COURSE CODE: 16B11BT611   MAX. MARKS: 25

COURSE NAME: Downstream Processing

COURSE CREDITS: 04   MAX. TIME: 1Hr 30 Min

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

1. Why the downstream processing is an economically important component of the bioprocess? **[2]**

2. Why the extracellular product synthesizing strains are preferred over intracellular product synthesizing strains? **[2]**

3. **a)** What do you understand by Concentration polarization? **[1]**

   b) How does it affect the performance of membrane? **[1]**

   c) How will you deal with this condition? **[1]**

4. What are the desirable characteristics of membrane to be used for filtration? **[2]**

5. Differentiate the following: **[4]**

   a) Adsorption and Liquid-liquid extraction

   b) HPLC and FPLC

6. You have a mixture of four different proteins with the following information:

Protein	pI	Molecular Weight	Other properties
A	5	200 kDa	
B	5	100 kDa	Have affinity towards Glucose
C	8	200 kDa	
D	6	50 kDa	
E	8	100 kDa	

   Design a chromatography experiment with minimum number of steps to purify each protein of the mixture. Also draw the chromatogram of each chromatography. **[4]**

7. Define the following terms: **[4]**

   a) Adsorbate   **b)** Breakpoint in Adsorption

   c) Raffinate   **d)** Distribution Coefficient

8. Leucine dehydrogenase is recovered from a homogenate of disrupted *Bacillus cereus* cells using an aqueous two-phase polyethylene glycol-salt system. 150 litres of homogenate initially containing 3.2 units enzyme ml-1 are processed; a polyethylene glycol-salt mixture is added and two phases form. The enzyme partition coefficient is 3.5.

   (a) What volume ratio of upper and lower phases must be chosen to achieve 80% recovery of enzyme in a single extraction step? [2]

   (b) If the volume of the lower phase is 100 litres, what is the concentration factor for 80 % recovery? [2]