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

Total Number of Pages : 03 **B.Tech.**
PCE6J001

6th Semester Regular Examination 2017-18
FUNDAMENTALS OF BIOCHEMICAL ENGINEERING
BRANCH : CHEM
Time : 3 Hours
Max Marks : 100
Q.CODE : C332

Answer Part-A which is compulsory and any four from Part-B.
The figures in the right-hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

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

(a) The filter material used for the air filtration system is/are
(i) Glass wool
(ii) Glass fibre
(iii) Norite
(iv) All the above

(b) The del factor (Δ) increases as the final number of cells
(i) Decreases
(ii) Increases
(iii) Zero
(iv) Constant

(c) The immobilized enzyme produced by micro encapsulation technique provides
(i) an extremely large surface area
(ii) smaller surface area
(iii) high amount of solvent
(iv) relatively smaller surface area

(d) The disk centrifuge is the type of centrifuge used most often for bio separations due to its
(i) continuous operation
(ii) lesser cost
(iii) higher speed
(iv) ease in operation

(e) The plot commonly used for determining the Vmax is
(i) lineweaver Burk plot
(ii) Langmuir plot
(iii) EadieHofstee plot
(iv) All of these

(f) Yield coefficient represents
(i) total biomass or product produced
(ii) conversion efficiency of a substrate into product
(iii) conversion rate of a substrate into biomass or product
(iv) product time of biomass or product

(g) An ion exchange resin is composed of
- (i) polymeric network
- (ii) ionic functional groups
- (iii) counter ions
- (iv) All of these

(h) Chromatography is based on the
- (i) different rate of movement of the solute in the column
- (ii) separation of one solute from other constituents by being captured on the adsorbent
- (iii) different rate of movement of the solvent
- (iv) Any of the above

(i) Which of the following is not the physical method for the cells rupturing?
- (i) Milling
- (ii) Homogenization
- (iii) Ultrasonication
- (iv) Enzymatic digestion

(j) Which of the operation does not come under upstream processing?
- (i) Media preparation
- (ii) Inoculums development
- (iii) Effluent treatment
- (iv) Storage of raw material

Q2. Answer the following questions : (2 x 10)

(a) Write down some applications of mass transfer in bioprocessing.

(b) What are the general requirements of a fermentation process?

(c) What do you mean by critical and non-critical parameter of a fermentation process?

(d) Define Kirchhoff's law.

(e) What do you mean by gas hold up? How it affects oxygen transfer rate?

(f) What is Fischer lock and key hypothesis for enzyme specificity?

(g) Draw a typical batch growth curve of a microbial culture.

(h) What are the methods of air sterilization?

(i) What is the composition of gobargas?

(j) What do you mean by clarification of fruit juice? Name the enzyme used for this.

Part – B (Answer any four questions)

Q3. (a) Write down the applications of microbiology in food and diary industries. **(5)**

(b) What do you mean by "koji"fermentation? **(2)**

(c) Briefly explain the advantages of "koji" fermentation how it differentiate from submersed fermentation? **(8)**

Q4. (a) What is Line weaver-Burk plot and Langmuir plot and how it can be used to calculate Michaelis-Menten constant? **(5)**

(b) Derive the Michaelis-Menten equation for enzyme kinetics from first principle. **(10)**

Q5. (a) Describe briefly the concept of design of a fermenter. What are the factors that you consider as essential for successful design and operation of a fermenter? **(10)**

(b) What are the basic difference between upstream and downstream processing? **(5)**

Q6. **(a)** What are the various effluent treatment methods? Describe them briefly. **(10)**

(b) Write a short note on chromatography. **(5)**

Q7. Explain in details the production of biogas and what are factors affecting methane formation. **(15)**

Q8. Describe the process of oxygen transfer methodology from the air bubble to the cell or cluster of cells in fermentation broths. Briefly explain what are the factors affecting oxygen transfer rate in fermentation process. **(15)**

Q9. **(a)** Write a short note on enzyme immobilization. **(5)**

(b) Briefly explain the different methods of cell disruption technique. **(10)**