CHPE01 PETROLEUM EXPLORATION AND WELL LOGGING

COURSE OBJECTIVES:

1. To understand the logging technologies
2. To delineate hydrocarbons through direct and indirect means/methods
3. To determine the formation lithology through logs like S.P, G.R etc. and also depositional environment with the help of Gamma rays spectroscopy and Dip-meter tools
4. To determine the physical properties of the subsurface, strata like resistivity, porosity, thickness etc. through tools like latero, induction, density, neutron, etc.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Know various well logging methods.
2. Know resistivity logs method.
3. Know the gamma ray log and density logs methods.
4. Do cased hole logging and production logging methods.

UNIT I [CO:1] **(12)**

Introduction: History, fundamental problems and the way we go. Reservoir rocks, reservoir properties. **Direct Methods:** Mud logging- coring â€“ conventional and sidewall coring - Core analysis.

Concepts of well logging: What is well logging? Principle of log measurement- Classification of logging methods â€“ the tool (probe) and the environment of measurement.

UNIT II [CO:2] **(12)**

Open-hole logging: SP Logging- Origin of SP, uses of SP log-Calculation of salinity affirmation water-Shaliness-Factors influence SP log.

Electrical logs: Conventional resistivity logs- Limitations of conventional resistivity tools. Focused resistivity log- Advantages of focused resistivity tools over conventional resistivity tools â€“ Micro resistivity logs. Induction log - principle and depth of investigation.

UNIT III [CO:3] **(12)**

Nuclear Logs: Natural gamma measurement â€“ Principle and applications of gamma log. Caliper log: Principle and application of caliper tool.

Density log: Principle of density tool- Environmental Corrections-Porosity determination- Tool calibration. Litho density log. Neutron log: Principle and application of neutron tool. Porosity determination. Sonic log: Principle and application of sonic log.

UNIT IV [CO:4] **(12)**

Cased hole logging: Gamma ray spectral log-Neutron decay time log-Determination of fluid saturation behind casing-Cement bond log. Production logging tools.

Log Interpretation: quick look methods, quantitative interpretation-shale content, porosity from single log, water saturation from logs.

LEARNING RESOURCES:

TEXT BOOK:

Well logging and formation evaluation, Toby Darling, Elsevier, New York, 2005

REFERENCE BOOK(s):

1. Basic well logging and formation evaluation, Prof. Dr. Jurgen Schon. 2015.

2. Well Logging for Earth Scientists, Darwin V. Ellis, Julian M. Singer, Springer, 2007
3. Well Logging Handbook, Oberto Serra, Editions Technip, 2008.
4. Well Logging & Reservoir Evaluation, Oberto Serra, Editions Technip, 2007.