

# GUJARAT TECHNOLOGICAL UNIVERSITY

## ELECTRONICS & COMMUNICATION (WIRELESS COMMUNICATION TECHNOLOGY) (44)

### SENSOR TECHNOLOGY

Subject Code: 2724406

M. E. Semester – II

**Type of course:** Open Elective

**Prerequisite:** Concept of internal characteristics of passive elements like resistor, capacitor, inductor etc., Diode and transistor working, knowledge of basic fundamentals of mechanical terms like position, strain, stress etc.

**Rationale:** The course provide good knowledge of working of different types of sensors used in various application areas. The course also provide knowledge of interfacing of electronic circuits with different sensors for it's applications in different fields.

#### Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

#### Content:

Sr.No.	Course Contents	TotalHrs	% Weightage
1	<b>Sensors Fundamentals and Characteristics</b> Sensors, Signals and Systems; Sensor Classification; Units of Measurements; Sensor Characteristics	7	10-12%
2	<b>Physical Principles of Sensing</b> 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	8	20-22%
3	<b>Interface Electronic Circuits</b> 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	7	20-22%
4	<b>Sensors in Different Application Area</b> Occupancy and Motion Detectors; Position, Displacement, and Level; Velocity and Acceleration; Force, Strain, and Tactile Sensors; Pressure Sensors, Temperature Sensors	8	18-20%
5	<b>Sensor Materials and Technologies</b> Materials, Surface Processing, Nano-Technology	6	18-20%

#### Reference Books:

1. J. Fraden, Handbook of Modern Sensors:Physical, Designs, and Applications, AIP Press, Springer
2. D. Patranabis, Sensors and Transducers, PHI Publication, New Delhi

3. Mechatronics- Ganesh S. Hegde, Published by University Science Press (An imprint of Laxmi Publication Private Limited).

**Course Outcome:**

1. Understand the concept of sensors and its characteristics.
2. Understand the practical approach in design of technology based on different sensors
3. Learn various sensor materials and technology used in designing sensors

**List of Experiments:**

Based on syllabus

**Open Ended Problems:**

1. Design weighn scale machine with “TARE” function.
2. Design excitation circuit for temperature sensor.

**Major Equipments :** Kits for different sensors used in various applications

**Learning website:** [www.nptel.ac.in](http://www.nptel.ac.in)

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.