

20PEB403					NATURAL GAS PROCESSING AND VALUE ADDITION					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	0	0	3	3	25	50	25	-	-	100

### COURSE OBJECTIVES

- Demonstrate the concepts of Gas Processing.
- Demonstrate the Cryogenic processing of gases.
- Develop skills to plan processing required to meet market specification economically.
- Confidence to implement safe processing and handling of gases

#### Unit I

Hours: 10

Introduction- Defining Gas processing, Historical background, General processes concerning gas Processing : Water and Hydro Carbon Liquid Separation, Dehydration, H<sub>2</sub> S Removal and elemental Sulfur extraction, Carbon Di Oxide ( CO<sub>2</sub> ) removal, Mercury Removal. Gas processing for pipeline transportation (Corrosion protection, limits for water, H<sub>2</sub>S and CO<sub>2</sub> contents).

#### Unit II

Hours: 10

Introduction to Refrigeration/ Cryogenic Process for separation / processing of Gases: Refrigeration Cycle, Cascade refrigeration processes (Multiple pure component system and Mixed Refrigeration system), Turbo Expander and System, Advanced Refrigeration system

#### Unit III

Hours: 10

Extraction of components in Natural gas and /or liquids: Helium Extraction, Nitrogen Removal, Propane and Butane (LPG) Extraction, Ethane Extraction, NGL component extraction from NGL liquids by Fractionation process, NGL Extraction from Gas Mix, Introduction to use of natural gas liquid (NGL), its components for manufacture of value added products: C<sub>2</sub>, C<sub>3</sub> and C<sub>4</sub>

#### Unit IV

Hours: 9

Gas processing for LNG Production (limits of Water, CO<sub>2</sub>, H<sub>2</sub>S and Mercury contents etc.), LNG Production process, LNG Storage, LNG Transportation & Regasification.

### COURSE OUTCOMES

On completion of the course, student will be able to

CO1- Gather comprehensive understanding and information about the LNG value chain.

CO2- Understand physical and chemical properties of LNG with processing techniques.

CO3- Assess techno-commercial factors involved in the development and operation of LNG regasification terminals and liquefaction processes

CO4- Understand LNG transportation and Ship handling at receiving terminals.

CO5- Enumerate global and domestic scenario and pricing of LNG.

CO6- Practice employee health and safety as well as adherence to required standards for safety and operations

### TEXT / REFERENCE BOOKS

1. Gas Production Engineering by Sanjay Kumar
2. Handbook of Natural Gas Transmission and Processing by Saeid Mokhatab, William A Poe and James G. Speight

### END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100

Exam Duration: 3 Hrs.

PART A: Part A/Question: <Short Notes, Problems, Numerical>

20 Marks

PART B :< Justification, Criticism, Long answers, Interpretation >

80 Marks