Devi Ahilya University, Indore, India Institute of Engineering & Technology				**III Year B.E. (Electronics and Telecommunication)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
ETR5E3	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
SMART SENSORS AND MEMS	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objectives:

The student will gain a basic understanding of current MicroElectroMechanical Systems (MEMS) technology and industrial instrumentation systems, with particular emphasis on smart sensors and actuators. The course introduces the fundamental of measurement systems and focuses in particular on MEMS fabrication, MEMS transducer types and applications.

Prerequisite: Basic Electronics

COURSE CONTENTS

Unit 1: Principles of Sensing, Classification and Terminology of Sensors, Measurands. Some basic discussion about electric field, potential, capacitance, resistance etc.

Unit 2: Acoustic and Magnetic Sensors, Mechanical Sensors, Radiation and Thermal Sensors Chemical and Biosensors, Electronic Interface and Integrated Sensors/Design Projects/ Wireless integration.

Unit 3: Introduction to Microsystems, MEMS microsystem components, Microfluitics microsystem components, Microfluidics Continued microsystem components, Electronic/wireless integration, putting it all together- system design.

Unit 4: Introduction to Bulk Micromachining, Isotropic and Orientation Dependent Wet Etching, Dry Etching, Buried Oxide Process, Silicon Fusion Bonding, Sacrificial Layer Technology,

Unit 5: Surface Micromachining using Plasma Etching, ,Combined 1C Technology and Anisotropic Wet Etching, Processes Using Both Bulk and Surface Micromachining, Adhesion Problems in Surface Micromachining, Surface Versus Bulk Micromachining

Learning Outcomes:

At the end of this course, students will be able to:

1. Select the right sensor for a given application.
2. Design basic circuit building blocks.
3. Simulate, synthesize, and layout a complete sensor or sensor system
4. Design MEMS device or microsystem ready for fabrication tools.

BOOKS RECOMMENDED:

[1]. Brignell JE and White NM (1996). Intelligent sensor systems revised edition.
[2]. Beeby SP, Ensell GJ, Kraft M and White NM (2004). MEMS Mechanical Sensors.
[3]. Bentley JP (2005). Principles of measurement systems.

List of Practical Assignments:

- Based on Matlab toolboxes