

Total No. of Questions : 12]

SEAT No. :

P869

[4659]-293

[Total No. of Pages : 3

B.E. (Chemical)

c - BIOPROCESS ENGINEERING

(Elective - I) (Semester - I) (2008 Course) (Theory)

Time : 3 Hours]

[Max. Marks : 100

Instructions to the candidates:

- 1) *Answer 3 questions from Section - I and 3 questions from Section - II.*
- 2) *Answers to the two sections should be written in separate books.*
- 3) *Neat diagram must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*
- 5) *Assume suitable data if necessary.*

SECTION - I

- Q1)** a) Write down general structure of monosaccharides and their functions. [8]
b) Explain amino acid building blocks and polypeptides? [8]

OR

- Q2)** Explain with neat sketches important cell types? [16]

- Q3)** Explain manufacturing processes for: [16]
a) Lactic acid.
b) Butanol.

OR

- Q4)** a) Explain waste water treatment by anaerobic process. [8]
b) Manufacturing process of high fructose corn syrup (HFCS). [8]

- Q5)** An enzyme was assayed at an initial substrate concentration of $10^{-5}M$. The K_m for the substrate is $2 \times 10^{-5}M$. At the end of 1 min, 2% of the substrate has been converted to the product [18]

- a) What percent of the substrate will be converted to the product at the end of 3min? What would be the product and substrate concentrations after 3min?
- b) If the initial substrate concentration were $10^{-6}M$, what percent of the substrate will be converted to the product after 3min.
- c) What is the maximum attainable velocity with the enzyme concentration used?
- d) At about what substrate concentration will V_{max} be observed.
- e) At this substrate conc., what % of substrate will be converted to product?

OR

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- Q6) a)** Write a brief note on Enzyme Immobilized Technology. [8]
b) What are the factors of which influence the enzyme activity? Explain each factor in detail. [10]

SECTION - II

- Q7) a)** Ethanol formation from glucose is accomplished in a batch culture of *saccharomyces cerevisiae* and the following data were obtained [12]

Time(h)	Glucose(s)g/l	Biomass(X)g/l	Ethanol(P)g/l
0	100	.5	0.0
2	95	1.0	2.5
5	85	2.1	7.5
10	58	4.8	20.0
15	30	7.7	34.0
20	12	9.6	44.0
25	5	10.4	47.0
30	2	10.7	49.0

- i) By fitting the biomass data to the logistic equation determine the carrying capacity coefficient k .
 ii) Determine yield coefficient $Y_{p/s}$ & $Y_{x/s}$
b) A strain of mould was grown in a batch culture on glucose and the following data were obtained. [6]

Time(h)	Cell conc.(g/l)	Glucose conc. (g/l)
0	1.25	100
9	2.45	97
16	5.1	90.4
23	10.5	76.9
30	22	48.1
34	33	20.6
36	37.5	9.38
40	41	.63

- i) Calculate the max. net specific growth rate.
 ii) Calculate the apparent growth yield.
 iii) What max cell conc. could one expect if 150g of glucose were used with the same size in column.

OR

- Q8)** a) Explain the typical growth curve for bacterial population? [8]
b) Derive an expression for maximum possible dilution rate and also state its significance? [10]

- Q9)** a) Explain immobilized biocatalyst with suitable example and there application. [8]
b) Explain bubble column bioreactor. [8]

OR

- Q10)**a) Discuss and compare mechanically agitated contactor and bubble column reactor and fermenter. [8]
b) What is mean by critical oxygen concentration and its significance with respect to cell growth? [8]

Q11) Write short notes on: [16]

- a) Ultra filtration.
- b) Electro dialysis.
- c) Electrophoresis.
- d) Crystallization.

OR

- Q12)**a) Write Short notes on bioprocess economics. [8]
b) Discuss solvent extraction with examples used in bioseparations. [8]

