

DEPARTMENT OF MINING ENGINEERING
LECTURE PLAN

Course: VI Semester B.Tech (Mining Engineering) **Session:** 2024-2025 **Semester:** Winter

Subject: Coal Mine Methane Recovery and Utilization (MNO – 304)

Subject Teacher: Dr Patitapaban Sahu, L – T – P: 3 – 0 – 0

Topic	No of Lectures
Unit-1 Methane formation: Coalification process, Thermogenic methane, Biogenic methane, Physical structure of coal, Movement of methane in coal.	5
Unit-2 Types of methane recovery: Coalbed methane (CBM), Coal mine methane (CMM), Ventilation air methane (VAM), Abandoned mine methane (AMM)	02
Unit-3 Coal mine methane production: Different phases for CMM production: - Dewatering, Stable and Declining methane production; Factors influencing CMM production: -Total gas-in-place in coal reservoir, Methane sorption capacity of coal, Diffusion in coal, Permeability of coal; Drilling technology:- Vertical and Horizontal drilling, Lateral and Multilateral drilling, Directional drilling; Well Completion:- Open-hole cavity and Under ream completion, Cased-hole completion Reservoir stimulation:- Hydraulic fracturing, Hydraulic fracture fluids; Case study	10
Unit-4 Coal mine methane (CMM) utilization: CMM capture, Pipeline injection, Gas processing: - Nitrogen rejection unit (NRU) technologies, CO ₂ and water removal technologies, and CMM upgrading options; Onsite use options of CMM by coal mines, Global scenario of CMM recovery, Case study	07
Unit-5 Ventilation Air Methane (VAM): VAM capture, Enrichment of VAM using Multi stage fluidized/moving bed using absorbent and desorb VAM utilization technologies: - Ventilation Air Methane Regenerative After Burner, Thermal Flow Reverse Reactor, Catalytic Flow Reverse Reactor, Catalytic Monolith Reactor, Lean-Burn Gas Turbines, Gas Concentration and Biofiltration; Economic analysis, Challenges in capturing, enrichment and utilization of VAM; Case study	10
Unit-6 Methane emission factors for coal mining and handling activities: Estimation of methane emission factors, Indian and Intergovernmental Panel on Climate Change (IPCC) emission factors, Case study	03
Unit-7 Regulatory aspects of coal mine methane recovery	02

LIST OF REFERENCE BOOKS

Coal and coalbed gas by R.M. Flores, 2014

Advanced Mine Ventilation by P. Thakur, 2019

Coal Mine Regulation (CMR) by L.C. Kaku, 2017

Fundamentals of Coalbed Methane Reservoir Engineering by John Seidle, 2011

Note: The question paper would comprise of 50% of average level, 30% of moderate level and 20% of high difficulty level.
Evaluation schemes are as follows: (i) 30% weightage in mid-semester and 50% weightage in end-semester examinations.
(ii) 20% weightage in quizzes and/or assignment.



(P Sahu)
Associate Professor/Mining Engg.