

M. Sc. DEGREE EXAMINATION, NOVEMBER 2010  
BIOTECHNOLOGY  
THIRD SEMESTER

COURSE : CORE  
PAPER : BIOPROCESS TECHNOLOGY AND ENZYME TECHNOLOGY  
TIME : 3 HOURS MAX. MARKS: 100

SECTION – A

ANSWER ALL QUESTIONS.

10 x 2 = 20

1. Define Downstream Processing of a fermentation process.
2. What are Chelators?
3. What are enzyme inhibitors? Give examples.
4. Differentiate between Batch and Fed-Batch culture process.
5. What is a Chemostat?
6. Define Specific growth rate.
7. What is a PID controller?
8. Differentiate Binghamplastic and Pseudoplastic fluids.
9. What is the relation between  $K_{La}$  and power consumption.
10. Define critical  $O_2$  concentration.
11. Define Del factor.
12. List the most important advantages of immobilized biocatalysts.
13. Define Reverse Osmosis.
14. Ultrasonication- Explain.
15. Write the Principle of affinity Chromatography.
16. Name any two commonly used biphasic systems in Aqueous two Phase Extraction.
17. Name and list the advantages of any two enzymes used in food industry.
18. Define enzyme mimicking.
19. What are unnatural substrates?
20. Give the list of designs used to optimize media.

SECTION – B

ANSWER ANY FOUR QUESTIONS, EACH WITHIN 600 WORDS. (4 x 10 = 40)

21. Give an account on the design of a bioreactor. Also add a note on their types.
22. Elaborate on the steps and the techniques involved in the downstream processing of an intracellular product.
23. Explain the various growth phases of microorganisms in batch culture. Also discuss the relationship between the substrate concentration and specific growth rate.

24. Write short notes on:
  - a. Ping Pong bi-bi mechanism
  - b. Thermal death kinetics
25. Explain in detail the competitive inhibition kinetics of enzymes. Also add a note on the Lineweaver – Burk plot for the same.
26. What are biosensors? Explain in detail about the types of biosensors.

### SECTION – C

**ANSWER ANY TWO QUESTIONS, EACH WITHIN 1500 WORDS. (2 x 20 = 40)**

27. Derive the Michaelis Menten equation for enzyme catalyzed reactions. Add a note on LB and Eadie –Hofstee Plot.
28. Write an essay on the principle and types of immobilization.
29. Write notes on:
  - a. Anaerobic digesters
  - b. Media Formulation
30. Discuss in detail the following:
  - a. Commercial application of enzymes in various industries.
  - b. Biomass and substrate utilization kinetics of the Fed-batch culture.

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