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Total Number of Pages : 02

B.Tech
PCE6J001

6th Semester Regular / Back Examination 2018-19
FUNDAMENTALS OF BIOCHEMICAL ENGINEERING

BRANCH : CHEM

Time : 3 Hours

Max Marks : 100

Q.CODE : F628

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part- I

Q1 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- a) What are the basic strategies of downstream processing?
- b) What are the basic differences between upstream and downstream processing?
- c) Mention the complexities that found in kinetic study of a biochemical reaction?
- d) What do you mean by Ostwald ripening?
- e) What type of bioreactors do you suggest for immobilized enzyme systems?
- f) What are the applications of enzymes in food and beverage industries?
- g) Why sterilization is required for bioprocessing?
- h) What are the different methods of cell disruption?
- i) Describe the effects of gas velocity on mass transfer rate in fermentation broths?
- j) Describe the growth associated and non-growth associated product formation in fermentation process.

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- a) Briefly explain the modern applications of biotechnology.
- b) What are the different techniques one can adopt for separation of insoluble after fermentation?
- c) Describe the five kingdoms classification of microorganism proposed by Whittaker.
- d) What is meant by immobilization of enzymes? Describe different methods of immobilization.
- e) Describe the Koshland induced-fit hypothesis for enzyme specificity.
- f) Briefly explain different methods of continuous sterilization?
- g) Derive Michaelis-Menten equation for enzyme kinetics from first principle?
- h) What are the different methods of controlling fermentation process condition? Describe them briefly.
- i) . What is solid state and submerged fermentation and give some applications of both.
- j) Describe the process of oxygen transfer methodology from the air bubble to the cell or cluster of cells in fermentation broths
- k) Briefly explain what are factors affecting oxygen transfer rate in fermentation process.
- l) What are the various effluent treatment methods? Describe them briefly.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain in details the design and construction of a fermentor. **(16)**

Q4 What are the various effluent treatment methods? Describe them briefly. **(16)**

Q5 The following data have been obtained for two different initial enzyme concentrations for an enzyme-catalyzed reaction. **(16)**

$v(E_0)=0.015\text{g/l}$ g/l-min	1.14	0.87	0.70	0.59	0.50	0.44	0.39	0.35
[S] (g/l)	20	10	6.7	5.0	4.0	3.3	2.9	2.5
$v(E_0)=0.00875\text{g/l}$ g/l-min	0.67	0.51	0.41	0.34	0.29			

a) Find K_m

b) Find V_m for $[E_0]=0.015\text{ g/l}$ and $[E_0]=0.00875\text{ g/l}$

c) Find K_2

Q6 Explain in details the production of biogas and what are the factors affecting methane formation? **(16)**