Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.SC. INDUSTRIAL BIOTECHNOLOGY(IB) - SEMESTER - 3 EXAMINATION - WINTER - 2023

Subject Code:1330104 Date: 07 Dec 2023

Subject Name:Metabolic Engineering

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat and clean diagrams as required**

Q.1 Write a note on following (Marks:10X2=20)

1. Define t_d and t_g. What if one cell divides into two?
2. Give any two limitations of Monod equation.
3. Define metabolism.
4. What is the relationship between the rate of reaction and concentration of substrate?
5. Give any two applications of TELENS.
6. What is BIOBRICKS?
7. Define metabolic flux.
8. Why might multiple genomic modifications be necessary for successful metabolite overproduction?
9. What is the role of enzymes in the regulation of metabolic pathways?
10. Define synthetic biology.

Q.2 Answer the following (Any 2 out of 3) (Marks:2X10=20)

1. Explain role of Phosphofructokinase 1 and Fructose 1,6-Bisphosphatase in the regulation of glucose metabolism.
2. Describe CRISPR-Cas system and its applications in gene modification.
3. Describe C^{13} labeling method for flux determination.

Q.3 Answer the following (Any 6 out of 8) (Marks:6X5=30)

1. Draw a neat and clean diagram of microbial growth cycle. Explain Monod model.
2. Explain the law of conservation of mass.
3. What is elemental balance? Describe in brief.
4. Write a short note on the degree of reduction.
5. Write a short note on organization of metabolic pathway.
6. Draw neat and clean diagram concerning Factors That Determine the Activity of Enzymes.
7. Write a short note on MOMA.
8. Explain iFBA in brief.

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