

GUJARAT TECHNOLOGICAL UNIVERSITY

Power Electronics

B. E. SEMESTER: VI

Subject Name: **Industrial Instrumentation**

Subject Code: **162401**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	0	2	5	70	30	50

Sr. No.	Course Contents	Total Hrs
1.	Introduction: <ul style="list-style-type: none">• Principle of transduction• Classification based on various criteria• Characteristics and parameters• Characterization	4
2.	Mechanical And Electromechanical Sensors: <ul style="list-style-type: none">• Types and Working principles of Resistive Sensors, Inductive Sensors, Capacitive Sensors, Piezo Electric Sensor, Ultrasonic Sensors	4
3.	Thermal Sensors: <ul style="list-style-type: none">• Types and working principles of Thermal Sensors.• Various thermal sensors like Gas thermometry, Thermal expansion, acoustic temperature sensor, Magnetic, Resistive, Thermo electric, Thermal radiation type, semiconductor, quartz crystal, spectroscopic, noise thermometry, Heat flux, NQR thermometry	4
4.	Magnetic Sensors: <ul style="list-style-type: none">• Types and working principles of magnetic sensors• Sensors based on various effects like magnetic field, magneto elastic, magnetic elastic, Torque/ force, magneto resistive, hall effect(magneto-galvanic), proximity, magneto-stiction etc.	4

5.	Radiation Sensors: <ul style="list-style-type: none"> • Basic Characteristics • Photo detectors • X-ray and nuclear radiation sensors • Fibre optic sensors 	4
6.	Electro-Analytical Sensors <ul style="list-style-type: none"> • Electrochemical cell, cell potential, Simple hydrogen electrode • Liquid junction and other potentials, polarization, reference electrodes • Sensor electrodes • Electro ceramics, ChemFET 	4
7.	Smart Sensors and Recent Trends In Sensor Technology: <ul style="list-style-type: none"> • Definition and properties • Primary sensors • Power supply, excitation and signal processing like amplification, filtering, conversion • Compensation for nonlinearity, noise, response time, drift, cross sensitivity, interference etc. • Interface with smart sensors , information coding and data communication, Automation • Technological trends in sensor technology like film sensors, Semiconductor IC technology, Micro-electromechanical systems, nano sensors etc. 	6
8.	Applications of Sensors and Transducers: <ul style="list-style-type: none"> • Use of various sensors for measuring temperature, flow, pressure, torque, position, force, strain, thrust, acceleration, velocity etc. • Concept of industrial automation. 	4

Textbook:

1. Sensors and Transducers, D. Patranabis

Reference Book:

1. A course in electrical and electronics measurement and instrumentation, A. K. Sawhney