# Gautam Buddha University; Greater Noida

## School of Engineering (Mechanical Engineering)

| Degree | Course Name | Course Code | Marks:100 |
|---|---|---|---|
| M. Tech. in Design Engg. | Design of Pressure Vessels and Piping | MED 505 | SM+MT+ET 25+25+50 |
| **Semester** | **Credits** | **L-T-P** | **Exam.** |
| I | 3 | 3-0-0 | 3 Hours |

### Unit – I

**Introduction:** Introduction; Stresses in a circular ring; Cylinder - Membrane stress analysis of vessel shell components; Cylindrical shells; Spherical shells; Tori-spherical heads; Conical heads; Thermal stresses; Discontinuity stresses in pressure vessels. **(07 Hours)**

### Unit – II

**Buckling and Fracture in Vessels:** Buckling phenomenon; Elastic buckling of circular ring and cylinders under external pressure; Collapse of thick walled cylinders or tubes under external pressure; Effect of supports on elastic buckling of cylinders; Buckling under combined external pressure and axial loading; Control and significance of fracture mechanics in vessels. **(06 Hours)**

### Unit – III

**Design of Vessels:** Pressure vessels subjected to internal pressure & external pressure; Design of tall cylindrical self supporting process columns; Supports for short vertical vessels; Stress concentration - at a variable thickness transition section in a cylindrical vessel; About a circular hole; elliptical openings; Theory of reinforcement - pressure vessel design.

**(08 Hours)**

## Unit – IV

**Pipe Fittings**: Introduction to piping components; Bends; Tees; Bellows and valves. Flow diagram; Piping layout; General arrangement drawings;Preparation of cross sectional drawings ;Piping isometric drawings; Piping material; Piping supports; Types of supports; Support selection; Support location; Support span charts. **(10 Hours)**

## Unit – V

**Piping Design:** Piping stress analysis; Flexibility factor and stress intensification factor; Design of piping system as per standard piping codes.

**(07 Hours)**

## Unit – VI

**Maintenance Of Pressure Vessel and Piping:** Health monitoring of pressure vessels and piping from maintenance perspective. **(07 Hours)**

## Recommended Books:


1. Pressure Vessels: Design and Practice; Somnath Chattopadhyay; CRC Press.
2. Pressure Vessel Design; Donatello Annaratone.
3. Pressure vessel Design; J. F. Harvey; CBS Publication.
4. Process Equipment Design; L. E. Brownell & E. D. Young; Wiley Eastern Ltd.; India.
5. ASME Pressure Vessel and Boiler Code; Section VIII Div 1 & 2; 2003 American Standard Code for Pressure Piping ; B 31.1.
6. Pressure Vessel Design Hand Book; Henry H Bednar; CBS Publishers and Distributors.
7. Chemical Process equipment; Selection and Design; Stanley M Wales Butterworths; Series in Chemical Engineering;1988.
8. Approximate Methods in the Design and Analysis of Pressure Vessels and Piping; William. j.; Bees; ASME Pressure vessels and piping conference;1997