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Total No. of Pages : 02

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B.Tech.(BT) (2011 Onwards) (Sem.–6)

ENZYMOLOGY AND ENZYME TECHNOLOGY

Subject Code : BTBT-603

Paper ID : [A2285]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

a. Differentiate between 'Isoenzymes' and 'Alleloenzymes'.

b. Significance of 'transition state' in enzyme catalyzed reaction.

c. At a very high substrate concentration, velocity of an enzyme-catalyzed reaction becomes independent of substrate concentration. Why?

d. How binding affinity of an enzyme can be correlated with its K_m value?

e. Give commercial applications of any two enzymes with their sources.

f. Why 'ethanol' is given while treating patients suffered from 'methanol poisoning'?

g. An enzyme catalyzed reaction follows first order kinetics with a rate constant of 0.0231 min^{-1}. Calculate its half life.

h. Indirect assay of an enzymatic reaction through one example.

i. Ping pong mechanism.

j. Hanes-Woolf plot.

SECTION-B

2. Explain the molecular basis of structural stability of enzymes with respect to folding and defolding.

3. Discuss the importance, working principle and design of fluidized bed reactor system in heterogenous enzymatic reactions.

4. Explain Thiele Modulus. Write down the expression for Thiele modulus for a first order reaction, spherical geometry.

5. Differentiate between Non-competitive and Uncompetitive inhibition of enzymes. Write their expressions and draw neat sketches with proper labeling.

6. Discuss enzyme-catalyzed processes in organic solvents.

SECTION-C

7. Why immobilization of enzymes is needed at commercial scale? Explain various methods of enzyme immobilization with neat diagrams. Also discuss their advantages and limitations.

8. Penicillin is hydrolyzed and made inactive by the enzyme penicillinase that is found in some resistant bacteria. The molecular weight of this enzyme in *S. aureus* is 29,400. The amount of penicillin hydrolyzed in 1 minute in a 10 mL solution containing 10 ng of penicillinase was measured at various concentrations of penicillin :

Penicillin (micromolar)	Amount hydrolysed (nmoles/minute)
1	0.11
3	0.25
4	0.34
10	0.45
30	0.58
50	0.61
60	0.62

   a. Using the graph paper on the next page, generate a double reciprocal plot of this data. Does penicillinase follow Michaelis-Menten kinetics? What is the K_m (in moles)?

   b. What is the V_{max} (in n moles/min)?

   c. Calculate the specific activity of the enzyme in terms of (i) units/mg protein and (ii) units/mole.

   d. What is the turnover number (k_{cat}) under these experimental conditions if there is one active site per enzyme molecule (in min^{-1})?

9. Comment on following :

   a. Parameters that affect enzyme kinetics.

   b. Allosteric enzymes (Explain it quoting with one classic example).