

UEI831 BIOSENSORS AND MEMS

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Overview of biosensors and their electrochemistry: Molecular reorganization: Enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity
Fundamentals of surfaces and interfaces

Bioinstrumentation and bioelectronics devices: Principles of potentiometry and potentiometric biosensors, Principles of amperometry and amperometric biosensors, Optical Biosensors based on Fiber optics, FETs and Bio-MEMS, Introduction to Chemometrics, Biosensor arrays; Electronic nose and electronic tongue

MEMS Technology: Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology – Lithography, Etching, MEMS material, Bulk micromachining, Surface micromachining, Microactuator, electrostatic actuation, Micro-fluidics

MEMS types and their applications : Mechanical MEMS – Strain and pressure sensors, Accelerometers etc., Electromagnetic MEMS – Micromotors, Wireless and GPS MEMS etc
Magnetic MEMS – all effect sensors, SQUID magnetometers, Optical MEMS – Micromachined fiber optic component, Optical sensors, Thermal MEMS – thermo-mechanical and thermo-electrical actuators, Peltier heat pumps

COURSE LEARNING OUTCOME (CLO):The student will be able to

1. Understand the concept molecular reorganization, fundamentals of surfaces and interfaces
2. Understand the Principles of different types of biosensors
3. Understand the concept of MEMS design, and fabrication technology and its applications.

Text Books:

1. Gardner, J.W., *Microsensors, Principles and Applications*, John Wiley and Sons (1994).
2. Kovacs, G.T.A., *Micromachined Transducer Sourcebook*, McGraw-Hill (2001).
3. Turner, A.P.F., Karube, I., and Wilson G.S., *Biosensors – Fundamentals and Applications*, Oxford University Press (2008).

Reference Books:

1. Trimmer, W., *Micromechanics and MEMS*, IEEE Press (1990).

Evaluation Scheme:

Sr. No.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	45
3	Sessionals (May include Assignments/Projects/Tutorials/Quizzes/Lab Evaluations)	25