(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2679 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

DOWNSTREAM PROCESSING

Time : 3 Hours *Total Marks : 100*

Note : *Attempt* ***all*** *questions.*

1. Attempt any **TWO** parts of the following : **(10×2=20)**

   (a) What are the characteristics of bioseparation ? Outline the major unit operations involved in downstream processes.

   (b) What are the characteristics of biological materials ? Discuss the problems encountered during recovery and requirement to overcome these difficulties.

   (c) Write short notes on :—

      (i) Cost cutting strategy in downstream processing

      (ii) Role of downstream processing in biotechnology.

2. Attempt any **TWO** parts of the following : **(10×2=20)**

   (a) What is pretreatment of fermentation broth ? Briefly describe the physical methods of cell disruption.

   (b) What are the separation techniques available for removal of insolubles and biomass from fermentation broth ? Explain the working and design of continuous rotatory vacuum drum filter.

(c) Microbial cell recovery is carried out in a continuous disc-stack centrifuge. The centrifuge is operated at 5000 rpm for separation of baker's yeast. At a feed rate of 60 1/min, 50% of the cells are recovered. At constant speed, solid recovery is inversely proportional to flow rate. Calculate :

(i) Flow rate required to recover 90% of cells if the centrifuge speed is fixed at 5000 rpm ?

(ii) Operating speed required to recover 90% of cells if the flow rate in the centrifuge is maintained at 60 1/min ?

3. Attempt any **TWO** parts of the following : **(10×2=20)**

(a) What is purification factor ? Describe the theory and design of single stage two phase liquid-liquid extraction method with suitable example.

(b) What is Langmuir isotherm adsorption model ? Describe the theory and design of fixed-bed adsorber with suitable example.

(c) Write a note on protein precipitation methods.

4. Attempt any **TWO** parts of the following : **(10×2=20)**

(a) What is the basic principle of electrophoresis ? Write about the working principle and applications of isoelectric focusing.

(b) What is zone spreading ? Describe the principle and applications of ion exchange chromatography.

(c) Discuss the principle and applications of affinity chromatography.

5. Attempt any **TWO** parts of the following : **(10×2=20)**

(a) Explain the basic theory of crystallization and application in purification of bioproducts.

(b) What is product polishing ? Write a note on freeze drying and its advantages.

(c) Describe the steps involved in downstream processing of citric acid.