



# CBCS SCHEME

21BT752

## Seventh Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.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. What are biosensors? Explain the basic components of biosensors. Classify the types of biological recognition elements. (10 Marks)
- b. What are ion-selective field-effect transistors (FETs) and how are they utilized in biosensor systems? (10 Marks)

OR

- 2 a. Describe the working principles and applications of electrochemical sensors in biosensor technology. (10 Marks)
- b. Discuss thermometric biosensors, highlighting their mechanism and potential applications in healthcare. (10 Marks)

### Module-2

- 3 a. Describe the principle, methodology and applications of amplification techniques such as PCR in biosensor technology. (10 Marks)
- b. Analyze the working principles of Surface Plasmon Resonance (SPR) biosensors and their applications, citing biocore as an example. (10 Marks)

OR

- 4 a. Compare and contrast antibody based and DNA based biosensors, providing examples of their applications in disease detection. (10 Marks)
- b. Explain the role of nanomaterials in advancing biosensor technology, with case studies on their applications. (10 Marks)

### Module-3

- 5 a. Describe the principles behind labelled and label-free techniques, giving suitable examples for each in bioaffinity sensors. (10 Marks)
- b. How can whole-cell sensing be employed for detecting environmental pollutants? Illustrate with examples. (10 Marks)

OR

- 6 a. List any four characteristics that affect biosensor performance. Briefly describe each. (10 Marks)
- b. Describe the basic characteristics of biosensors. (10 Marks)

### Module-4

- 7 a. With a schematic diagram, explain the principle and working of UV-Vis spectroscopy. (10 Marks)
- b. Explain the working principle of impedance spectroscopy. Add a note on its applications. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 8 a. With a schematic diagram, explain the principle and working of fluorescence spectroscopy. (10 Marks)
- b. Discuss the construction and working of ion-selective electrodes in potentiometry. (10 Marks)

**Module-5**

- 9 a. Discuss the working principles and applications of microfluidics in point-of-care diagnostics. (10 Marks)
- b. How do mobile biosensors contribute to managing outbreaks of diseases like COVID 19 or tuberculosis? (10 Marks)

OR

- 10 a. Describe the role of smart phone integrated biosensors in real-time detection of infectious agents. (10 Marks)
- b. Explain the design and working of textile-based biosensor for health monitoring. (10 Marks)

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