Well logging Lecture Plan (GPC-510) – 2025

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	GPC 510	**Well Logging**	3	0	0	9

Course Objective
Knowledge of various Well Logging Tools available in the industry. Knowledge on borehole corrections required of the acquired physical measurements at subsurface depth and how these physical properties are used to infer about subsurface formations. Understand the concept of Perforation and Cased-hole tools.
Learning Outcomes
Upon successful completion of this course, students will learn different aspect of Well Logging tools used in the industry, their calibration, environmental correction, and brief application. The primary objective of the course is to introduce Well logging Techniques for Hydrocarbon, mineral exploration, geothermal, carbon sequestration and energy storage.

Unit No.	Details of Lectures	Lecture Hrs.	Outcome
1.	Introduction to well logging and borehole environment.	**3**	History of logging and Use of drilling fluid
2.	Rock composition, Resistivity, and water saturation Profile with lateral distance for Oil wet and Water wet rock	**2**	Property variation with lateral distance in wells
3.	Definition of porosity and permeability, Darcy's law, absolute permeability, effective and relative permeability, effective porosity. Relationship between porosity and permeability.	**4**	To know the Darcy's law, porosity concept, fluid flow
4.	Formation Factor, Resistivity Index and Water saturation, Archie's Law	**2**	To know about Archie's law
5.	Principles of Spontaneous Potential (SP) tool and borehole environmental correction	**2**	SP tool and Log response
6.	Resistivity Tools (Normal, Lateral, Laterolog, Dual Latero log and Dual Induction log) and borehole environmental correction.	**6**	Resistivity tools and response
7.	Sources of Natural Gamma ray and Natural Gamma Ray Spectrometry tool, Compensated Neutron Logging (CNL) Tool.	**5**	GR tools and response
8.	Formation Density Compensated Tool, Borehole Compensated Sonic/Acoustic Tool, CBL/VDL tool	**6**	Density, and sonic tools, and their responses
9.	Temperature, Caliper, Repeat Formation Tester (RFT), Side Wall Coring	**4**	Principle of Temperature, caliper, RFT, coring tools
10.	Thermal Decay Time (TDT) Tool	**3**	Principles of TDT and

	Logging while Drilling (LWD)/ Measurement while Drilling (MWD)		LWD/MWD tools
11.	Continuous Flow meter Tools	**1**	Concept of continuous flowmeter tools
12.	Fluid Density and Temperature measurement Tool in producing well	**2**	Log response of Fluid density and Temperature measurement tools in producing well
13.	Perforation Devices, Depth control and Safety aspects in wells	**2**	Use of perforation in wells
	Total	**42**	

Text Books

1. Bateman, R, M., Open Hole Log Analysis and Formation Evaluation.
2. Serra, O., Fundamentals of Well Log Interpretation
3. Bateman, R, M., Cased Hole Log Analysis and Reservoir Performance Monitoring

Reference Books

1. Brock, J., Open Hole Log Analysis
2. Ellis, D. V., Well Logging for Earth Scientists
3. Helander, D. P., Fundamentals of Formation Evaluation.
4. Vaish, J. P., Geophysical Well Logging: Principles and Practices