

## **(BT530) ADVANCED FERMENTATION TECHNOLOGY**

### **Objectives of the Course:**

*This course helps the student to understand the various requirements in the fermentation industry like measurement of variable, process control, modeling and simulation of fermenters.*

### **UNIT I: Fermentation Processes and Parameters:**

General requirements of fermentation processes and an overview, configuration of fermentor and ancillaries, main parameters to be monitored and controlled in fermentation processes.

### **UNIT II: Media Design for Fermentation Process:**

Criteria for good medium, medium requirements for fermentation processes, points to be considered in the selection of different nutrients including oxygen, formulation of optimal growth and product formation, examples of simple and complex media, design of various commercial media for industrial fermentations – medium optimization methods.

### **UNIT III: Sterilisation of Media:**

Over view on fermentation technology, history of development of fermentation industry, Introduction, design of batch sterilization processes – calculation of Del factor, holding time, Richard's rapid method for sterilization cycles, design of continuous sterilization processes, Sterilisation of fermenter, feeds, liquid wastes, filter sterilization of media, air, exhaust air, theory and design of depth filters.

### **UNIT IV: Instrumentation for Measurement and Control of Variables:**

Introduction to process variables, instruments used for measurement and control of temperature, flow measurement and control, measurement and control of pressure, rate of stirring, control of foam, oxygen and pH.

### **UNIT V: Production of Value added compounds from renewal sources:**

Production of primary and secondary metabolites: Biopolymers, Biodiesel, Bioethanol, aminoacids, antibiotics.

### **TEXT BOOKS :**

1. Peter F. Stanbury, Stephen J. Hall & A. Whitaker, "Principles of Fermentation Technology", 2<sup>nd</sup> ed., Pergamon, 1995.
2. Scragg A.H., "Bioreactors in Biotechnology", Edited, Ellis Horwood Limited, England, 1991.
3. Pauline M. Doran, "Bioprocess Engineering Calculation", Blackwell Scientific Publications.

### **REFERENCE BOOKS :**

1. Shuler, M.L. and Kargi, F. " Bioprocess Engineering - Basic concepts", 2<sup>nd</sup> ed., Prentice Hall of India Pvt. Ltd., 2005.
2. Mukhopadhyay S.N., "Process Biotechnology Fundamentals", 2<sup>nd</sup> ed., Viva Books Private Limited, Chennai 2004.
3. Wang D.I.C., Cooney C.L., Demain A.L., Dunnill.P., Humphery A.E., Lilly M.D., " Fermentation And Enzyme Technology ", John Wiley And Sons., 1980.
4. Bailey and Ollis, " Biochemical Engineering Fundamentals", 2<sup>nd</sup> ed., McGraw Hill, 1986.