Course Type	Course Code	Name of Course	L	T	P	Credit
DC	GPC202	Self-Potential Method: Theory and Application	3	0	0	9

Course Objective

1. The self-potential method is a simple yet innovative process, enabling non-intrusive assessment and imaging of disturbances in electrical currents of conductive subsurface materials by measuring the electrical response at the ground's surface or in boreholes. It has an increasing number of applications, from mapping fluid flow in the subsurface of the Earth to understanding the plumbing systems of geothermal fields, and detecting preferential flow paths in earth dams and embankments and oil exploration.

2. Course discusses the fundamental concept about the self-potential method

Learning Outcomes

1. Ability to select the proper drilling fluid compatible to the well.
2. Ability to design a sandbox experiment.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Fundamentals of the self-potential method: Coupling between electric and non-electric flows and forces in the earth causing self-potential, The electrical double layer, Poisson's Equation	6	Introduces the basic concept of the Self- Potential Method
2.	Origin of Self-Potentials	6	Explains the various causes of Self- Potential
3.	Field Measurement: Mapping and Monitoring of SP, Electrode Drift, Sources of Noise	5	The field procedure, sources of noise are discussed in detail
4.	Why Self-Potential in general is negative	3	Explains the cause of negative Self- potential
5.	Geobattery and the Sandbox experiment	4	The section explains the concept of geobattery using a sandbox experiment. Sandbox experiments can be used to test conceptual models at an intermediate scale, between the core sample and field scales.

6.	Self-Potential response over typical Geometrical shaped causative sources	4	Discusses the mathematical treatment for determination of Self-Potential anomaly over typical Geometrical shaped causative sources
7.	Interpretation of Self-Potential Data: Nomograms, Charge /Dipole Occurrence Probability, Analytical Signal, Enhanced Local Wave Number technique, Euler and Extended Euler Techniques	6	Discusses the various interpretation techniques as applied to Self-Potential Data
8.	Case Histories: Mineral Exploration, Oil Exploration, Mapping of Coal Fire Front, Ground Water Exploration	8	Discusses the applicability of Self- Potential Method
	Total	**42**	

Text Books:

1. Bhattacharya, B. B., and Shalivahan, 2016, Geoeletcric Methods: Theory and Applications: McGraw Hill Education (india) Private Limited
2. Telford, W. M., Geldart, L. P., Sheriff, R. E., and Keys, D. A., 1976, Applied Geophysics, Cambridge University Press

Reference Books:

1. Revil, A., and Jardani, A., 2013, The Self-Potential Method: Theory and Applications in Environmental Geosciences Applied Drilling Engineering: Cambridge University Press.