:****Test Books**

1. Electrical and Electronic Measurements and instrumentation R.KRajput S. Chand 3rd Edition, 2013
2. Sensors and Transducers, DPatranabis PHI Learning Second Edition, May 2015

**Reference Books**

1. Sensors for safety and process control in hydrogen technologies. Hübert, Thomas, Lois Boon-Brett, and William Buttner CRC Press 2018
2. A Course in Electrical and Electronic Measurements and Instrumentation John .P. Uyemura, John Wiley A. K. Sawhney- Dhanpat Rai & Co., Delhi 2018 reprint

**Web links and Video Lectures (e-Resources):**

- [NPTEL :: Electrical Engineering - NOC:Sensors and Actuators](#)
  - [Bing Videos](#)
  - [Sensors and Transducers and Introduction \(electronics-tutorials.ws\)](#)

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Role play
- Circuit Debugging
- Visit to Electromechanical Industries

**COs and POs Mapping (CO-PO mappings are only Indicative)**

CO'S	PO's											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2							1			
CO2	3	2							1			
CO3	3	2							1	1		

**Level 3- Highly Mapped,   Level 2-Moderately Mapped,   Level 1-Low Mapped,   Level 0- Not Mapped**