B.E. ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Choice Based Credit System (CBCS)
SEMESTER -VI

Sensors and Applications (3:0:0) 3
(Effective from the academic year 2021-22)

Course Code	21ET642	CIE Marks	40
Teaching Hours/Week (L:T:P):	3:0:0	SEE Marks	60
Total Number of Lecture Hours	40	Exam Hours	03

Course objectives:

This course will enable students to:

1. Understand the working of different types of transducers and sensors.
2. Describe recent trends in sensor technology and their selection.
3. Undertake complex and unstructured problem-solving real time challenges using sensors.
4. Have a multidisciplinary experience, integrating knowledge of courses in Electronics and Telecommunication engineering.

Introduction: Introduction to sensors and Applications; its significance and scope in the current scenario. Industrial applications, research and innovations related to sensors. Impact of the course on society problems, sustainable solutions, and national economy.

Module – 1

Sensors and Transducers:

Introduction, Classification of Transducers, Advantages and Disadvantages of Electrical Transducers, Transducers Actuating Mechanisms, Resistance Transducers, Variable Inductance Transducers, Capacitive Transducers, Piezoelectric Transducers, Hall Effect Transducers, Thermoelectric Transducers, Photoelectric Transducers.

(8 Hours)

Module – 2

Sensors and Transducers (continued):

Stain Gages, Load Cells, Proximity Sensors, Pneumatic Sensors, Light Sensors, Tactile Sensors, Fiber Optic Transducers, Digital Transducers, Recent Trends – Smart Pressure Transmitters, Selection of Sensors, Rotary – Variable Differential Transformer, Synchros and Resolvers, Induction Potentiometers, Micro Electromechanical Systems.

(8 Hours)

Module – 3

Data Acquisition Systems and Conversion:

Introduction, Objectives and Configuration of Data Acquisition System, Data Acquisition Systems, Data Conversion.

Data Transmission and Telemetry: Data/Signal Transmission, Telemetry. Measurement of Non – Electrical Quantities:Pressure Measurement

(8 Hours)

Module – 4

MCUs and DSPs for sensor:

Introduction, MCU control, MCUs for sensor interface, DSP control, Software, tools and support, sensor integration.

(8 Hours)

Module – 5

Sensor Communication and MEMS:

Wireless zone sensing, surface acoustical wave devices, intelligent transportation system, RF-ID, Micro optics, micro-grippers, micro-probes, micro- mirrors, FEDs, communications for smart sensors - sources and standards, automotive protocols, industrial networks, office and building automation, home automation, protocols in silicon, other aspects of network communications.

Summary of the Course: students will be acquire knowledge in different types of sensors and sensor communications along with MEMS.

(8 Hours)

Course outcomes: The course students will be able to:

CO1: Understand the understanding of working of various transducers and sensors, recent technologies.

CO2: **Apply** the knowledge gained in the developing different sensor applications.

CO3: **Analyze** the use of smart sensors in communication, MEMS and automation.

CO4: **Interpret** the given case study situation related to applications of sensors.

CO5: Perform in a **group** to **build** a small application and prepare the report for the same.

Textbooks
1. R.K Rajput, "Electrical and Electronic Measurements and instrumentation", 3rd Edition, S. Chand Publications, 2013.
2. Randy Frank, "Understanding Smart Sensors", 2nd Edition. Artech House Publications, 2013.

References
1. G. K. Ananthasuresh, K. J. Vinoy, S. Gopalakrishnan, K. N. Bhat, V. K. Aatre, "Micro and Smart Systems: Technology and modelling", Wiley Publications,2012.
2. J.B. Gupta, "A Course in Electronics and Electrical Measurements and Instruments", 13th Edition, Katson Books, 2008.