

**End Semester Examination**  
**Course Name: Analytical Biotechnology (BT 601)**  
**Time: 9.00-12.00, Dated: 12/05/2023**  
**Total Marks: 40**

**Q1.**

- A. What are the Computational Parts required for Recombinase-based AND gate in a logic circuit?
- B. Draw the work flow of Gibson Assembly for Construction of Recombinase-based AND gate.
- C. Show the operation of a stable memory maintenance over multiple cell generations using Recombinase-based AND gate.
- D. Show the operation of Recombinase-based NOR gate.
- E. Show diagrammatically that Recombinase-based logic and memory can implement digital-to-analog converters.

(Marks: 2x 5=10)

**Q2.**

- A. Draw **Gel electrophoresis diagram** to show autonomous **Motion of the DNA motor** at different time points. [Hint: DNA motor (E+F) and its substrate (S) were incubated at a motor/substrate ratio for varying time periods and then resolved by gel electrophoresis].
- B. Write operation of XOR Gate using DNazymes + Truth Table
- C. Show the operation of **Strand exchange** reactions for OR gate in Computing Mammalian cells by FRET
- D. Show with diagram the Piezoelectric Effect in AFM in response to applied mechanical stress.
- E. How can you determine the following materials a) amorphous, b) crystalline, c) polycrystalline, by TEM?

(Marks: 2x 5=10)

**Q3.**

- A. Describe diagrammatically the positive and the negative photoresists used in photolithography.
- B. Show the steps involved in fabrication of FET device for GSH detection.
- C. Draw the real-time analysis curve of GSH detection by FET.
- D. Draw the stability analysis curve for GSH detection using FET.
- E. Plot the Change in Drain Current for Blank surface, CDNB, GSH and GSH+CDNB on GST bound ZnO-NPs in FET

(Marks: 2x 5=10)

**Q4.**

- A. Show the working principle of ESI.
- B. Show the experimental overview of MALDI-TOF/TOF analysis for rAOx enzyme.
- C. How do you detect Early and Late Apoptosis by Flow Cytometry?
- D. Explain the concept of Pin-hole in Confocal Microscopy with diagram.
- E. How do you probe that the wheel and the Cargo reach the final desired position?

(Marks: 2x 5=10)