SUBJECT CODE: 11BY/PC/BE34

M. Sc. DEGREE EXAMINATION, NOVEMBER 2013
BIOTECHNOLOGY
THIRD SEMESTER

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

SECTION – A
ANSWER ALL QUESTIONS.   **(20 x 1 = 20)**

1) State the Monod equation for microbial cultures.

2) What is a chemostat?

3) What is enzyme immobilization? What are its advantages?

4) What are the three major applications of ultrafiltration during downstreaming?

5) How can cross- linking be used for enzyme immobilization, give examples?

6) State the relationship of dissolved oxygen (DO) to specific growth rate.

7) State the functions of an axial flow impeller?

8) Swirling and vortex formation can be prevented by using which fermentor components?

9) Single cell protein is an example of which culture process? State the advantages.

10) Surface renewal theory predicts which relationship between mass transfer coefficient and molecular diffusivity?

11) What is steady state – Define?

12) Define Biosensors.

13) Which is the most commonly used impeller for a wide range of viscosities?

14) What are the types of stirrers that are used for microbiological processes?

15) Name two carriers.

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16) How is the average concentration of oxygen in the boundary layers surrounding the bubbles (Co*) in a reactor normally determined?

17) Why is vortexing undesirable in the agitation of biological systems?

18) If liquid density and viscosity remains constant, how does the Reynolds number in a stirred tank reactor vary?

19) State two advantages in Radial flow impellers?

20) State the functions of an axial flow impeller?

SECTION – B

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

21. Compare and explain the advantages for the following types of bioreactors:
    a) Airlift reactors
    b) Mechanically agitated reactors
    Draw labeled diagrams to represent both types (2 marks each)
22. Describe measurement and control of bioprocess parameters essential for fermentation.
23. Write short notes on:
    i) Process and applications of solid state fermentation.
    ii) Explain thermal death kinetics during sterilization of medium
24. Describe the different methods of immobilizing enzymes and their advantages.
25. Demonstrate the relationship between specific growth rate and substrate concentration using the Monod equation. [graph - 2 marks]
26. During down-stream processing of soluble fermentation products, aqueous two phase separation or precipitation techniques are employed. Explain the principles involved with graphs to demonstrate relationships of yield to product recovery.
    {graphs - 2 marks each}

SECTION – C

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

27. Describe the importance of nutrient transfer rates with a note on dissolved oxygen as a limiting substrate for aerobic cultures. {graphs and derivations – 7 marks}
28. Explain the design and operation of a typical conventional bioreactor.
29. Discuss in detail about the following aspects of fermentation:
    a) King and Altman procedure
    b) Membrane separations
    {graphs or diagrams - 3 marks each }
30. Describe major applications of enzymes for diagnosis and development of biosensors.

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