Natural Gas Processing

1.1 Course Number: CH481

1.2 Contact Hours: 3-0-0 Credits: 9

1.3 Semester-offered: 3rd year- even

1.4 Prerequisite: Thermodynamics

1.5 Syllabus Committee Member: Prof. U. Ojha, Dr Milan Kumar

2. **Objective:** The course will introduce production and processing of natural gas. Gas-liquid separation will be covered in next few lectures that include various gravity separators, theory behind gravity separation, and types of gravity separation method such as vertical, horizontal gravity separator and coalescer. The course will then cover various gas purification steps such as acid gas treatment, gas dehydration and gas cleaning. Gas hydrates and coal bed methane will be discussed in detail. The last part of the course will deal with various aspects of the transportation and storage of natural gases.

3. **Course Content:**

Unit wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction to Gas Processing and Their Properties	Origin, Composition, Natural gas properties, Phase behavior, Characterization of reservoir based on phase behavior	6
2	Phase Separation	Phase separation, Sizing of two, three phase separators, skimmers	10
3	Gas Hydrates	Origin, Thermodynamics of formation and decomposition, Properties, Methods of extraction	4
4	Gas Dehydration	Water-hydrocarbon system, Gas dehydration, Physical and Chemical, solid, liquid, Sizing of dehydration units	6
5	Treatment Process	Acid gas treating, Design of treatment plants, Chemistry behind acid gas separation	7
6	Storage	Storage of Natural gas	2
7	LNG processing	Liquefaction of Natural Gas, Thermodynamics of LNG processing, refrigerant processes	5
		Total	**40**

4. **Readings**

4.1 Text Books:

1. Natural Gas Peoduction Engineering, C. U. Ikoku (Gas dehydration)
2. Advanced Natural Gas Engineering, X. Wang & M. Economides (three phase separation)
3. Natural Gas Hydrates J. Caroll (Gas hydrates)
4. Petroleum and Gas field processing, H. K. Abdel Aal, M. Aggour, M. A. Fahim (two phase separation)
5. Handbook of Natural Gas Transmission and Processing by Saeid Mokhatab, William A. Poe, James G. Speight (Acid gas treatment)
6. Natural Gas Processing Principles and Technology-Part I and II, A. H. Younger, P. Eng

4.2 Reference Books:

5. **Outcome of the Course:** The students will be equipped to handle various operating units in an industrial gas processing units. The knowledge gained form the course will equip them for trouble-shooting in the above units. They will also learn about pipeline maintenance and flow assurance. The students will be able to design new acid gas treatment units and mange existing acid gas treatment units in the plants.