

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VII

BIO-TECHNOLOGY

Subject Name: **Bio-Process Plant Design**

Subject Code: **170403**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
4	0	2	6	70	30	30	20

## PART – [A]

Sr. No	Course Content	Total Hrs.
1.	Basics of Stress, Strain and Mechanical Properties of Materials	3
2.	Development of the flow sheets and its description.	3
3.	Piping and instrumentation diagrams.	3
4.	Detailed process design of the following equipments(numericals included) a) shell and tube heat exchanger, b) evaporators, c) distillation columns	15
5.	Detailed mechanical designs of following vessels(numericals included) a) Pressure vessels b) Heads and closures c) reactor d) storage tank (theory only)	12
6.	Nozzles, supports, non-standard flanges: Sketch, uses	6
7.	Design of tall vertical vessels.	6

## **PART [B]**

1.	Pipeline design( concept of piping, design features, numericals)	4
2.	Selection and design of fluid moving machinery. (types of pumps, valves etc and their total design and selection features, comparisons, advantages, disadvantages)	8
3.	Bioprocess validation.Bioprocess and plant economics	4

### **Text Book:**

#### **PART [A]**

1. Process Equipment Design, M.V.Joshi, second edition.

#### **PART [B]**

1. Bioprocess Engineering- Systems, Equipment and Facilities, Bjorn K.L., Nancy A.D., Wiley Intersciences, First Edition

### **Reference Books:**

1. Perry's Chemical Engineers Handbook
2. Pharmaceutical Engineering, Sambamurthy
3. Chemical Engineering – Vol. 6 – Richardson & Coulson.
4. Process Equipments Design – Vessel Design – L. E. Brownell, D. H. Young.
5. ISI Codes / ASME section 8-B
6. Plant Design and Economics for Chemical Engineers – Peters & Timmerhaus.
7. Bioseparations Science and Engineering by Roger Harrison, Paul Todd, Scott Rudge and Demetri Petrides, 1<sup>st</sup> Edition, published by Oxford University Press

### **Laboratory Work / Term Work:**

1. Drawings of technical sketches of various equipments, diagrams etc from the text books (one from each topic)
2. Assignments on topics designed to clear the concepts of the subjects (one from each topic)