

Subject Code: 1ET4060502	Subject Title: Natural Gas Engineering
Pre-Requisite	--

COURSE OBJECTIVE

The objective of the course is to provide the basic knowledge of natural gas and its utilization

COURSE OUTCOMES

Upon successful completion of this course, students will have the exposure of the natural gas processing, handling and utilization.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment
3	-	2	4	60	40	20	30

COURSE DETAILS

Unit	Topics and Sub-topics	Lecture Hours
1	Introduction: Composition of Natural Gas, Utilization of Natural Gas, Natural Gas Industry, Natural Gas Reserves, Types of Natural Gas Resources, Future of the Natural Gas Industry.	5
2	Properties of Natural Gas: Physical properties of natural gas and hydrocarbon liquids associated with natural gas. Reservoir aspects of natural gas. Calorific value of gas and measurement.	5
3	Gas Compression: Heat and Mass Transfer Principles and Applications in Natural Gas Engineering, Use of Mollier Diagrams.	5
4	Gas Flow Measurement: Process control and instrumentation in natural gas processing plants.	5
5	Natural Gas Processing: Field separation and oil absorption process, Refrigeration and low temperature processing, Liquefaction Process, Dehydration of Natural Gas, Sweetening of Natural gas and sulphur recovery. Processing for LPG, CNG, system, Conversion of gas to liquid. Custody transfer- principles and measurements.	5
6	Gas Gathering, Transport and Storage: Gas Gathering System. Steady Flow in Simple Pipeline System, Steady State and non Steady State Flow in Pipelines, Solution for Transient Flow. Transmission of Natural Gas, Specifications. Underground Storage and Conservation of Natural Gas. LPG, NGL & LNG storage.	5
7	LNG: Production and Utilization.	5
8	Issue and Challenges to Enhance Supply of Natural Gas	4

SUGGESTED LIST OF EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (outcomes in psychomotor and affective domain) so that students are able to acquire the competencies/program outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Name of Experiment	Contact Hrs
01	Introductions to process instrumentations i Pressure ii. Flow iii. Temperature	06
02	Study of Centrifugal pump Characteristics and to determine; Power Input, Shaft Output, Discharge, Total Head, Pump Output, Overall Efficiency and Pump Efficiency	04
03	To investigate- i. Fourier's law for linear conduction of heat along a simple bar. ii. Effect of Surface contact on thermal conduction. iii. The rate of heat transfer from radial steady conduction through a wall of cylinder.	06
04	Study of heat transfer in natural convection process, and determination of the Heat transfer coefficient of heated vertical cylinder, which is exposed to atmosphere.	04
05	To investigate the flow round a 90o bend in a duct of rectangular section using pressure tapings along the walls to establish pressure Co-efficient.	04

Text Books:

- Gas Production Engineering : Sanjay Kumar
- Natural Gas Production Engineering : Mohan Kelkar
- Handbook of Natural Gas Engineering : Doland L. Katz

Reference Books:

- Practical Natural Gas Engineering : R. V. Smith
- Natural Gas : E. N. Tiritsoo
- Fundamentals of Gas Reservoir Engineering : Jacques Hogoort