

2015  
B.E. (Biotechnology) Sixth Semester  
BIO-614: Down Stream Processing

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section. State clearly your assumptions.

x-x-x

1. Write briefly:

(1×10 = 10)

- a) Define cell disruption.
- b) What is product polishing?
- c) What is Reverse osmosis?
- d) Define downstream and upstream processing?
- e) Why is drying important?
- f) List three features of the design of centrifuge?
- g) What is bioseparation?
- h) What is adsorption?
- i) What is filtration
- j) Give the principle of electrophoresis?

**SECTION-A**

2. Discuss the various stages in the recovery of a biomolecule from a fermented broth. What considerations would you keep in mind to conceive a proper scheme of recovery? Explain with suitable example. (10)
3. a) Differentiate between ultrafiltration and microfiltration.  
b) Elaborate on the different chemical methods that may be employed for cell lysis. (5, 5)
4. a) Discuss the different types of filters.  
b) A 30-ml sample of broth from penicillin fermentation is filtered in the laboratory on a 3 cm<sup>2</sup> filter at a pressure drop of 5 psi. The filtration time is 4.5 min. and filter cake of *Penicillin chrysogenum* is significantly compressible with  $s = 0.5$ . If 500 liters broth from a pilot scale fermenter must be filtered in 1 hour, what size filter is required if the pressure drop is:  
i) 10 psi?  
ii) 5 psi?  
Residence due to the filter medium is negligible? (5, 5)

**SECTION-B**

- 5) What are the different types of driers used for drying the fermentation product? (10)
- 6) Write in detail about exclusion chromatography. Also discuss its applications. (10)
- 7) Write note on any **four**: (2½ x 4 = 10)
  - a) Reverse phase chromatography.
  - b) Distillation.
  - c) Crystallization.
  - d) Two dimensional gel electrophoresis.
  - e) Dialysis.

x-x-x