JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-VI Semester (BT)

COURSE CODE: 18B11BT611

MAX. MARKS: 25

COURSE NAME: Downstream Processing

COURSE CREDITS: 04

MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in square brackets. Write your answers to the point.

[CO1]

Q1. a) Why the product recovery should be done in minimal number of steps? [1.5]

b) The purity of the product is defined by its intended use. Whether this statement is correct? Justify your answer with a suitable example. [2.5]

[CO2]

Q2. Suppose you are interested in purifying an arginase enzyme from a Gram positive bacteria. The enzyme is expressed intracellularly. Draw a flow chart representing the all main steps involved in its purification. [2]

[CO3]

Q3. Differentiate between following: [4]

a) Liquid-Liquid Extraction and Adsorption

b) Ion Exchange and Hydrophobic Interaction Chromatography

[CO4]

Q4. a) Whether a Nano-filtration should be done before ultrafiltration? Justify your answer. [1.5]

b) What do you understand by Concentration polarization? How will it impact over the membrane performance? [2.5]

c) How will you deal with the issue of concentration polarization? [2]

Q5. Cells of the fall armyworm *Spodoptera frugiperda* are cultured in a fermenter to produce viral particles for insecticide. Viral particles are released into the culture broth after lysis of the host cells. The initial culture volume is 5 litres. An aqueous two-phase polymer solution of

volume 2 litres is added to this liquid; the volume of the bottom phase is 1 litre. The virus partition coefficient is 10^{-2}.

a) What is the yield of virus at equilibrium?   [1]

b) Derive an equation for the concentration factor in terms of liquid volumes and the partition coefficient only.   [2]

c) Calculate the concentration factor for the viral extraction.   [2]

[CO5]

Q6. You have isolated a protein mixture in a buffer of pH 8.0. The mixture has four different proteins with the following information:

Protein	pI	Molecular Weight
A	5	200 kDa
B	6	100 kDa
C	6	200 kDa
D	5	50 kDa
E	7	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]