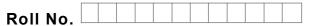
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B.Tech.(BT) (2011 Onwards) (Sem.–6) ENZYMOLOGY AND ENZYME TECHNOLOGY Subject Code : BTBT-603 Paper ID : [A2285]

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.

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- 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.

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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).

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