

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST-3 EXAMINATION- JUNE -2016

B.Tech 6th Semester

COURSE CODE: 16B11BT611

MAX. MARKS: 35

COURSE NAME: Downstream Processing

COURSE CREDITS: 04

MAX. TIME: 2 HRS

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

1. Though the productivity in chemostat is found to be higher than that of in batch culture, the batch culture is still preferred choice for the production of various biomolecules. Can you give the reason? [1]
2. Differentiate between Fluidized and fixed bed bioreactor. [2]
3. Why the strain improvement is important for developing the industrially important strains? [2]
4. What are the different limitations of plant cell culture? [2]
5. A pilot-scale disc-stack centrifuge is tested for recovery of bacteria. The centrifuge contains 25 discs with inner and outer diameters 2 cm and 10 cm, respectively. The half-cone angle is 35°. When operated at a speed of 3000 rpm with feed rate of 3.5 litre min⁻¹, 70% of the cells are recovered. If a bigger centrifuge is to be used for industrial treatment of 80 litres min⁻¹, what operating speed is required to achieve the same sedimentation performance if the larger centrifuge contains 55 discs with outer diameter 15 cm, inner diameter 4.7 cm, and half-cone angle 45°? [3]
6. Aqueous two-phase extraction is used to recover α -amylase from solution. A polyethylene glycol-dextran mixture is added and the solution separates into two phases. The partition coefficient is 4.2. Calculate the maximum possible enzyme recovery when:
 - a) the volume ratio of upper to lower phases is 5.0; and [2]
 - b) the volume ratio of upper to lower phases is 0.5. [2]
7.
 - a) Why the iron vessel is not preferred for the production of citric acid? [1]
 - b) Which type of liquid-liquid extraction is efficient: Multistage counter current, Multistage co-current or Single stage? Justify your answer. [2]
 - c) How can citrate be synthesized when pyruvate is not available? [2]
8.
 - a) What are the limitations of natural penicillin? [1]
 - b) How the pathogens become resistant for the penicillin derived antibiotics? [1]
 - c) Compare the properties of *Zymomonas mobilis* and *Saccharomyces sp.* for the ethanol production. What are the properties need to be improved in *Saccharomyces sp.* for the effective production of ethanol and why? [3]

9. a) Suppose you have a protein mixture which contains five different proteins with the following properties:

Protein	Molecular weight	pI	Affinity	Remarks
A	200 kDa	5.0	-	
B	400 kDa	5.0	Ni ²⁺	
C	200 kDa	7.0	-	Have higher hydrophobicity as compared to Protein A
D	400 kDa	7.0	-	
E	600 kDa	5.0	-	

How will you purify each protein in minimal steps? Design a suitable experiment with proper justification. [4]

- b) What are the advantages of purification of extracellular products over the intracellular products? [2]

- c) How will you check whether the protein is purified? [2]

10. Explain the downstream processing of Citric acid and Gluconic acid with a proper flow chart. [3]