

## V2EVEL08 SENSOR SYSTEMS FOR ELECTRIC VEHICLES

### **MODULE-I:** Sensor fundamentals and characteristics (8 Periods)

Definitions, Classification of sensors and actuators, General requirements for interfacing, Performance characteristics of sensors and actuators

### **MODULE-II:** Temperature & Optical sensors (9 Periods)

Temperature sensors: Thermoresistive sensors, Thermoelectric sensors, p–n junction temperature sensors.

Optical sensors: Quantum-based optical sensors, Photoelectric sensors, Charge coupled (CCD) sensors and detectors, Active far infrared (AFIR) sensors, Optical actuators.

### **MODULE-III:** Electric, magnetic and mechanical sensors (10 Periods)

Electric and magnetic sensors: Capacitive sensors - Capacitive position, proximity, and displacement sensors, Inductive sensor, eddy current sensor, Hall effect sensor, Voltage and current sensors.

Mechanical sensors: Force sensor, Acceleration sensor, Pressure sensor, Velocity sensor.

### **MODULE-IV:** Chemical, MEMS and smart sensors (9 periods)

Chemical sensors: Electrochemical sensors, Thermochemical sensors.

MEMS and smart sensors: MEMS sensors, Smart sensors, Wireless sensors and actuators and issues associated with their use, RFIDs and embedded sensors.

### **MODULE-V:** Interfacing methods and circuits & Interfacing to microprocessors (6 periods)

Interfacing methods and circuits: Amplifiers, Power amplifiers, Digital circuits.

Interfacing to microprocessors: The microprocessor as a general-purpose controller, General requirements for interfacing sensors and actuators

### **Textbooks:**

1. Nathan Ida, Sensors, Actuators and their interfaces, Second Edition, 2020, IET
2. Jacob Fraden, "Hand Book of Modern Sensors: physics, Designs and Applications", 2015, 3rd edition, Springer, New York.