# EC 313: SENSORS & TRANSDUCERS (3-0-0: 3)

**Introduction to Sensor- Based Measurement Systems**

General Concepts And Terminology, Sensor Classification, General Input-Output Configuration, Static Characteristics Of Measurement Systems, Dynamic Characteristics, Other Sensor Characteristics, Primary Sensors, Materials For Sensors, Microsensor Technology

**Resistive, Reactance Variation, Electromagnetic Sensors**

Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Magnetoresistors, Light-Dependent Resistors (LDRs), Resistive Hygrometers, Resistive Gas Sensors, Liquid Conductivity Sensors, SignaF Conditioning for Resistive Sensors: Resistance Measurement, Voltage Dividers, Dynamic Measurements, Capacitive Sensors, Inductive Sensors, Electromagnetic Sensors.

**Flow, Pressure and Level Transducers**

Flow Transducers Like Differential Pressure, Variable Area, Positive Displacement, Electromagnetic, Anemometer, Ultrasonic Flow meter, Turbine Flow meter, Vortex Flow meter, Electromagnetic Flow meter, Coriolis Effect Flow meter, Pressure Transducers Like Mercury Pressure Sensor, Bellows, Membranes And Thin Plates, Piezoresistive Sensors, Capacitive Sensors, VRP Sensors, Optoelectronic Sensors, Vacuum Sensors, Level Transducers Like Displacer, Float, Pressure Gages, Balance Method, Time-Of-Flight Measurements, Level Measurements By Detecting Physical Properties.

**Temperature Sensors**

Thermoelectric Sensors: Thermocouples, Piezoelectric Sensors, Pyroelectric Sensors, Electrochemical Sensors, Acoustic Temperature Sensors, Nuclear Thermometer, Magnetic Thermometer, Semiconductor Types, Thermal Radiation, Quartz Crystal, NQR, Spectroscopic Noise Thermometry, Heat Flux Sensors.

**Digital and Semiconductor Sensors**

Position Encoders, Resonant Sensors, SAW Sensors, Sensors Based On Semiconductor Junctions, Sensors Based On MOSFET Transistors, Charge-Coupled And CMOS Image Sensors, Fiber-Optic Sensors, Ultrasonic-Based Sensors, Biosensors.

**Sensors for Robotics**

Proximity Sensors: Typical Sensor Characteristics, Technologies For Proximity Sensing, Electro-Optical Sensors, Capacitive Sensors, Magnetic Sensors.

**Text Books**

1. Patranabis D., "Sensors And Transducers", Prentice-Hall India.
2. Ramon Pallas & John G. Webster, "Sensors and Signal Conditioning", John Wiley & Sons

**References**

1. Webster John G., "Instrumentation and Sensors Handbook", CRC Press
2. Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs and Applications", Springer
3. Shawhney A. K., "Electrical And Electronics Measurements And Instrumentation", Dhanpat Rai & Sons.