Indian Institute of Technology
Course Details Report

Course No: CH5023

Course Name: Unconventional Oil and Gas Resources

Course Type:

Theory

Description:

Global oil production data shows that global crude oil production from the existing fields has already peaked and will decline significantly in years to come. On the other hand, coal mining as a fossil fuel resource is undesirable in CO2 constrained world. As a result, un-conventional oil and gas resources are gaining importance as the next generation fossil fuel resource. While enhanced oil recovery (EOR), in short to medium term is looked upon as a strategy which will eliminate the need for fresh capital investment. Natural gas resources like shale gas and methane gas hydrates are being explored, as a medium to long term strategy to meet the rising energy demand and simultaneously cutting down the CO2 emissions. Overall objective of the course is to provide basic knowledge related to unconventional energy resources, its properties and its exploitation techniques.

Course Content:

Weightage for each topic is given in terms of %

15% - Introduction to conventional oil and gas reservoirs, petroleum systems, concepts of reservoir engineering, phase behavior, production methods, EOR.

15% - Heavy oil and oil sands, occurrences, resources, reservoir characteristics, properties of heavy oil and oil sands, drilling and completion methods, production of heavy oil and oil sands, mining, in situ combustion, steam flooding, production issues, reservoir management, flow assurance, transportation methods, upgradation, refining.

25% - Shale oil and gas, origin, reservoir properties, drilling and completion, horizontal well technology, hydraulic fracturing, reservoir management, produced water treatment methods, environmental issues, emerging trends and technologies.

15% - Coalbed methane (CBM), CBM properties, production methods, methods of drilling, completing, and stimulating CBM wells, hydrologic issues and water production, coal seam gas development, in situ gasification, coal conversion.

30% - Gas hydrates, origin, properties and classification of hydrate reservoirs, molecular structure of hydrate, hydrate formation and dissociation process, phase behavior, kinetics, characterization methods, thermodynamic models, flow assurance issues and hydrate prevention, hydrate promoters and inhibitors, production methods.

Text Books:

Carcoana, A. (1992) Applied Enhanced Oil Recovery, Prentice Hall.

Sloan, D and Koh, C (2008) Clathrate Hydrates of Natural Gases, 3rd Edition. CRC Press.

Reference Books:

Unconventional Oil and Gas Resources Handbook. (2016) Ma Z Y, Holditch S A (Eds).Gulf Professional Publishing.

James, G. (2009) Enhanced Recovery Methods for Heavy Oil and Tar Sands, Gulf Publishing Company.

Chaudhary, A U. (2003) Gas Well Testing Handbook, Gulf Professional Publishing, Elsevier

Dayal, A. M., Mani, D. (2017) Shale Gas: Exploration and Environmental and Economic Impacts, Elsevier