Course Type	Course Code	Name of Course	L	T	P	Credit
DC	**GPC201**	**Introduction to Rock Physics**	**3**	**0**	**0**	**9**

Course Objective

Rock physics is an interdisciplinary branch of geophysics that explains geophysical data, such as seismic wave velocities or electrical conductivity in the context of mineralogy, fluid content, and environmental conditions. Rock physics employs indirect geophysical data, such as seismic impedance, sonic log velocities, laboratory measurements, and petrophysical information about porosity, fluid type, and saturation in reservoir characterization, evaluation, and monitoring.

Learning Outcomes

This course module introduces basic concepts of Rock Physics and also provides Rock Physics model to understand the velocity in the porous media.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1.	Basics of seismic wave propagation, porosity, permeability, rock type	6	To know about seismic velocity, petrophysical properties
2.	Isotropic and Anisotropic Form of Hooke's law	3	The concept of isotropic and anisotropic media
3.	Relationships among elastic constants in an isotropic and anisotropic medium	4	Elastic constant in anisotropic and isotropic media
4.	Thomsen's Anisotropic Parameters	2	Weak anisotropic medium
5.	Impedance, Reflectivity and Transmittivity Seismic Amplitude Variation with Offset (AVO)	4	Concept of impedance, reflectivity and AVO
6.	Seismic Attributes – elastic impedance, AI, GI, EEI, AVO, attenuation, anisotropy, porosity, permeability, electrical conductivity and their relationships	4	Relationship between Seismic impedance and extended elastic impedance in layered media
7.	Physical properties of rock, and relate these properties to the mechanical behavior of the rocks	3	Understanding of Physical behaviour of rock

8.	Effective elastic modulae, Hashin-Shtrikman bounds Voigt-Reuss bounds Hills Average Method	6	To know about upper and lower bounds of elastic properties
9.	Rock and Pore Compressibility, Rock physics Diagnostics model	4	Concept of pore compressibility and diagnostic model
10.	The effects of fluids on rock properties: Gassmann relation for fluid Substitution. Contact model, constant Model and Friable sand model	6	Computation of seismic wave velocities using these models and Gassmann Relation
	Total Classes	**42**	

Text Book

1. Introduction to the physics of rocks, Gueguen and Palciauskas, Prinston Univ. Press, 1992.
2. The Rock Physics Handbook, Mavko, Dvorkin and Mukerji, Cambridge Univ. Press, 1998.

Reference Book

1. Wave Propagation in Elastic Solids: North-Holland Series in Applied Mathematics and Mechanics (North-Holland Series in Applied Mathematics & Mechanics) by J.D. Achenbach and H. A. Lauwerier