20BT016 BIOSENSORS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P
45	-	-

WA/RA	SSH/HSH	CS	SA	S	BS
-	-	-	-	-	-

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 successful completion of this course, the student will be able to

- Extend principles of engineering to the development of bio-analytical devices and the design of sensors.
- Understand the basic configuration and distinguish biosensor systems.
- Explore and improve the performance range of biosensors.
- Cope up with current developments in biosensors and bioelectronics applications.

SKILLS:

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

UNIT - I

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 - II

Transducers in Biosensors: Various types of transducers; Principles and applications - calorimetric, optical, potentiometric / amperometric, conductometric /resistometric, piezoelectric, semiconductor, impedimetric and chemiluminiscence.

UNIT - III

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 - IV

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 - V

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.