

NATURAL GAS ENGINEERING

(L-T-P: 3-0-0)

Objectives:

After going through this course the students will be able to:

- (i) Fully explain the processes involving the movement of gas from wellhead to the market;
- (ii) Determine appropriate requirements and associated processing options to make gas marketable;
- (iii) Develop and apply basic process logic for control/automation operations.
- (iv) Solve design problems related to prediction and optimization of natural gas reservoir performance and gas storage reservoir.

Syllabus:

Module-I: Natural Gas.

Unit 1: Natural Gas: Composition, Resources, Reserves and Utilization. Liquefied Natural Gas. Natural Gas Industry: Present Status and Future Challenges.

Unit 2: Properties of Natural gas: Physical Properties of Natural Gas and its Associated Liquids. The Gas Compressibility Factor. Viscosity and Compressibility of Gases. Reservoir Engineering Aspects of Natural Gas.

Module-II: Gas Processing.

Unit 1: Field Separation of Natural Gas Componets. Types of Separators. Separation Principles. Factors Affecting Separation. Separator Design.

Unit 2: Dehydration Processes. Water Content of Natural Gas. Gas Hydrates. Hydrate Inhibitors. Hydrate Control in Natural Gases.

Unit 3: Desulfurization Processes: Solid Bed Sweetening Processes. Physical and Chemical Absorption Processes.

Module-III: Production and Flow Measurements.

Unit 1: Gas Production. Static and Flowing Bottom-Hole Pressure. Basic Energy Equation. Average Temperature and Deviation Factor Method. Sukkar and Cornell Method. Cullendar and Smith Method.

Unit 2: Flow Measurements: Measurement Fundamentals. Methods of Gas Flow Measurements.

Module-IV: Gas Compression:

Unit 1: Types of Compressors. Compressor Selection. Compression Processes.

Unit 2: Compressor Design Fundamentals.

Module-V: Gas Gathering, Transportation and Storage and Unconventional Gases.

Unit 1: Gas Gathering Systems. Steady-State Flow in Pipelines. Storage of Natural Gas.

Unit 2: Unconventional Gases. Coal Bed Methane. Shale Gas. Tight Gas Sands.

Pre-requisite: Thermodynamics, Fluid Mechanics.

Text Books:

1. Natural Gas Production Engineering: Chi U. Ikoko; John Wiley & Sons, New York, USA.
2. Gas Production Engineering: Sanjoy Kumar; Gulf Publishing Company, Houston, Texas, USA.
3. Gas Reservoir Engineering: John Lee and Robert A. Wattenbarger; Society of Petroleum Engineers, USA.