



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3173911

Semester – VII

Subject Name: NANOSENSORS AND TRANSDUCERS

Type of course: Nanotechnology, materials science and Electronics.

Prerequisite: Synthesis of nano materials – II, Electrical and Optical Properties of Nanomaterials

Rationale: To make students understand the use of nanotechnology-based electronic devices in the sensor base field, the challenges to prepare nanotechnology-based electronic sensor for industries.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction to sensing system and nanotechnology: Introduction to nano sensor, nano sensing systems. Future scope of Sensor in industries. Future requirement of nanotechnology in sensing.	9
2	Sensing Enhancement of sensitivity, Enhancement of specificity, Nano-photonics based sensing, Nano-electronics based sensing	9
3	High impact of nanotechnology in sensing: Impact of Nanotechnology sensing in Medical health and wellness. Impact of Nanotechnology sensing in environment monitoring. Impact of Nanotechnology sensing in agriculture and food industries. Impact of Nanotechnology sensing in energy, transportation and national securities.	8
4	Nanotechnology based transducer for sensing: Introduction. Electro Transduction: One dimensional nanostructure based sensor, Liquid	8



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	and gas sensor array, Label free biological sensor, Carbon nano tubes, metal oxide and ceramic materials, conducting polymers, surface chemistry, Electromagnetic transduction, Spectroscopy transduction, magnetic transduction, mechanical transduction.	
5	Processing of Sensing device: Introduction, Fabrication, Designing and modeling, Foundries, Standardization, Packaging, Work force and Road map.	8

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
25	35	30	10		

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Environmental Applications of Nanomaterials: Synthesis, Sorbenis And Sensors, Imperial College Press, By Glen. E. Fryxell Guozhong Cao.
2. Emerging Nanotechnology, Discovery Publication House Pvt. Ltd., M. P. Arora.
3. Nanofabrication: Principles, Capabilities And Limits, Springer (India) Pvt. Ltd., Zheng Cui.
4. Nanotechnology-Enabled Sensors, Springer US;1 edition, Kourosh Kalantar-zadeh, Benjamin Fry

Course Outcomes:

Student will

Sr. No.	CO statement	Marks % weightage
CO-1	Apply basic concepts of different types of sensor and their applications in various fields of industries.	25%
CO-2	Understand role of transducer based sensing .	25%
CO-3	Understand the role of nanotechnology in high sensing sensor	25%



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CO-4	Apply Processing of Sensing device:	25%
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List of Experiments:

1. Preparation of thin film using spin coater.
2. Preparation of thin film using dip coater.
3. Preparation of thin film using spray drying technique.
4. Characterization of thin film.
5. Analysis of properties of prepared thin film.