

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2023

COURSE CODE (CREDITS): 16B11BT611 (04)

MAX. MARKS: 15

COURSE NAME: Downstream Processing

COURSE INSTRUCTORS: Dr. Saurabh Bansal

MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

[CO1]

1. a) Why downstream processing design is important? [1]
- b) Why is it suggested to carry out downstream processing in minimal steps? [1]
- c) What are the different factors involved in deciding the final price of the products? [2]

[CO2]

2. Suppose an organism synthesizes an enzyme "amylase" intracellularly. How will you purify the amylase from the organism? Explain your answer through flow chart. [2]
3. Why removal of nucleic acid is important in the case of intracellular products purification? [1]

[CO3]

4. Suppose you have a broth containing gelatinous and smaller cells, you want to separate out the insoluble from the soluble using filtration.
 - a) What kind of problems you may face during the filtration while dealing such kind of broth? [1]
 - b) How will you deal with such problems to make filtration easy and faster? [1]
5. How the pressure drop across the filter medium affect in case of following samples while filtration?
 - a) Slurry containing Incompressible solids [1]
 - b) Slurry containing Compressible solids [1]

[CO4]

6. Microbial cells are separated from a culture broth at a flow rate of $3.35 \times 10^{-3} \text{ m}^3/\text{s}$. Assume the cells are spherical with average diameter of $1 \mu\text{m}$. Select a centrifuge that can perform this separation. Given data: $\rho_{\text{cell}} = 1.1 \rho_{\text{water}}$, $\rho_{\text{broth}} = \rho_{\text{water}}$, $\rho_{\text{water}} = 997 \text{ kg/m}^3$, $\mu_{\text{broth}} = 3\mu_{\text{water}}$, the viscosity of water ($\mu_{\text{water}} = 0.9 \times 10^{-3} \text{ N.s/m}^2$). [2]
7. In a centrifuge, what will be the applied centrifugal force at a point equivalent to 5 cm from the axis of rotation and a speed of 5000 RPM? [2]