

Ref. No.: EX/PG/BME/T/128B/2025

Master of Biomedical Engineering Examination, 2025

(1st Year, 2nd Semester)

Biosensors and Devices

Time: Three hours

Part-I (50 Marks)

Full Marks: 100

Use separate answer script for each part

Answer any five questions

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|------|---|----------|
| Q-1) | Describe and explain with neat sketch the principle of operation of pH meter | 10 Marks |
| Q-2) | Describe briefly glucose sensor with neat sketch and explain its operation. | 10 Marks |
| Q-3) | Describe and explain the operation of Linear Variable Differential Transformer (LVDT) used as displacement transducer | 10 Marks |
| Q-4) | Describe and explain the operation of an automated biochemical analysis system. | 10 Marks |
| Q-5) | Describe a tissue-based biosensor and explain its operation. Include neat sketch in your answer. | 10 Marks |
| Q-6) | Explain the principle of Chemiluminescence and describe a biosensor based on such principle. | 10 Marks |
| Q-7) | Explain the basic enzyme catalysis mechanism and deduce the mathematical expression for Line-Weaver Burk plot | 10 Marks |
| Q-8) | Describe Ion Sensitive Field Effect Transistor and explain its operation | 10 Marks |

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MASTER OF BIO-MEDICAL ENGINEERING FIRST YEAR SECOND SEMESTER – 2025

BIOSENSORS AND DEVICES

Part – II

Marks: 50

Answer any five questions.

(5X10)=50

1. Write short note on pH activated drug delivery system. Name two pH sensitive polymers used as drug delivery matrix. What is ion trapping?
2. Write the drawbacks of conventional DDS. Propose an ideal drug delivery system with the help of a diagram and one example.
3. Classify newer DDS based on the technical sophistication. Write a short note on blood-brain barrier. What is the major cause of individual variation in drug response?
4. What do you mean by plasma half life? If plasma conc. Of an intravenous injection (500mg) is 10mg/L and rate of elimination is 100mg/h then find $t_{1/2}$. Write a short note on magnetically activated DDS. Write the difference between matrix and reservoir system.
5. Write how insulin release in accordance to patient need could be made using different types of newer drug delivery systems.
6. Define drug as per WHO. What do you mean by drug delivery system? What do you mean by pharmacodynamics and pharmacokinetics? Provide one example each of the following:
Antifungal preservatives, Antioxidant, Binders, Lubricant, Surfactant
7. Write a short note on factors governing the apparent volume of distribution of drugs.
8. What are the three basic requirements of newer drug delivery system? Differentiate between hydrodynamic pressure, hydration and hydrolysis activated DDS.