DOWNSTREAM BIO-PROCESS

(Professional Elective-VI)

Course Code: 15CH1146

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Course Outcomes :

At the end of the Course, the Student will be able to:

CO 1 Describe the principles of Filtration and centrifugation

CO 2 Select methods of cell disruption and Extraction according to requirement

CO 3 Describe the principles of adsorption, Ultra filtration and Electrophoresis

CO 4 Discuss working principle of elution chromatography and process of precipitation

CO 5 Describe the principle and applications of crystallization

UNIT-I (10 Lectures)

Introduction to bioseparations, Filtration and Micro filtration: - Equipment for Conventional Filtration, Pretreatment, General Theory for Filtration, Continuous Rotary Filters, Micro filtration.

Centrifugation, settling of solids, Centrifuges, Centrifugal filtration, Scale-Up of Centrifugation.

UNIT-II (10 Lectures)

CELL DISRUPTION:

Cell membranes, Chemical Methods, Mechanical Disruption.

EXTRACTION:

The chemistry of extraction, Batch extraction, Staged Extraction, Differential extraction, Fractional Extractions with stationary phase and Fractional Extractions with two moving phases.

UNIT-III (10 Lectures)

ADSORPTION :

The chemistry of adsorption, Batch adsorption, Adsorption in a continuous stirred tank, Adsorption in fixed beds.

ULTRA FILTRATION AND ELECTROPHORESIS:

Basic ideas, Ultrafiltration, Electrophoresis, Electro dialysis and Isoelectric Focusing.

UNIT-IV (10 Lectures)

ELUTION CHROMATOGRAPHY:

Adsorbents yield and purity, discrete stage analysis, Kinetic analysis, Precipitation with a non solvent, Precipitation with salts, Precipitation with temperature change, Large Scale precipitation.

UNIT-V (10 Lectures)

CRYSTALLIZATION :

Basic concepts, crystal Size Distribution, Batch crystallization, Recrystalization.Drying: - Basic concepts, Drying Equipment, Conduction Drying, Adiabatic Drying.

TEXT BOOK:

Better. P. A., Cussler E. L.,Wei-Shou Hu,A, "Downstream Processing for Biotechnology", Wiley- Interscience Publication, 1988.

REFERENCE:

K. G Clarke , "Bioprocess Engineering" , Elsevier Science, 2013