

M.E./M.TECH. Degree Examination, December 2020

Second Semester

BY18201 – BIOSEPARATION TECHNOLOGY

(Regulation 2018)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Characteristics of includes Type of microorganisms & their morphological features, Concentration of cell, products & byproducts, Physical & rheological characteristics.
 - a) Enzymes
 - b) Biomolecules
 - c) Amino acids
 - d) Fermentation broth
2. Which of the following is the anionic detergent used in cell lysis?
 - a) Cetyltrimethyl ammonium bromide
 - b) Sodium lauryl sulphate
 - c) Tween 20
 - d) Triton X-100
3. Ultrafiltration is mainly used for the.....
 - a) Concentration of salts
 - b) Removal of salts
 - c) Purification of amino acids
 - d) Concentration of enzymes
4. Which of the following process is often used for encapsulation of biomolecules?
 - a) Spray dryer
 - b) Rotary vacuum dryer
 - c) Tray dryer
 - d) Lyophilizer
5. Elucidate the characteristics of biomolecules.
6. Distinguish ultrafiltration and dialysis.

7. Outline the important parameters to be considered for selecting the precipitation method for protein precipitation.
8. Elucidate retention volume and retention time in size exclusion chromatography.

PART B - (4 X16 = 64 marks)

9. (a) Elucidate recombinant protein purification in detail and the guidelines to be followed during its purification. **(16)**

(OR)

- (b) Assume that the *Aspergillus sp.* produces intracellular enzymes during solid-state fermentation. How can we separate the intracellular enzymes from the biomass and explain the various methods used for the separation of intracellular enzymes from the biomass? **(16)**
10. (a) Calculate the specific cake resistance and the filter cloth resistance based on the following experimental data for a constant pressure filtration of a suspension of incompressible solids of concentration 15 kg/m^3 on a filter cloth of area 3 m^2 . The pressure drop was 3 bars. The filtrate viscosity is $1.5 \times 10^{-3} \text{ kg/m.s}$. **(16)**

Filtration time, sec	30	60	90	120	150
Filtrate volume (m^3)	2×10^{-3}	4×10^{-3}	6×10^{-3}	8×10^{-3}	10×10^{-3}

(OR)

- (b) Elaborate the importance of industrial centrifuges used for the separation of biomass and culture filtrate and its various types with applications. **(16)**
11. (a) Consider that the biotechnology company produces amylase from *Bacillus sp* in solid-state fermentation. Explain the various methods used for the concentration and fractionation using the hydrophobic patches available on the surface of the amylase. **(16)**

(OR)

- (b) Elaborate biphasic extraction with neat sketch and various phase systems used for the separation of biomolecules with its merits, demerits in detail. **(16)**

12. (a) Assume that crude culture filtrate of *Aspergillus sp.* contains pectinase and cellulase of positive and negative charges respectively with similar molecular masses. Which type of chromatographic separation could be used for the purification of the above enzymes and justify in detail with a neat sketch? **(16)**

(OR)

- (b) A biotechnology company produces enzymes of high value and low volume. Explain the appropriate final polishing process used for the production of encapsulated powdered enzyme and various steps involved in the above process. **(16)**