B.Tech. Biotechnology: Semester-V BBT 504: BIOPROCESS ENGINEERING	
Teaching Scheme	**Examination Scheme**
Lectures: 3 hrs/Week	Class Test -12 Marks
Tutorials: 1 hr/Week	Teachers Assessment – 6 Marks
Credits: 4	Attendance – 12 Marks
	End Semester Exam – 70 marks

Course Objective

To understand the concept of microbial growth, nutritional requirements and the fermentation process and bioprocess design. The important bioprocess design for some of industrial important products will be essentially covered in this course.

Course Learning Outcomes

After completing the course, the student shall be able to:

CO1: Understand principle of fermentation in industries..

CO2: Analyze the kinetics of batch and fed batch fermentation process.

CO3: Identify parameters affecting yield of fermentative process...

CO4: Understand the mechanism of sterilization of process fluids, recovering and purifying products.

CO5: Analyze the mechanism of upstream processing in fermentation technology.

CO6: Understand the production of acetone, ethanol, butanol, lactic acid, citric acid and acetic acid.

CO7: Analyze the production and purification of antibiotics and enzymes from ferementation technique.

Unit 1: Microbial Growth
Microbial growth, Mass balance, Principle of microbial nutrition, formulation of culture media, selective media. Maintenance coefficient and yield concept, Kinetics of Batch, Continuous and Fed-batch fermentation processes, Simple structured models, isolation, preservation and maintenance of Industrial important microorganism
Unit 2: Bioreactor
Components of Bioreactor, Parameters and factors affecting yield: antifoam agents, importance of pH, etc. Fluid rheology, Sterilization of process fluids, recovering and purifying products, integration of reaction and separation.

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Unit 3: Production of Commercial products

Fermentative production, Baker's yeast, Distiller's yeast, Organic solvents: acetone, ethanol, butanol, Organic acids: lactic acid, citric acid and acetic acid, Enzymes (Proteases, Lipases and alphaamylase), Amino acids (Lglutamic acid, phenylalamine and L-lysine), Antibiotics: Penicillin, Streptomycine, Tetracycline.

Suggested Readings

- Biochemical Engineering: J.M. Lee, Prentice Hall.
- Bioprocess Engineering: M. Shuler and F. Kargi, Pretice Hall.
- Comprehensive Biotechnology: M. MooYoung, Editor.
- Biotechnology: H.J. Rehm and G. Reed, VCH.

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