17FT019 INDUSTRIAL BIOTECHNOLOGY

Hours Per Week :

L	T	P	C
3	1	-	4

Total Hours :

L	T	P
45	15	-

WA/RA	SSH/HSH	CS	SA	S	BS
15	30	-	5	5	-

Course Description and Objectives:

- This course will impart the knowledge to students abut prospectous of industrial biotechnology in food sector. By the end of this course students will be able to Understand biotechnology and application of biotechnology in food industry and agriculture.

Course Outcomes:

Upon successful completion of this course student should be able to:

- Get the knowledge about cell and tissue culturing techniques and downstream processing
- Know about Rdna technology and their application in different areas
- Know about application of biotechnology in particular to food industry

SKILLS:

- ✓ Understand the concept of cellular and microbial culture techniques and their downstream and upstream techniques.
- ✓ Gain perspectives to industrially important food products manufacture with the implication of biotechnology.
- ✓ Acquire field work techniques to study, observe and prepare documents, charts, ppts, models etc.

UNIT - I

Prospectus of biotechnology- definition, scope and applications, Application of Biotechnology in food (Food industries), pharmaceuticals and agriculture, Application of biotechnology for food plant waste utilization, biogas plants.

UNIT - II

Fermentation Process: General requirements of fermentation processes, Basic design and construction of fermentor and ancillaries, Main parameters to be monitored and controlled in fermentation processes; An over view of aerobic and anaerobic fermentation processes and their application in the biotechnology industry, solid substrate, slurry fermentation and its applications, whole cell immobilization, behaviour of microbes in different reactors (air lift, fluidized, batch, continuous and fed batch condition).

UNIT - III

Bioproces optimization: Conventional optimization process (one variable at a time approach), need for statistical experimental design, screening techniques-Plackett Burman design, response surface methodology-Box- Benken design, central composite design and self directing optimization.

UNIT - IV

Solid state fermentation: Introduction to solid state fermentation (SSF), comparison of SSF with submerged fermentation, applications in industry, growth kinetics in SSF, Heat and Mass transfer problems in SSF, SSF bioreactors, Scale up of SSF.

UNIT - V

Plant and animal cell cultivation: Plant and animal cells compared to microbial cultivation, Bioreactor considerations for plant cell-suspension culture, immobilazation culture and organized tissues. Methods used for cultivation of animal cells, Bioreactor conideration for animal cell culture suspension culture, anchorage dependent cultivation. Imporant industrial products from plant and animal cell cultivation.

ACTIVITIES:

- Prepare a flowchart for the production process of industrially important food products using biotechnology.

TEXTBOOKS:

1. Bains W. 1993. Biotechnology fromA to Z. Oxford Univ. Press.

2. Stanbury P.F, Stephen J. Hall and Whitaker A - Principles of Fermentation Technology, 2nd edition, ButterWorth -Heinemann, An imprint of Elsevier, India pvt. Ltd., 2005.

3. Shuler, M.L. and Kargi - F. " Bioprocess Engineering – Basic concepts – Second Edition, Prentice Hall of India Pvt. Ltd., 2005.

REFERENCEBOOKS:

1. Bailey andOllis - " Biochemical Engineering Fundamentals", 2nd Edition, McGraw Hill,1986

2. Pauline M. Doran - Bioprocess Engineering Calculations, First edition, Blackwell Scientific Publications, 2005

3. James M Lee - Biochemical Engineering, First edition, Prentice Hall, 1992