

**IV B.Tech I Semester Supplementary Examinations, April/May 2005**  
**BIO-CHEMICAL ENGINEERING**  
**(Chemical Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. Discuss on the recent advances in animal and plant cell cultures.
2. (a) List out the different factors effecting enzyme activity.  
 (b) Discuss the following:
  - i. Effect of pH on enzyme kinetics.
  - ii. Effect of temperature on enzyme reaction rates.
3. A pesticide inhibits the activity of a particular enzyme A. Which can therefore be used to assay for the presence of the pesticide in an unknown sample. In the laboratory the initial rate data is obtained as given below.

S, mol/L	V, mol(L.mm) x10 <sup>6</sup> No inhibition	10 <sup>-5</sup> M inhibitor
3.3 x 10 <sup>-4</sup>	56	35
5.0 x 10 <sup>-4</sup>	71	45
6.7 x 10 <sup>-4</sup>	88	60
1.65 x 10 <sup>-3</sup>	128	100
2.2 x 10 <sup>-3</sup>	147	117

Is the pesticide a competitive or non-competitive inhibitor? Evaluate  $k_i$ ,  $v_{max}$  and  $k_m$ .

4. Write short note on
  - (a) Interactions and carriers used for enzyme immobilization by adsorption
  - (b) Surface functional groups useful for covalent enzyme attachment
5. Discuss in detail calvin cycle used for glucose from CO<sub>2</sub>.
6. A generated form of the logistic equation is proposed by Konak equation for batch bacterial growth.

$$\frac{1}{N^{a+b}} \frac{dN}{dt} = k \left( \frac{N}{N_{\infty}} \right)^a \left( 1 - \frac{N}{N_{\infty}} \right)^b$$

Where  $N_{\infty}$  = Stationary phase population

a, b = Constants.

N = Cell man.

Show that the maximum growth rate occurs at  $N/N_{\infty} = a/(a+b)$  and that its value is given by

$$\left. \frac{dN}{dt} \right|_{\max} = \frac{k N_{\infty}^{a+b} a^a b^b}{(a+b)^{a+b}}$$

7. Explain the change in power consumption for agitating a liquid when a gas is sparged below the impeller. What are the benefits of mechanical operation in Aerobic Bioprocess, which utilizes mold culture? Give a correlation which is useful for a heated or cooled CSTR?
8. Discuss the product formation patterned in Bioreactors? Why are antibiotic production process generally operated as Batch culture? How Lag time minimized?

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