

KATHMANDU UNIVERSITY  
End Semester Examination  
May/June, 2022

Marks Scored:

Level : B. Tech.

Year : III

Exam Roll No:

Time: 30 mins.

Course : BIOT 308

Semester : II

F. M. : 20

Registration No.:

Date : June-10, 2022

SECTION "A"

[20Q.  $\times$  0.5 = 10 marks]

Encircle the most appropriate option among the given choices.

1. The first enzyme to be crystallized was  
 Amylases       Nuclease       Urease       Phytase
2. The enzyme Peptidase has  
 Low specificity       Moderate specificity  
 High specificity       Stereospecificity
3. The enzyme lactate dehydrogenase falls under the category  
 Hydrolases       Oxidoreductases  
 Transferases       Isomerases
4. Which of the following techniques is used for salt removal during enzyme purification?  
 Centrifugation       Dialysis  
 Precipitation       Affinity chromatography
5. The following properties are maximized during enzyme purification except  
 Yield       Catalytic activity  
 Purity       Specificity
6. The unit of Michaelis constant ( $K_m$ ) is  
 mg        $\text{mgml}^{-1}$         $\text{mgs}^{-1}$         $\text{s}^{-1}$
7. The kinetic parameter  $K_{cat}$  is also known as  
 Catalytic activity       Specific activity  
 Turnover number       Catalytic efficiency
8. The reciprocal of Y intercept in Lineweaver-Burk (LB) plot is an estimation of  
  $K_m$         $1/K_m$         $v_{max}$         $1/v_{max}$
9. Which Inhibitors binds enzymes by noncovalent bonds with low dissociation rates?  
 Reversible inhibitors       Irreversible inhibitors  
 Tight binding inhibitors       Loose binding inhibitors

10. An increase in substrate concentration does not affect the inhibition in  
 Competitive inhibition                       Noncompetitive inhibition  
 Uncompetitive inhibition                       Tight binding inhibition
11. The study of enzyme mechanism involves the determination of the following properties except  
 Sequences of enzyme complexes               Rate of conversion of complexes  
 Structure of the complexes                       Interaction of the complexes with inhibitors
12. Which of the following statement is **TRUE**?  
 Enzyme does not alter the equilibrium constant of the reaction  
 Enzyme increases the equilibrium constant of the reaction  
 Enzyme decrease the equilibrium constant of the reaction  
 Enzyme may increase or decrease the equilibrium constant of the reaction
13. Enzymes are restricted to using amino acid side chains with pKa values between \_\_\_\_\_ as general acids and bases.  
 3 - 7                       4 - 10                       3 - 6                       4 - 7
14. Estimation of molecular weight of an enzyme can be except  
 Gel filtration                                       Ion exchange chromatography  
 SDS page     Ultracentrifugation
15. The useful upper limit for Edman degradation is  
 10-20 cycles of degradation                       30-40 cycles of degradation  
 40-60 cycles of degradation                       50-60 cycles of degradation
16. True for enzyme structure study with NMR  
 Enzymes higher than 25 kDa can be studied  
 Low protein concentration is required  
 Protein dynamics can be studied  
 Prolonged stability is not required
17. Non-Protein organic part of the protein is  
 Cofactor                       Coenzyme                       Apoenzyme                       Isoenzyme
18. The catalytic efficiency of an enzyme is best defined by the ratio  
  $K_{cat}/K_m$                         $K_m/K_{cat}$                         $K_{cat}/K_i$                         $K_i/k_m$
19. In determining the steady state kinetic constants for a system, it is best at least to cover substrate concentrations of  
 0.1 - 4.0  $K_m$                        0.25 - 5.0  $K_m$                        0.5 - 7.0  $K_m$                        0.4 - 5.0  $K_m$
20. Both  $k_m$  and  $v_{max}$  are affected in  
 Noncompetitive inhibition                       Competitive inhibition  
 Uncompetitive inhibition                       Oncompetitive inhibition

SECTION "B"  
[10 Q × 1 = 10 marks]

Fill in the blanks.

21. Enzymes increase the rate of reaction by as much as \_\_\_\_\_ folds.
22. The unit of specific activity of an enzyme is \_\_\_\_\_.
23. The catalytic efficiency of an enzyme is best defined by the ratio \_\_\_\_\_.
24. An example of enzyme with covalent catalysis is \_\_\_\_\_.
25. The number of amino acid residues in active site that takes part in catalysis by chymotrypsin is \_\_\_\_\_.
26. The assumption of  $k \ll k^{-1}$  is not required in \_\_\_\_\_ enzyme kinetic model.
27. The enzymes that join two molecules are classified as \_\_\_\_\_.
28. An enzyme is least soluble at its \_\_\_\_\_ point.
29. The techniques for determination of three-dimensional structure of enzyme is \_\_\_\_\_.
30. Inhibition of alcohol dehydrogenases by methanol is an example of \_\_\_\_\_ inhibition.



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SECTION "C"  
[3Q × 8 = 24 marks]

Attempt *ANY THREE* questions.

1. Explain the different steps for the purification of adenylate kinase from pig muscle.
2. Explain the different types of enzyme inhibition with an example for each type.
3. Derive the expression for enzymatic reaction rate using steady state kinetic model.
4. Explain the mechanism of enzymatic action of Triosephosphate isomerase.

SECTION "D"  
[31 marks]

Attempt *ANY SIX* questions. (**Q5 is compulsory**)

5. Write short notes on [2 × 3 = 6]
  - a. Lineweaver–Burk Plots
  - b. Proximity effects
6. List and briefly explain the different properties of enzymes as catalyst. [5]
7. Explain in brief the methods of determination of molecular weight of an enzyme. [5]
8. Draw a flowchart for the direct methods for determination of amino acid sequence of an enzyme. [5]
9. Explain how an enzyme increases the reaction rate by transition state stabilization. [5]
10. What are the different sources of enzymes? Discuss in brief? [5]
11. What are the significances of  $K_m$  and  $K_{cat}$  during the study of enzyme properties? [5]

