

**M.TECH. DEGREE EXAMINATIONS: JANUARY 2009**

First Semester

**BIOTECHNOLOGY**

P07BTE11 Enzyme Technology and Applications

**Time: Three Hours****Maximum Marks: 100****Answer ALL Questions:-****PART A (20 x 1 = 20 Marks)**

1. Catalase is classified as
  - a. Hydrolase
  - b. Oxidoreductase
  - c. Ligase
  - d. Lyase
2. The number of substrate molecules converted into product per unit time is
  - a. Enzyme unit
  - b. Specific activity
  - c. Turnover number
  - d. Relative activity
3. In Line weaver – Burt plot  $1/v$  is plotted against
  - a.  $[S]$
  - b.  $1/[S]$
  - c.  $V/[S]$
  - d.  $[S]/V$
4. In competitive inhibition
  - a.  $K_m$  is changed
  - b.  $V_{max}$  is changed
  - c.  $K_m$  and  $V_{max}$  are changed
  - d. Neither  $K_m$  or  $V_{max}$  is affected.
5. Anionic exchanger employed in ionic binding
  - a. CM Cellulose
  - b. Sepharose
  - c. DEAE – Cellulose
  - d. Alumina
6. The polymerization initiator in preparation of polyacrylamide gel
  - a. Potassium persulfate
  - b. Acrylamide
  - c. DMAPN
  - d. TEMED
7. A bifunctional reagent used to cross-link enzymes for immobilization
  - a. Dextran
  - b. Amberlite IR-45
  - c. Gluturaldehyde
  - d. Silicagel
8. When mass transfer resistance is large, Damkohler number is
  - a. = 1
  - b. < 1
  - c. > 1
  - d.  $\infty$
9. Effectiveness factor is give as
  - a.  $\eta = V / V_0 S_0$
  - b.  $\eta = S_0 / V(V_0)$
  - c.  $\eta = V_0 / V(S_0)$
  - d.  $\eta = S / V_0 (S_0)$

10. Thiele module  $\Theta$  is defined by
- |                             |                           |
|-----------------------------|---------------------------|
| a. $V_p / A_p \sqrt{Des/k}$ | b. $V_p/A_p \sqrt{k/Des}$ |
| c. $A_p / V_p \sqrt{Des/k}$ | d. $V_p/A_p k^2$          |
11. Flux of substrate from the bulk fluid to the interface is given by
- |                       |                       |
|-----------------------|-----------------------|
| a. $N = ks (s - s_0)$ | b. $N = ks(s)$        |
| c. $N_s = k(s)$       | d. $N_s = ks (s_0-s)$ |
12. Effects of external resistance are not significant if
- |                |                       |
|----------------|-----------------------|
| a. $Bi$ is 100 | b. $Bi$ is $<1$       |
| c. $Bi$ is 1   | d. $Bi$ is negligible |
13. Enzyme used to remove hair from hides
- |               |              |
|---------------|--------------|
| a. Keratinase | b. Laccase   |
| c. Catalase   | d. Cellulase |
14. Identify the enzyme that cannot be used for meat tenderization
- |            |              |
|------------|--------------|
| a. Trypsin | b. Bromelain |
| c. Papain  | d. Rennet    |
15. Enzyme used to prevent and remove blood clots
- |                 |                   |
|-----------------|-------------------|
| a. Asparaginase | b. Streptodornase |
| c. Trypsin      | d. Urokinase      |
16. Enzyme used in preparation of instant tea
- |                   |             |
|-------------------|-------------|
| a. Pectinase      | b. Tannase  |
| c. Chlorophyllase | d. Protease |
17. Piezoelectric biosensors uses crystals of
- |           |             |
|-----------|-------------|
| a. Sodium | b. Silica   |
| c. Quartz | d. Titanium |
18. Detection of bacteria in food or clinical samples using luciferase enzyme
- |                             |                           |
|-----------------------------|---------------------------|
| a. Piezoelectric biosensor  | b. Optical biosensor      |
| c. Potentiometric biosensor | d. Calorimetric biosensor |
19. Use of ion-selective electrodes to transduce biological reaction into electrical signal
- |                           |                             |
|---------------------------|-----------------------------|
| a. Optical biosensor      | b. Piezoelectric biosensor  |
| c. Amperometric biosensor | d. Potentiometric biosensor |
20. Measuring analyte concentration based on heat generated by enzyme catalyzed reaction
- |                           |                             |
|---------------------------|-----------------------------|
| a. Calorimetric biosensor | b. Piezoelectric biosensor  |
| c. Optical biosensor      | d. Potentiometric biosensor |

**PART B (5 x 16 = 80 Marks)**

- 21.a) Explain the mechanism and kinetics of enzyme inhibition with reference to competitive, noncompetitive and mixed type inhibitors (6 + 6 + 4)

**(OR)**

- 21.b) Explain  
i). Michaleis – Mentor kinetics (8 + 8 marks)  
ii). Evaluation of its parameters

- 22.a) Explain in detail the advantages and limitations of enzyme immobilization (8+8 marks)

**(OR)**

- 22.b) Explain the different methods of enzyme immobilization (16 marks)

- 23.a) What is Damkohler number?. Explain the kinetics of immobilized enzymes in porous and non porous solid supports (2 + 7 + 7)

**(OR)**

- 23.b) Discuss the effect of solution partition and diffusion on the kinetics of immobilized enzyme. (8+8 marks)

- 24.a) Describe the applications of enzymes in  
i). Diagnostic applications (8+8 marks)  
ii). Pharmaceutical industry

**(OR)**

- 24.b) i). Discuss the extraction of commercially important enzymes from natural sources (8 + 8 marks)  
ii). Explain the applications of enzymes in food industry.

- 25.a) Explain the application of enzyme biosensors in (8 + 8 marks)  
i). Healthcare ii). Environment

**(OR)**

- 25.b) i). Discuss the analytical applications of enzymes (8 + 8 marks)  
ii). Explain the principle in design of enzyme electrode

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