GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 2

Mechanical Engineering (Cryogenic Engineering)

Subject Name CRYOGENIC PLANTS AND EQUIPMENTS

Sr.No	Course content
1	Gas separation and gas purification system : Thermodynamically Ideal separation system, general characteristics of mixtures , temperature composition diagram for cryogenic gas mixtures , fugacity , enthalpy composition diagrams, Simple condensation and evaporation, principles of rectification, theoretical plate calculations for columns, Mecabe – Thiele method for theoretical plate calculation , types of rectification columns
2	Air separation and purification systems: Linde single column, double column, Linde-Frank1 and Heylandt systems, argon, xenon and krypton. 'L' Air liquede systems fir hydrogen, hydrogen – deuterium in separation systems, helium separation system, separation of helium isotopes , purification of helium.
3	Modern air liquefaction , liquid nitrogen and oxygen plants.
4	Dewars, classification of Dewars, static and chassis mounted cryogenic liquid storage and transport tanks LNG storage tanks, construction Liquid and vapour shielded vessels, cryogenic liquid transfer pumps, liquid transfer lines their design, vacuum insulated line joints, and cryogenic valves liquid transfer systems.
5.	Design of cryostat. Various types of cryostats, construction, their salient features.
7.	Fabrications and jointing techniques, flanged and bolted joints , joining of dissimilar metals , welding of stainless steel and alloy steels

List of Experiments:

1. Study of cryogenic storage vessels.
2. Study of separation system for O_2 and N_2.
   a. Linde single column system
   b. Linde double column system
   c. Linde Frankle system
   d. Heylandt system
3. Study and design of rectification column.
4. Study of cryogenic fluid transfer line vacuum insulated line joints.
5. Cryogenic valves & design of transfer line.
6. Study of the various fabrication techniques applied to cryogenic plant & equipments.
7. To study of Philips LN2 plant.
8. To study the salient design feature of a cryostat & its construction & equipments.
9. Study of separation system for H2 & He.

Reference Books:

1. Cryogenic Systems, **Barron, McGraw Hill Book Co**.
2. Theory and design of cryogenic systems : **A.Arkherov**
3. Cryogenic process engineering **Timmerchand & Flynn**