

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9589

Roll No.

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B.Tech.

(SEMESTER-IV) THEORY EXAMINATION, 2011-12

ENZYME ENGINEERING

Time : 3 Hours]

[Total Marks : 100

Note : Attempt **all** sections.

Section – A

1. Attempt **all** parts of the following : **10 × 2 = 20**
- (a) What are enzymes ? Discuss their effect on activation energy of a reaction.
 - (b) Differentiate between coenzymes and isoenzymes with examples.
 - (c) Describe any two mechanical methods for disruption of cell wall during enzyme extraction.
 - (d) Describe role of electrophoresis in enzyme purification.
 - (e) Discuss the significance of K_m and V_{max} .
 - (f) Define turnover number. What is its unit ? Write the equation to calculate turnover number.
 - (g) Describe deactivation kinetics.
 - (h) List advantages and disadvantages of enzyme immobilisation over free enzyme.
 - (i) Describe briefly the applications of biosensor in diagnostics.
 - (j) What do you mean by "Effectiveness Factor" for enzyme reactors ?

Section – B

2. Attempt any **three** parts of the following : **3 × 10 = 30**
- (a) Explain any one case study of enzyme purification from plant cell.
 - (b) Compare MWC model of allosteric regulation with KNF model of allosteric regulation.
 - (c) Discuss various techniques for enzyme immobilization with suitable examples.
 - (d) Write a note on enzyme reactors. Describe Fluidized-bed membrane reactor and Packed-bed reactor.

- (e) An enzymatic assay was carried under two different sets of conditions out using a pure substrate S. The results are tabulated below :

[S] / 10 ⁻⁵ M	V _o	
	Condition A	Condition B
1.5	0.21	0.08
2.0	0.25	0.1
3.0	0.28	0.12
4.0	0.33	0.13
8.0	0.44	0.16
16.0	0.40	0.18

- (i) Plot the data using the Lineweaver-Burke plot.
(ii) Calculate the values of V_{max} and K_m for both sets of conditions.

Section – C

Attempt **all** parts of the following :

5 × 10 = 50

3. Write a note on principle and steps involved in development of enzymatic assays.

OR

Describe different methods for characterization of enzymes.

4. Describe the Briggs Haldane approach for enzyme kinetics and derive the Michaelis-Menten equation.

OR

Explain multisubstrate kinetics with their behaviour on LB plot.

5. Derive modified MM equation for uncompetitive inhibition.

OR

Differentiate substrate inhibition and product inhibition with suitable examples.

6. Write a note on analytical, medical & industrial applications of immobilized enzymes.

OR

Describe the principle and functioning of biosensor. Explain any one biosensor, where enzyme electrode is being used.

7. Derive the equation for enzyme kinetic reaction in an immobilized CSTR.

OR

Write a note on enzyme inhibition and reactor performance.