

PE6050 Exploration and formation Evaluation of Oil and Gas Reservoirs

Course Content:

Gravity, introduction to Geophysical Methods, the Role of Non-Seismic Methods in the E& P Business, Gravity Surveying, Determination of Contour Map anomalies, Calculation of Gravity Responses, Determination of Gravity Resolution of Bodies, anticlines and Faults, Depth Estimation Methods: Half-Width, Gradient-Amplitude, Exercises on Paper and Using Computer Software Magnetism and Electrical Methods, introduction to Magnetic and Electrical Methods, Gravity and Magnetic Signatures, (Poisson's) Relationship Between Gravity and Magnetic Responses, Electrical Measurement Methods, Calculations of Resistivity Profiles, Effective Resistivity, Exercises on Paper and Using Computer Software Electrical and Electro-Magnetic (EM) Methods, EM: Diffusion Or Wave-Propagation ? Land EM: TEM Surveying, Magneto Tellurics (Mt): Measurements & Modelling, Marine EM: CSEM (Controlled Source Electromagnetics) Measurements, Calculations of E Refraction, Mt Resolution, EM Skin Depth & Velocity, Exercises on Paper and Using Computer Software CSEM Modeling and inversion, EM Terminology, Exercises: CSEM Scripps Modelling: 3 Layers Exercises: CSEM Scripps Modelling: 5 Layers, CSEM & Mt: Scripps Occam inversion, Time-Lapse Gravity & Electrical Methods, Joint inversion CSEM & Mt, Joint inversion TE & TM Joint inversion TDEM (Time Domain EM), Mt Sub-Surface Correlation and Mapping from Log Data. Delineation of Fractures from Logs. Production Logging. Well Logging for Metallic and Non-Metallic Minerals: Radioactive and Nonradioactive Evaporates, Coal, Sulphur. Borehole Geophysics for Groundwater Exploration., Effective Pay Thickness of an aquifer. Saline Water-Fresh Water interface from Log Data., Determination of Groundwater Flow Direction By Logs. theoretical Computations of Normal and Lateral Log Responses. Identification and Delineation of Sub-Surface formations from Well Log Data. Calculation of Reservoir Parameters: formation Factor, Porosity, Permeability, Resistivity, Water and Hydrocarbon Saturations, and Movable Oil. Subsurface Correlation of formations and interpretation of Field Data.

Text Books:

1. **Kearey, P., Brooks, M., & Hill, I.** an introduction to Geophysical Exploration. John Wiley & Sons, 2013
2. **Telford, William Murray, Lloyd P. Geldart, and Robert E. Sheriff.** applied Geophysics. Vol. 1. Cambridge University Press, 1990.

Reference Books:

1. **D.P Helander** 'Fundamentals of formation Evaluation'
2. **Dewan.J.T** 'Essentials of Modern Open-Hole Log interpretation' Pen Well Books, 1983.

Prerequisite:

Nil