Code No: NR410807 **NR**

IV B.Tech I Semester Supplementary Examinations, November 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. The three catalytic groups in the 307 amino acid enzyme carboxypepetidase are arginine 145, tyrosine 248, and glutamic acid 270. Calculate the relative positions of these three residues assuming that the molecule has only straight, a helix structure. What structural alternatives are used in the real molecule to bring these three residues together, within a few tenths of a nanometer, to effect catalysis? [16]

2. (a) Discuss about commercial applications of enzymes. [6]
   (b) Assuming a steady state conversion of a substrate into product with the help of an enzyme, derive a rate equation for the product formation considering Briggs- Haldane approach. [10]

3. The kinetic model of lactose hydrolysis by Asperigillus Niger Lactase can be described as as shown in the figure 1:

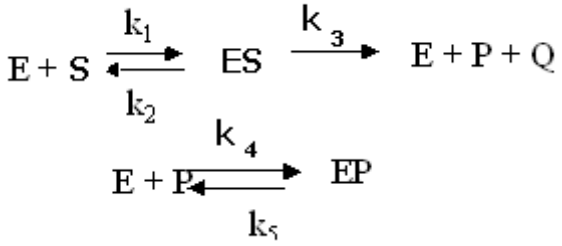

Figure 1:

Where S,P,Q,E are Lactose, galactose, glucose and free enzyme.

   (a) Derive the rate equation for the production of galactose by using Briggs-Haldane approach. [10]
   (b) Does galactose inhibit the reaction competitively or non-competitively? [6]

4. Write short note on
   (a) Physical and catalytic properties of immobilase glucose isomerase catalyst.[8]
   (b) Reaction conditions for glucose syrup isomerization in a packed column immobilized reactor. [8]

5. Explain in detail the products of secondary metabolite synthesis. [16]

6. A Strain of mold was grown in batch culture on glucose and the following data were obtained.

Time(h)	CellConcentraton(g/l)	GlucoseConcentraton(g/l)
0	1.25	99
9	2.45	97
16	5.10	90
23	10.5	77
30	22	48
34	33	21
36	38	9.5
40	42	0.6

   (a) Calculate the maximum net specific growth rate. [5]

   (b) Calculate the apparent growth yield. [5]

   (c) What maximum cell concentration could one expect if 160g of glucose were used with the same size inoculum? [6]

7. Explain Monod's Chemostat equation for a continuous culture. What are the non ideal conditions, which may affect the Ideal Continuous Stirred Tank Model? [16]

8. Explain the importance of sterilization in a fermentation process. [16]

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