



CBCS SCHEME

15BT51

Fifth Semester B.E. Degree Examination, Jan./Feb.2021 Bio Kinetics & Bio Reaction Engineering

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- 1 a. Define the following with example:
(i) Rate (ii) Order (iii) Mechanism (08 Marks)
(iv) Elementary and Non Elementary reactions. (08 Marks)
b. Explain the temperature dependency of rate constant given by collision theory. (08 Marks)

OR

- 2 a. Explain Integral and differential method of analyzing kinetic data. (08 Marks)
b. Derive equation for II order biomolecular reaction for $M \neq 1$. (08 Marks)

Module-2

- 3 a. Derive a performance equation for batch reactor. (08 Marks)
b. In isothermal batch reactor, the conversion of liquid reactant A achieved in 13 min is 70%. Find the space time and space velocity to effect this conversion in plug flow reactor and in mixed flow reactor. Consider first order kinetics. (08 Marks)

OR

- 4 a. Explain the qualitative discussion of product distribution in parallel reaction. (08 Marks)
b. Explain the size comparison of CSTR and PFR. (08 Marks)

Module-3

- 5 a. What are the main cause for non ideality in a vessel? Explain. (04 Marks)
b. Explain RTD curve. (06 Marks)
c. Derive the relationship between C, E and F curve. (06 Marks)

OR

- 6 a. Derive the RTD equation for PFR. (08 Marks)
b. Explain in detail the conversion for 1st order reactions. (08 Marks)

Module-4

- 7 a. Derive M-M equation starting from all assumptions. (10 Marks)
b. Explain compitative inhibition. (06 Marks)

OR

- 8 a. The following data is obtained for two different initial enzyme concentration for an enzyme catalysed reaction.

$V([E_0] = 0.015 \text{ g/l})$ g / l - min	[S] g / l	$V([E_0] = 0.00875 \text{ g/l})$ g / l - min
1.14	20.0	0.67
0.87	10.0	0.51
0.70	6.7	0.41
0.59	5.0	0.34
0.50	4.0	0.29
0.44	3.3	
0.39	2.9	
0.35	2.5	

- (i) Find K_m .
 (ii) Find V_m for $[E_0] = 0.015 \text{ g/l}$
 (iii) Find V_m for $[E_0] = 0.00875 \text{ g/l}$
 (iv) Find K_2 (10 Marks)
- b. Explain allosteric and feedback regulation. (06 Marks)

Module-5

- 9 a. Derive Monod growth kinetics using ideal reactor. (06 Marks)
 b. Explain in detail primary and secondary product formation kinetics. (10 Marks)

OR

- 10 a. Define the following:
 (i) Degree of reduction.
 (ii) Overall growth yield.
 (iii) Respiratory quotient. (06 Marks)
- b. With neat sketch, explain the following :
 (i) Sterilization of liquid media.
 (ii) Filter sterilization. (10 Marks)
