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Total number of pages : 02

B.Tech.  
PCCH4402

7<sup>th</sup> Semester Regular / Back Examination 2017-18  
Fundamentals of Biochemical Engineering

BRANCH : CHEM

Time : 3 Hours

Max Marks : 70

Question Code : B216

Answer Question No. 1 which is compulsory and any FIVE from the rest.

The figures in the right-hand margin indicate marks.

Assume suitable notations and any missing data wherever necessary.

Answer all parts of a question at a place.

**Q1. Answer the following questions : (2 x 10)**

- (a) What is anabolism?
- (b) What is the composition of gobargas?
- (c) What is meant by "specific oxygen uptake rate"?
- (d) Define g number or centrifuge effect.
- (e) Define limiting substrate concentration and write the expression for growth equation.
- (f) What is enzyme specificity? What are the various types of enzyme specificity?
- (g) Mentation the complexities that are found in kinetic study of a biochemical reaction.
- (h) What is product yield co-efficient?
- (i) Define the terms reflectivity and transmissivity.
- (j) What is meant by Del factor?

**Q2. (a) Write some applications of mass transfer in bio-processing. (3)**

**(b) What are the different methods of controlling fermentation process condition? Describe them briefly. (7)**

**Q3. (a) Describe the process of oxygen transfer methodology from the air bubble to the cell or cluster of cells in fermentation broths. (6)**

**(b) What are the various factors affecting oxygen transfer rate in fermentation process? Explain any two. (4)**

**Q4. Describe briefly the concept of design of a ferementer. What are the factors do you consider as essential for a successful design and operation of a ferementer? (10)**

**Q5. Explain with a neat flow sheet the production of ethyl alcohol from starch sources. (10)**

**Q6. (a) With a neat diagram, describe the various phases of cell growth in a batch culture. (6)**

**(b) Describe the growth associated and non-growth associated product formation in a fermentation process. (4)**

**Q7. (a) Derive Michaelis-Menten equation. (5)**

- (b) Initial rates of an enzyme-catalyzed reaction for various substrate are given as follows : (5)

S, mole/lit	$4.1 \times 10^{-3}$	$9.5 \times 10^{-4}$	$5.2 \times 10^{-4}$	$1.03 \times 10^{-4}$	$4.9 \times 10^{-5}$	$1.06 \times 10^{-5}$	$5.1 \times 10^{-6}$
V, mole/(lit.m in)	177	173	125	106	80	67	43

Calculate  $V_m$  and  $K_m$  using Line-weaver-Burk Plot.

**Q8. Write short notes on any TWO : (5 x 2)**

- (a) Activated sludge treatment
- (b) Tubular centrifuge
- (c) Continuous sterilization
- (d) Chromatography