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16BT302 BIOSENSORS

Hours Per Week :

L	T	P	C
3	1	-	4

Course Description and Objectives:

This course offers an insight into the usage of biomolecules as recognition elements for detection of a particular analyte and biological elements such as proteins in place of silicon chips. The objective of the course is to impart knowledge on types of biosensors, their working principles and applications.

Course Outcomes:

Upon completion of the course, the student will be able to

CO1: Acquire knowledge on concepts of biosensors & biological computers.

CO2: Analyze bio-samples by using bio-affinity, and microbial based and bio-catalysis based biosensors.

CO3: Design of biosensors for biotechnological applications.

CO4: Evaluate various types of transducers for biosensors.

CO5: Develop bio-molecules and its assembly in Bioelectronics field.

SKILLS:

- ✓ *Immobilize enzymes and biomolecules on solid platforms.*
- ✓ *Choose the appropriate sensing method for detection of specific biomolecules and pathogens.*

UNIT - 1 L-9, T-3

INTRODUCTION: Biosensors- advantages and limitations; Various components of biosensors; Biocatalysis based biosensors; Bioaffinity based biosensors and microorganisms based biosensors; Biologically active material and analyte; Types of membranes used in biosensor constructions.

UNIT - 2 L-9, T-3

TRANSDUCERS IN BIOSENSORS: Various types of transducers; Principles and applications - colorimetric, optical, potentiometric/amperometric, conductometric/resistometric, piezoelectric, semiconductor, impedimetric and chemiluminiscence.

UNIT - 3 L-9, T-3

APPLICATIONS OF BIOSENSORS: Biosensors in clinical chemistry, medicine and health care; Biosensors for veterinary, agriculture and food; Low cost biosensor for industrial processes for online monitoring; Biosensors for environmental monitoring; Application of enzymes in analysis; Design of enzyme electrodes and their application as biosensors in industry, healthcare, food and environment.

UNIT - 4 L-9, T-3

BIOELECTRONICS: Potential advantages and developments towards a biomolecular computer; Development of molecular arrays as memory stores; Molecular wires and switches; Mechanisms of unit assembly.

UNIT - 5 L-9, T-3

DESIGN FOR A BIOMOLECULAR PHOTONIC COMPUTER: Assembly of photonic biomolecular memory store; Information processing; Commercial prospects for biomolecular computing systems.

TEXT BOOKS:

1. B. R. Eggins, "Chemical sensors and biosensors", 1st edition, John Wiley and Sons Publishers, 2002.
2. J. Yoon, "Introduction to Biosensors", 1st edition, Springer, 2013.

REFERENCE BOOK:

1. V. C. Yang, "Biosensors Theory and Applications", 1st edition, Plenum Publishers, 2000.

ACTIVITIES:

- *Demonstrate glucose sensor parts, function and its principle.*
- *Develop paper based sensors for detection of pesticides.*