

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL ENGINEERING

B. E. SEMESTER: VII

Subject Name: **Process Equipment Design-II**

Subject Code: **170502**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	3	6	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	Introduction : Determination of internal design pressure, external design pressure & design temperature, Different types of equipments, Static & rotary equipments, Different types of static equipments, Properties of material, Fatigue, Creep, Brittle fracture, etc., Different methods of fabrication, Different types of welding joints, Joint efficiency, Radiography, etc.	3
2.	Mechanical design of Pressure vessel: Introduction of ASME Code sec-VIII, DIV-I & IS-2825, Classification of pressure vessel as per IS-2825, Mechanical design of Shell: shell subjected to internal pressure, Graphical & analytical method for Shell subjected to external pressure, design of shell for external pressure with & without stiffening ring, Different types of head, their selection criteria, Mechanical design of heads: Heads subjected to internal pressure, Graphical & analytical method for heads subjected to external pressure, Different types of Nozzles, their selection criteria, Design of nozzle pipe, Design of reinforcement pad by area for area method, Different types of flanges, Different types of standard flanges, their important features & selection criteria, Different types of flange facings & their selection criteria, Rating of standard flanges, Different types of gaskets, their selection criteria, Design of ring flange, etc.	15
3.	Mechanical design of Reaction Vessel: Mechanical design of shell, head, Jacket, coil, agitator, nozzle, body flange, etc., Different types of agitators & their selection criteria, Different types of agitator shaft sealing system & their selection criteria, Different types of power transmission system, Determination of power required for agitation, shaft diameter, blade thickness, etc., Different types of jackets &	7

	their selection criteria, Selection between coil & jacket	
4.	Mechanical design of Storage Tank: Classification of storage tank as per IS-803, Determination of capacity of storage tank, its diameter & height, Design of shell of storage tank, Design of bottom plate, Design of Self supported conical roof, Design of structured supported conical roof as per API 620, Selection of column, girders and rafters, Roof curb angle, Dyke wall, Floating roof, etc.	7
5.	Mechanical design of Shell & Tube Heat Exchangers: Mechanical design of Shell, tube, tube sheet, head, channel shell, , etc. of shell & tube heat exchanger	5
6.	Mechanical design of Vertical tall tower (Distillation Column): Mechanical design of shell, head, tray support, nozzle, , body flange, etc. of Vertical tall tower, Determination of shell thicknesses at various heights for tray tower & packed tower for internal & external pressure, Different types of tray supports & their selection criteria, design of horizontal structural member with periphery ring type packing support	8
7.	Supports : Different types of supports, Mechanical design of bracket support, skirt support & saddle support	6
8.	Pressure Relieving Devices : Different types of pressure safety valves, Rupture disks, sizing of valves	3

Term Work:

Based on above topics design problems (at least three) should be given to the students.
Fabrication drawings based on these designed equipments must be prepared.

Text Book:

1. Illustrated Process Equipment Design by S B Thakore, Second edition.

Reference Books:

1. Illustrated Process Equipment Design by S B Thakore, Second edition,.
2. Process Equipment Design - M.V.Joshi & V V Mahajani, Third edition.
3. Process Equipment Design (Mechanical Aspects) By B.C.Bhattacharya
4. Process Equipment Design - Vessel Design - L.E. Brownell & E.H.Young, First Edition.