Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCCH 4402

Seventh Semester Examination – 2013

FUNDAMENTALS OF BIOCHEMICAL ENGINEERING

BRANCH : CHEM

QUESTION CODE : C-197

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

   (a) What is enzyme specificity ? What are the various types of enzyme specificity ?

   (b) What are the various applications of heat transfer in bio-processing ?

   (c) Why sterilization is required for bio-processing ?

   (d) What are the different methods of cell disruption ?

   (e) What do you mean by critical and non-critical parameters for a fermentation process ?

   (f) What are the general requirements of fermentation process ?

   (g) Describe the effects of gas velocity on mass transfer rate in fermentation broths.

   (h) Compare the absolute air filter and fibrous type air filter for sterilization of air.

   (i) Find the g-number of a centrifuge with an effective radius of 10 cm and rotating at a speed of 30 rps.

   (j) Describe the growth associated and non-growth associated product formation in fermentation process.

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2. (a) Briefly explain different methods of continuous sterilization. 6

(b) What are the advantages and disadvantages of continuous sterilization ? 4

3. (a) Derive Michaelis-Menten equation for enzyme kinetics from first principle. 5

(b) What are Lineweaver-Burk plot and Langmuir plot and how it can be used to calculate Michaelis-Menten constant ? 5

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

(b) Write some applications of mass transfer in bio-processing. 3

5. (a) What is solid state and submerged fermentation and give some applications of both ? 6

(b) Describe about synthetic medium and crude medium. 4

6. (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 ? 4

7. What are the various effluent treatment methods ? Describe them briefly. 10

8. Write short notes on any **two** : 5×2

(a) Activated sludge treatment

(b) Immobilization of enzyme

(c) Plate-and-frame filter press

(d) Chromatography.