



CBCS SCHEME

21BT752

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2025 Biosensors and Applications

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the classification of biosensors based on their transducing elements. (10 Marks)
- b. Illustrate the principles and applications of optical biosensors on environmental monitoring. (10 Marks)

OR

- 2 a. Define immune-biosensor and whole-cell biosensors and discuss their applications in food safety. (10 Marks)
- b. Provide an overview of biosensor applications in medicine, agriculture and water quality monitoring. (10 Marks)

Module-2

- 3 a. What is ELISA (Enzyme - Linked Immunosorbents Assay)? Discuss its working mechanism with examples of its applications in biomarker detection. (10 Marks)
- b. Discuss catalytic biosensor, such as glucosensors, highlighting their mechanisms and relevance in medical diagnostics. (10 Marks)

OR

- 4 a. Describe the significance of biomarker testing and detection sensors in medical diagnostics, providing examples of recent advancements. (10 Marks)
- b. Explain the role of DNA, enzymes and antibodies in the functioning of biosensors, providing relevant case studies. (10 Marks)

Module-3

- 5 a. What are different biomolecule adsorption techniques? Explain. (10 Marks)
- b. Explain the kinetics between the enzyme and substrate. (10 Marks)

OR

- 6 a. Give two examples of whole-cell sensing and their applications. (10 Marks)
- b. Discuss strategies to improve the stability and reproducibility of biosensors under varying operating conditions. (10 Marks)

Module-4

- 7 a. Compare the principles and applications of voltmetry and amperometry in biosensing. (10 Marks)
- b. Compare the advantages and limitations of SPR versus fluorescence based detection techniques. (10 Marks)

OR

- 8 a. Compare and contrast the principles of UV – Vis spectroscopy and fluorescence spectroscopy. (10 Marks)
- b. How do redox process contribute to electrochemical sensing? Provide a detailed explanation. (10 Marks)

Module-5

- 9 a. Highlight the recent advancements in biosensors for environmental monitoring and healthcare. (10 Marks)
- b. Analyze the factors driving the growth of biosensor market and potential challenges in its expansion. (10 Marks)

OR

- 10 a. Discuss the applications of wearable biosensor in continuous glucose monitoring and cardiovascular health. (10 Marks)
- b. Explain how microfabrication technique have revolutionized the development of wearable biosensors. (10 Marks)
