

BACHELOR OF SCIENCE

5th SEMESTER

DISCIPLINE SPECIFIC ELECTIVES (DSEs)

BT520D2: BIO-TECHNOLOGY: BIOPROCESS ENGINEERING

CREDITS: THEORY – 4, PRACTICAL– 2(4+2)

OPTION-II

THEORY (4 CREDITS: 60 HOURS)

MAXIMUM MARKS: 60, MINIMUM MARKS: 24

Objective: This course aims at training the students for application of biotechnology principles for production of biobased products.

Unit–1 (15 HOURS)

Introduction to bioprocess technology; Microbial culture and its growth kinetics; Growth rate parameters - specific growth rate, doubling time, growth yield, metabolic quotient; Validity of exponential growth law; Measurement of microbial growth.

Unit– 2(15 HOURS)

Open and closed system; Batch, fedbatch and continuous culture; Chemostat and its elaborations; Product formation in microbial cultures - growth associated and non-growth associated; Factors affecting product formation.

Unit– 3(15 HOURS)

Design of bioreactors/fermenters – functions of Impeller, Baffles, Sparger; Types of bioreactors – stirred tank, airlift, packed bed, photobioreactor; Media preparation, Inocula development and sterilization.

Unit– 4(15 HOURS)

Downstream processing - cell disruption techniques, product recovery and purification; Membrane processes - basic concept of ultrafiltration, reverse osmosis, liquid membranes; Separation techniques – fractionation, centrifugation, chromatography; Lyophilization.

PRACTICALS (2 CREDITS: 60 HOURS) MAXIMUM MARKS: 30, MINIMUM MARKS: 12

1. Isolation of microorganism from natural resource.
2. Study of microbial growth characteristics.

3. Isolation and assay of amylase.
4. Purification of amylase through fractionation.

BOOKS RECOMMENDED

1. Industrial Microbiology, Casida - New Age International Private Limited
2. Biotechnology: A textbook of Industrial Microbiology, Crueger and Crueger, -Panima Publishing Co. New Delhi.
3. Industrial Microbiology, Patel AH, - Laxmi Publications, New Delhi
4. Principles of Fermentation Technology, Stanbury, Whitaker and Hall, Elsevier Science Ltd.

Expected Learning Outcomes:

1. Understanding of microbial growth, kinetics and measurement.
2. Idea of bioreactors along with the complementary components and processes.
3. Understanding of various methods and techniques involved in downstream processing of products.