Course Code	Course Title	L	T	P	C
1152BT107	Fermentation Technology	3	0	0	3

Course Category : *Program Elective*

a. Preamble : This course is important to understand the basic processes ongoing in a Biological Fermentation from both Upstream and Downstream processing perspectives.

b. Prerequisite Courses: None

c. Related Courses : Bioprocess Engineering, Unit Operations and Transport Phenomena

d. Course Outcomes : *Upon the successful completion of the course, students will be able to:*

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Students will gain a basic idea towards fermentation processes	K2
CO2	Study and understand the Instrumentation and control involved in the fermentation process.	K2
CO3	Learn about the recovery and purification of fermentation products	K2
CO4	Understand the Effluent treatment involved in fermentation process	K2
CO5	Understand the Fermentation economics involved in commercial aspect	K3

e. Course Content:

UNIT-I **UNIT-I An Introduction to Fermentation process**

Microbial Biomass, Microbial Enzymes, Microbial Metabolites, Recombinant Products, Transformation Process, Microbial Growth, Isolation and Preservation.

UNIT-II **Instrumentation and Control**

Temperature measurement and its control, Flow measurement and control, gases and liquids, pressure measurement and control analysis, control system.

UNIT-III **Recovery and Purification of Fermentation products**

Microbial Cells removal, Separation of foam, Filtration via Precipitation, Different Filtration Process , Centrifugation , Different Centrifuge, Cell Disruption, Recovery methods, Solvent Recovery , Supercritical fluid

Extraction, Chromatography, Membrane Processes, Drying, Crystallization, Whole Broth Processing.

UNIT-IV **Effluent treatment**

Strength of Fermentation Effluent, Treatment and Disposal, Treatment Processes: Physical, Chemical and Biological, Aerobic Process, Anaerobic Treatment.

UNIT-V **Fermentation Economics**

Introduction to Isolation of microorganisms of industrial interest , Strain improvement, Market potential, Plant and equipment , Media, air sterilization, heating and cooling , recovery costs.

TEXTBOOKS:

1. Principles of Fermentation Technology P.StanburyButtuworthHanman – 1999.
2. Fermentation and Biochemical Engineering Handbook – C.C Haber. William Andrew II Edition 2007.
3. Bioprocess Engineering Hydersen B.K Nancy A.DelaK.L.Nelsen Wiley Interscience,1994."