

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NGPC537	Formation Evaluation	3	0	0	3

Course Objective

Knowledge on Interpretation of basic and advanced well logs. Fundamental petrophysical concepts and relevant equations. Log measured properties can be used to determine the porosity, permeability, water/hydrocarbon saturation, shale content and rock type.

Learning Outcomes

The primary objective of the course is to introduce interpretation techniques of acquired wireline logs for hydrocarbon exploration, mineral exploration, and energy transition.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Archie's law for clean sand interpretation, Apparent water resistivity, Tixier ratio methods	2	Interpretation of clean sand. Use of Hingle plot and Pickett plot for formation water resistivity computation.
2.	Cross plotting technique. Usability of different porosity logs (NPHI, density, Sonic)	2	Identification of matrix in a rock
3.	Multimineral evaluation of complex formation (M-N plot, MID plot)	2	Mineralogy determination of a formation
4.	Shaly sand interpretation using neutron, density, resistivity, and sonic log responses	3	Interpretation of shaly sand
5.	High Resolution four arm Dipmeter (HDT) Tool, Data Processing, Azimuthal Frequency (AZF) PLOT, Smidth Plot, Interpretation of Dipmeter logs for structural and sedimentary environmental studies	5	Interpretation of sedimentary environment and structural variation with depth
6.	Utilization of Gamma, Resistivity, and Density Logs in mineral exploration	2	Interpretation of petrophysical logs in mineral exploration
7.	Advanced Logging Tools: Nuclear Magnetic Resonance, Cross-dipole Sonic, Induced Gamma Ray Spectrometry, (Chlorine Log, Reservoir saturation)	8	Principles of advanced logging tools and their application
8.	Determination of Porosity, Permeability and Capillary pressure of sedimentary rocks using laboratory instruments	4	Petrophysical properties in Laboratory
9.	Application of well logs in characterization of coals, Determination of quality of coal and rock strength	3	Log responses in coal seam
10.	Facies definition and log characteristics for identification of electrofacies	2	Electrofacies identification
11.	Detection of Fracture from Acoustic and	4	Fracture identification from

	Resistivity Image Tools and Case study		image logs
12.	Application of wireline logs in energy transition	5	Critical role of basic well logs in subsurface CO ₂ sequestration
	Total	42	

Text Books:

1. Bateman, R, M., Open Hole Log Analysis and Formation Evaluation
2. Helander, D. P., Fundamentals of Formation Evaluation.

Reference Books:

1. Brock, J., Applied Open Hole Log Analysis
2. Ellis, D. V., Well Logging for Earth Scientists
3. Bateman, R, M., Cased Hole Log Analysis and Reservoir Performance Monitoring.
4. Serra, O., Fundamentals of Well Log Interpretation
5. Vaish, J. P., Geophysical Well Logging: Principles and Practices