7th Sem
PE VI NOV'22

# Question Paper

Exam Date & Time: 21-Nov-2022 (02:00 PM - 05:00 PM)

## MANIPAL ACADEMY OF HIGHER EDUCATION

VII Semester B. Tech Chemical Engineering
End Semester Examination November 2022

**INTRODUCTION TO BIOCHEMICAL ENGINEERING [CHE 4064]**

**Marks: 50** **Duration: 180 mins.**

**Descriptive Questions**

**Answer all the questions.** Section Duration: 180 mins

1) List out at least four differences between prokaryotic and eukaryotic cell. (2)

A)

B) Describe the need of micronutrients and macronutrients for a cell. (3)

C) What are macromolecules? Mention any four macromolecules and discuss each one of them. (5)

2) What is the chemical basis of enzyme specificity? (2)

A)

B) Why is the rate of an enzyme-catalysed reaction proportional to the amount of [ES] complex? (3)

C) The initial velocity of an enzyme catalyzed reaction was measured at a series of different initial substrate concentrations. The data are shown in table below. Draw a Lineweaver Burk plot for this reaction. Determine the $K_m$ and $V_{max}$ for this enzyme. (5)

| [S] | υ |
|---|---|
| 0.02 **mM** | 10.83 **mM/s** |
| 0.04 **mM** | 18.57 **mM/s** |
| 0.07 **mM** | 26.76 **mM/s** |
| 0.1 **mM** | 32.50 **mM/s** |
| 0.15 **mM** | 39.00 **mM/s** |
| 0.2 **mM** | 43.33 **mM/s** |
| 0.3 **mM** | 48.75 **mM/s** |
| 0.5 **mM** | 54.17 **mM/s** |
| 0.7 **mM** | 56.88 **mM/s** |
| 1.0 **mM** | 58.12 **mM/s** |

3) Calculate the ratio of the substrate concentration required for 90 % of $V_{max}$ to the substrate concentration required for 10 % of $V_{max}$ (i.e., $[S]_{90}/[S]_{10}$) for an enzyme that obey Michaelis Menten kinetics. (2)

A)

B) Discuss about any three factors which influences the enzyme catalysed reaction. (3)

C) Write a series of known enzymatic reactions that result in the synthesis of pyruvate from glucose. (5)

4) Differentiate between active and passive transport across cell membranes. (2)

A)

B) What is Gibb's Free Energy? Mention its significance in biochemical reactions. (3)

C) Briefly describe Anaerobic and Autotropic metabolism. (5)

5) How do you measure the cell mass by direct method? (2)

A)

B) Explain Monod Model with underlying assumptions to predict the growth rate of a microbe. (3)

C) Describe in detail about the batch growth phases of a cell. (5)

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