

## **CHE-484: Natural Gas Engineering**

**Credit Hours:** 3-0

**Pre-requisites:** None

### **Course objective**

To provide an understanding of natural gas, its purification, transmission and distribution

### **Course Contents**

- i. Introduction: Occurrence of natural gas. Indigenous & world N.G. reserves & production.
- ii. Introduction to natural gas industry, N.G. as domestic, commercial & industrial fuel and as raw material for downstream petrochemical industry
- iii. Constituents of natural gas & compositions of gases from various fields of the country
- iv. Physical, chemical, thermal, thermodynamic and transport properties of natural gas. Gas laws & equations of state. PVT relations. Use of compressibility factor charts. Prediction of properties of gaseous mixtures
- v. Gas Conditioning & Processing: Gas cleaning: principles, methods & equipment. Introduction to various absorption, adsorption and chemical conversion gas purification processes.
- vi. Sulphur recovery from sour natural gas, recovery of LPG from N.G. recovery of helium from N.G., new trends in gas purification.
- vii. Gas Transmission: Outline of major steps in a transmission pipeline project. Pipeline flow formulae/equations: Transmission factor. Pipeline capacity/deliverability & efficiency. Gas compressor stations.
- viii. Piping codes and standards. Classification of steel pipe construction, Pipeline routing using topographical maps. Right of way. Looping & branching. Series & parallel pipe circuits. Steps of pipeline construction. Pipeline coating & laying. Pipeline protection, monitoring and maintenance. Operational problems of high-pressure pipelines.
- ix. Gas Distribution: City-gate stations. Gas odourization Character of distribution system loads: Estimation of design loads, sizing of services & stub mains, modification of existing systems, design of a new distribution system. Types of distribution system.

- x. Flow calculations & sizing of mains using practical flow equations. Distribution pressures. Types of distribution network. Network diagram and its related concepts & principles.
- xi. Gas metering. Pressure regulators : domestic, commercial & industrial.

### **Course Outcome**

The students will get adequate information regarding natural gas its processing, transmission and distribution.

### **Recommended Books**

- Ej Hoffman, Membrane, "Separation Technology and Processing", Gulf Publishing Company, 2003
- . Khol, A and Nielsen, R, , "Gas Purification" 5th Edition, gulf Publishing, Houston, 1997
- Kidnay A.J and W.R. Parrish, , Fundamentals of Natural Gas Processing CRC Press; New York, 2006
- Katz, D.L., Cornell, D., Kobayashi, R., Poettmann, F.H., Vary, J.A., Elenbass J.R., and Weinaug, C.F., , Handbook of Natural Gas Engineering", McGraw-Hill, New York, 1959
- Katz, D.L. and Lee, R.L., , "Natural Gas Engineering", McGraw-Hill, New York, 1990