

22PCM305T					Gas Processing Technologies					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hours/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

**COURSE OBJECTIVES**

- Understand the various types of gas processing and utilization techniques.
- Identify the parameters and selection criteria for different gas operations.
- Enable to identify different types of processing for gas dehydration and sweetening.
- Develop skills to plan processing required to meet market specification economically.
- Gather comprehensive understanding and information about the C<sub>1</sub> and C<sub>2</sub> gas value chain
- Identify applications of gas in different sectors like Industrial, commercial, residential and electric generation and transportation.

**UNIT I: Introduction to C<sub>1</sub> and C<sub>2</sub> gases****6 Hr.**

C<sub>1</sub> and C<sub>2</sub> gas industries. Natural gas and coal bed methane technology and earth science. Global and Indian scenario of gas. Property and its evaluation. Introduction to gas production, gas processing, gas compression, flow measurement, gas transportation: Road, rail and pipeline transport, Liquefied gas and compressed gas (LNG, CNG).

**UNIT II: Processing****7 Hr.**

Gas processing; Gas and liquid separation, separation equipment, types of separators, separation principles, separator design, stage separation, low temperature separation and gas cleaning. Gas-water system and dehydration processing: Water content of natural gas, gas hydrates, absorption dehydration, adsorption dehydration. Advanced dehydration processes. Desulfurization processing: removal processes, solid bed sweetening processes and physical and chemical absorption processes. Advanced desulfurization process. Membrane separation processes.

**UNIT III: Transportation****7 Hr.**

Introduction to gas usage and city gas distribution, Gas flow in pipelines at high, medium and low pressure, fluid dynamics and thermodynamics, Gas Flow Equations: General flow equation, Panhandle-A equation, Panhandle-B equation, Weymouth equation,, Polyflo equation, Lacey's equation and equation of velocity for gas pipeline. Steel, MDPE Pipelines, Pressure Regulators and Valves. Safety Guidelines, T4S regulations, Impact on environment, Disaster Management Plan.

**UNIT IV: Utilization****6 Hr.**

Gas Compression: Positive displacement and centrifugal compressors; fans. Gas utilization as fuels in industrial, commercial, residential, and electric generation; transportation; Utilization in petrochemicals manufacturing.

**Max. 26 Hr.****COURSE OUTCOMES**

On completion of the course, student will be able to

**CO1:** Recognize the fundamental of gas processing and its components

**CO2:** Understand the various influential parameters in gas processing operation.

**CO3:** Identifies various petrochemicals from C<sub>1</sub> and C<sub>2</sub> and learn their production techniques and examine various associated challenges.

**CO4:** Understand the gas processing, gas compression, transportation, operation and trouble shooting

**CO5:** Examine critical issues related to natural gas processing and various associated challenges

**CO6:** Identify applications of C<sub>1</sub> and C<sub>2</sub> gases in different sectors.

#### **TEXT/REFERENCE BOOKS**

- (1) Gas Production Engineering, Sanjay Kumar, Gulf Publishing Company, 1987.
- (2) Standard Handbook of Petroleum and Natural Gas Engineering. 3<sup>rd</sup> Edition. William C Lyons, Gary C Plisga. Gulf Professional Publishing, 2015.
- (3) Shashi Menon, "Gas Pipeline Hydraulics", Taylor & Francis Group, 2005.
- (4) John M Campbell "Gas Conditioning & Processing" Volume 2, Volume 3, Volume 4 published by Campbell Petroleum Series, 1988.

#### **END SEMESTER EXAMINATION QUESTION PAPER PATTERN**

**Max. Marks: 100**

Part A: 10 Questions each carrying 5 marks

Part B: 5 Questions each carrying 10 marks

**Exam Duration: 3 Hr.**

50 Marks

50 Marks