3/H–64 (iii) (Syllabus–2015)

2018

(October)

BIOCHEMISTRY

(Honours)

(Proteins and Enzymes)

(BCHEM–301)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer *any* **four** questions

1. *(a)* Outline how a protein is sequenced. 7

(b) A mixture of proteins mentioned below was applied to a gel filtration column. The exclusion range of the gel was 120000 Da. What will be the order of elution from the column? 3

Catalase ($P^I = 5{\cdot}6$, molecular weight = 242500 Da)

Lactoglobin ($P^I = 5{\cdot}2$, molecular weight = 37100 Da)

Hemoglobin ($P^I = 6{\cdot}9$, molecular weight = 64500 Da)

(c) Explain why enzymes are powerful and highly specific catalysts. 4

2. *(a)* Chymotrypsin, trypsin and elastase are proteolytic enzymes with similar characteristics but different specificities. Suggest possible binding site characteristics for each enzyme. 6

(b) Discuss the statement, 'enzymes enhance reaction rates and not the reaction equilibrium'. 4

(c) If at given concentration of reactants and products, the value of ΔG is zero, what can you conclude? 4

3. *(a)* Derive Michaelis-Menten equation using steady-state assumption. 8

(b) Discuss parameter(s) used to compare specificities of different enzymes towards their substrate. 4

(c) Briefly explain the unit of enzyme activity. 2

4. *(a)* What are coenzymes? Describe the role of pyridoxal phosphate as coenzyme. 2+7=9

(b) How does change in temperature affect the enzyme stability and activity? 5

(Continued)

5. *(a)* Briefly describe the mechanism of action of lysozyme. 7

(b) Write notes on the following : 3½×2=7

(i) Significance of activation energy and free energy

(ii) Advantages and disadvantages of Lineweaver-Burke plot

6. What are zymogens? Why are some enzymes synthesized and stored as zymogens? Explain the method of regulation of enzyme activity by proteolytic cleavage using chymotrypsin as an example. 2+3+9=14

7. *(a)* What do you understand by the term 'allosteric regulation'? Discuss using the sequential model. 8

(b) Explain covalent modification with respect to enzyme regulation with the help of suitable example(s). 6

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