U.S.N.										

B. M. S. College of Engineering, Bengaluru - 560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VII**
Branch: Chemical Engineering **Duration: 3 hrs.**
Course Code: 19CH7DCBCE **Max Marks: 100**
Course: Biochemical Engineering **Date: 12.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
Revealing of identification, appeal to evaluator will be treated as malpractice.

B.M.S.C.E. - ODD SEM 2021-22

UNIT - I

1. a) Enumerate the advantages and disadvantages of biological process. **04**

   b) Briefly discuss the role of chemical engineers in bioprocess industries. **08**

   c) Explain the Watson –Crick model of DNA and describe the important features of DNA molecules. **08**

UNIT - II

2. a) List out the major classes of enzyme proposed by international Union of Biochemistry and Molecular Biology. **04**

   b) Explain the effect of pH on % activity of enzyme. **06**

   c) Describe the steps incorporated in the production and purification of enzyme on commercial scale. **10**

OR

3. a) The following data have been obtained for an enzyme–catalyzed reaction on the substrate removal rate and substrate concentration **10**

[s] mol	0.002	0.005	0.02	0.04	0.06	0.08	0.10
Rate,r mol/min	0.045	0.115	0.285	0.38	0.46	0.475	0.505

Estimate the value of substrate removal rate constant Km and the value of Vmax.

   b) Derive the Michaelis-Menten expression for a single substrate biochemical reaction stating the assumption (steady state approximation). **10**

UNIT - III

4. a) Develop the rate expression for reversible competitive inhibition. **10**

   b) What is enzyme inhibition? Briefly explain any three types of inhibitions. **10**

OR

5. a) Describe the process of a immobilization of enzyme. **08**

b) Study on the hydrolysis of sucrose at pH = 4.5 and 25 ^{o}C using crude invertase obtained from baker's yeast in free and immobilized form. The following initial velocity data (Table 5.1) were obtained with 408 units of crude enzyme (1 unit = quantity of enzyme hydrolyzing 1mmol of sucrose/min when incubated with 0.29 *M* sucrose in a buffer at pH 4.5 and 25 ^{o}C). Determine the *Km* and *Vm* for this reaction using both free and immobilized enzyme. **08**

Table: 5.1 Initial velocity data

V0(mmol hydrolysed/1-min)		
Free enzyme	Immobilized enzyme	S(mol/l)
0.083	0.056	0.101
0.143	0.098	0.020
0.188	0.127	0.030
0.222	0.149	0.040
0.250	0.168	0.050
0.330	0.227	0.100
0.408	0.290	0.290

c) What are the uses of Dixon plot . **04**

UNIT - IV

6. a) Explain the growth patterns and kinetics in batch culture. **08**

b) What are the environmental factors that affect growth kinetics? Explain **06**

c) Derive an equation to find the Monod's constant. **06**

UNIT - V

7. a) Explain sterelization process used for the control of microorganisms. **10**

b) Explain in detail the physical methods and chemical methods of cell disruption. **10**

*****

B.M.S.C.E. - ODD SEM 2021-22