

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS- 2026

B.Tech-VI Semester (BT)

COURSE CODE (CREDITS): 18B11BT611 (04)

MAX MARKS: 25

COURSE NAME: Downstream Processing

COURSE INSTRUCTOR: Dr. Saurabh Bansal

MAX. TIME: 1 Hour 30 Min

- Note: (a) All questions are compulsory.*
(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems
(c) Use of calculator is allowed

| Q. No. | Question | CO | Marks |
|--------|--|----|-------|
| Q1 | Which method is more cost-effective in separating solubles from insoluble: Filtration and Centrifugation? Justify your answer. | 1 | 2 |
| Q2 a) | Why is precipitation important when processing extracellular products in large volumes? | 2 | 1 |
| Q2 b) | Why is salt-induced precipitation preferred for proteins over organic solvent-based precipitation? | 3 | 1 |
| Q2 c) | How does an organic solvent cause protein precipitation? | 3 | 1 |
| Q3 | Differentiate between: a) Liquid-liquid extraction and adsorption. b) Surface filtration and Depth filtration (illustrate with suitable diagrams) | 3 | 4 |
| Q4 | How do the following factors affect the rate of filtration? a) Compressibility of the filter cake b) Surface area of filter medium c) Viscosity of slurry | 3 | 3 |
| Q5 | Define the following terms with suitable diagrams? a) Adsorbate and Adsorbent b) Raffinate and Extract | 3 | 3 |
| Q6 | Draw and explain a typical breakthrough curve for adsorption in a packed bed column. Indicate the break point. | 4 | 2 |

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|-------|--|---|---|
| Q7 a) | “Filtration does not run at a steady state.” Is this statement correct? Justify your answer. | 4 | 1 |
| Q7 b) | How does the filter aid help in filtration? | 4 | 2 |
| Q8 a) | A 200 litres homogenate of disrupted <i>Bacillus cereus</i> cells containing 4 units enzyme ml ⁻¹ is processed using an aqueous two-phase polyethylene glycol-salt system to recover Leucine dehydrogenase. The enzyme partition coefficient is 5. What volume ratio of upper and lower phases must be chosen to achieve 80% recovery of enzyme in a single extraction step? | 4 | 2 |
| Q8 b) | If the lower phase volume is 100 litres, what is the concentration factor for 80% recovery? | 4 | 1 |
| Q9 | <i>Spodoptera frugiperda</i> cells are used to produce viral particles in a 5 L culture. After lysis, 2 L aqueous two-phase polymer solution is added to this liquid. After separation two phases, the bottom phase volume is 1 litre. The virus partition coefficient is 10 ⁻² . Derive an equation for the concentration factor in terms of liquid volumes and the partition coefficient only. | 4 | 2 |

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