



Shahjalal University of Science & Technology, Sylhet
Department of Biochemistry and Molecular Biology
2nd Year 1st Semester B. Sc. (Hons) Final Examination, 2015
Course No: BMB-221 Course Title: Enzymology-I
Credit: 2.0 Total Marks: 50 Time: 2 Hours

Instructions:

- Number in the right side indicates the marks of the question.
- Marks for each question are same.
- Answer any two (2) questions from each Part (A and B)..

Part-A

1. a) What is enzyme? Write down the general properties of enzyme that make it different from chemical catalysts. 1+4
- b) Why enzymes are so large? Write down some common features of active sites. *over cell* 4.5
- c) Identify the class of the following enzymes- 0.5X6 =3.0

| | | |
|---------------------------|------------------|----------------|
| (i) Kinase | (ii) Epimerase | (iii) Catalase |
| (iv) Pyruvate carboxylase | (v) Ribonuclease | (vi) Fumarase |
2. a) What is enzyme assay? What are the different methods of enzyme assay, explain with example. *sal conc* *over cell with opti-ph-Len* 4.5
- b) How could we determine the activity of Pyruvate Kinase? Explain the reaction setup and preconditions of the assay method. 4
- c) Write down the factors affecting an enzyme assay? 4
3. a) How does enzyme-substrate binding energy contribute towards the reaction specificity and enhanced catalysis efficiency? 3+3
- b) Elaborate the Lock and Key model of enzyme kinetics. Why this model could not able to explain the actual enzyme kinetics? What is the modern model of enzyme kinetics? 2+2+2.5

Part-B

4. a) Draw the typical curve for substrate concentration against initial velocity of enzyme catalyzed reaction. Explain the reasons behind the observed pattern. 4
- b) Derive the Lineweaver-Burk plot equation from Michaelis-Menten equation and draw the graph. What are the major advantages and drawbacks of Lineweaver-Burk plot. 4.5
- c) Define K_m and k_{cat} . Write their significance in relation with substrate concentration. 4
5. a) Relation between Reaction Velocity and Substrate Concentration using Michaelis-Menten Equation. (a) At what substrate concentration would an enzyme with a K_m of 0.006 M operate at one-quarter of its maximum rate? (b) Determine the fraction of V_{max} that would be obtained at the following substrate concentrations: $0.5K_m$, $2K_m$, and $10K_m$. 2+3
- b) Write down the differences among the competitive, non-competitive and uncompetitive inhibitor. 3.5
- c) The K_m of a reaction is 5 mM. After using of an inhibitor of 10 mM, the apparent K_m is 20 mM, without any change in V_{max} . What type of inhibitor is this and calculates K_I for the inhibitor? 4
6. a) Write down the role/significance of enzyme in the following medical complications (Any three)- 3X3= 9.0
- (i) Myasthenia Gravis
- (ii) Hemolytic Anemia
- (iii) Treatment of Alcoholism
- (iv) Methanol toxicity
- b) Elaborate the statement "Chymotrypsin is not a peptidase at all, but an acyl group transferase". 3.5

$$\alpha = 1 + \frac{[I]}{K_I}$$

$$K = \frac{5}{5}$$