**SENSOR TECHNOLOGY**

**(Open Elective – I)**

| **Course Code** | 20EC2501A | **Year** | III | **Semester** | I |
|---|---|---|---|---|---|
| **Course Category** | OE-1 | **Branch** | Offered by EC | **Course Type** | Theory |
| **Credits** | 3 | **L-T-P** | 3-0-0 | **Prerequisites** | Nil |
| **Continuous Internal Evaluation:** | 30 | **Semester End Evaluation:** | 70 | **Total Marks:** | 100 |

| **Course Outcomes** | |
|---|---|
| Upon successful completion of the course, the student will be able to | |
| **CO1** | **Understand** the concept of sensors and its characteristics. (L2) |
| **CO2** | **Select** the physical principles of sensing based on sensor signals and systems (**L**3) |
| **CO3** | **Identify** the sensor interfacing with various electronics circuits (L3) |
| **CO4** | **Utilize** the practical approach in design of technology based on different sensors.(L3) |
| **CO5** | **List** various sensor materials and technology used in designing sensors.(L4) |

**Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)**
**Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation**
*** - Average value indicates course correlation strength with mapped PO**

| **COs** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | | | | | | | | | | | 2 | | |
| **CO2** | 3 | | | | | | | | | | | | 3 | |
| **CO3** | 2 | | | | 2 | | | | | | | | 2 | |
| **CO4** | 2 | | | | 2 | | | | | | | | 2 | |
| **CO5** | | 2 | | | | | | | | | | | | 2 |
| Average | **3** | **2** | | | **2** | | | | | | | **2** | **3** | **2** |

**Syllabus**

| **Unit No.** | **Contents** | **Mapped CO** |
|---|---|---|
| I | **Sensors Fundamentals and Characteristics**<br>Sensors, Signals and Systems; Sensor Classification; Units of Measurements; Sensor Characteristics | CO1,CO2 |
| II | **Physical Principles of Sensing**<br>Electric Charges, Fields, and Potentials; Capacitance; Magnetism; Induction; Resistance; Piezoelectric Effect; Hall Effect; Temperature and Thermal Properties of Material; Heat Transfer; Light; Dynamic Models of Sensor Elements | CO1,CO2 |
| III | **Interface Electronic Circuits**<br>Input Characteristics of Interface Circuits, Amplifiers, Excitation Circuits, Analog to Digital Converters, Direct Digitization and Processing, Bridge Circuits, Data Transmission, Batteries for Low Power Sensors | CO1,CO3 |

| | | |
|---|---|---|
| IV | **Sensors in Different Application Area**<br>Occupancy and Motion Detectors; Position, Displacement, and Level; Velocity and Acceleration; Force, Strain, and Tactile Sensors; Pressure Sensors, Temperature Sensors | CO1,CO4 |
| V | **Sensor Materials and Technologies**<br>Materials, Surface Processing, Nano-Technology | CO1,CO5 |

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| **Learning Resources** |
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| **Text Books** |
| 1. J. Fraden, Handbook of Modern Sensors:Physical, Designs, and Applications, AIP Press, Springer<br><br>2. D. Patranabis, Sensors and Transducers, PHI Publication, New Delhi |
| **Reference Books** |
| 1. Mechatronics- Ganesh S. Hegde, Published by University Science Press (An imprint of Laxmi Publication Private Limited). |
| **e- Resources & other digital material** |
| 1. http://www.infocobuild.com/education/audio-video-courses/electronics/IndustrialInstrumentation-IIT-Kharagpur/lecture-34.html |