Reg. No. :

R 3132

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Seventh Semester

Biotechnology

BT 1401 — DOWNSTREAM PROCESSING

(Regulation 2004)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give two examples of industrial enzymes used in enzymatic cell disruption.

2. What is stabilization of bioproducts?

3. What are filter aids? Give examples.

4. What are the different types of centrifuge used in downstream processing?

5. List out any two solvents used in extraction of proteins.

6. What are the methods available for the precipitation of proteins?

7. Define selectivity coefficient.

8. What are the basic criteria to select adsorbents used in chromatography?

9. What is metastable equilibrium?

10. What are the driers used to dry heat sensitive bioproducts?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with neat block diagram, the steps involved in the processing of intracellular products.   (8)

      (ii) Explain the basic characteristics of biomolecules, which are useful in downstream processing.   (8)

Or

(b) (i) Discuss the merits and demerits of mechanical methods of cell disruption. (8)

(ii) Explain the chemical methods of cell disruption. (8)

12. (a) With neat diagram, explain the working principle of rotary vacuum filter and discuss about its merits and demerits with respect to bioproduct separation. (16)

Or

(b) (i) Write notes on centrifugation. (8)

(ii) The filtration of cell suspension, which has viscosity of 3.8 cp. Pressure drop across the filter, is about 500 mm Hg. The cell solids with density 21 g/L on the filter at the end of the filtration were dried and found to weigh 14 g. The specific cake resistance and the medium resistance are measured as 1.26×10^{10} cm/g and 1.13×10^8 cm^{-1} respectively. Estimate how long it would take to obtain 10000 L of filtrate from this cell broth on a filter with an area of 10 m². (8)

13. (a) (i) Describe concentration polarization, explain what can be done to reduce it. (8)

(ii) Describe the different types of membrane modules used in purification of bioproducts. (8)

Or

(b) (i) Explain the principle of aqueous two phase extraction and its limitations. (8)

(ii) Explain the following membrane separation processes: Reverse Osmosis and dialysis. (8)

14. (a) Write notes on (i) Bioaffinity chromatography and (ii) Pseudoaffinity chromatographic techniques. (16)

Or

(b) Describe the principle of Ion–exchange and size exclusion chromatography. (16)

15. (a) Define the following terms : (16)

     (i)   Primary nucleation.

     (ii)   Homogeneous nucleation

     (iii) Heterogeneous nucleation.

     (iv) Secondary nucleation.

Or

(b) (i) Write notes on lyophillization. (8)

     (ii)   Discuss the types of driers used in final product purification. (8)

R 3132