Course Code	Course Name	Credits
26PH103	GEO PHYSICS	04

Course Objectives

- To understand the fundamentals of earthquake, refraction, and reflection seismology.
- To learn seismic data acquisition and interpretation techniques.
- To provide practical exposure to seismic instruments and software tools.
- To develop skills in analyzing and modeling subsurface structures.

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Understand seismic wave propagation and Earth structure
- Apply refraction and reflection techniques in geophysical studies
- Acquire and process seismic data using instruments and software
- Analyze and interpret subsurface structures from seismic data
- Present geophysical findings based on data interpretation

Unit 1 - Earthquake seismology (12 Hrs.)

Picking arrivals, travel times, and the velocity structure of the Earth—Lab using the 24 channel seismic recorder to collect data on campus

Unit 2 – Refraction seismology (12 Hrs.)

Snell's law, travel paths—lab on interpreting seismic refraction data—including the data collected the previous week, computer modeling first arrivals for various velocity models

Unit 3 - Reflection seismology (12 Hrs.)

Travel paths, amplitudes, velocities, design of surveys for CMPs—lab on modeling a vertical incident seismic section and comparison with actual sections

Unit 4 – Reflection seismology (12 Hrs.)

Processing and interpretation of data—lab on data processing using Promax and demonstration of Petrel software for interpretation

Unit 5 - Reflection seismology (12 Hrs.)

Data interpretation using all of the previous topics—lab will be involve groups in constructing and presenting their interpretation of a data set in class

Reference Books:

1. Principle of engineering geology -KM Banger
2. *Principles of Seismology*, 2nd Edition,Cambridge University Press, 2017.
3. *Introduction to Seismology*,Birkhäuser Basel (Springer), 1979 (Reprint 2014)-Markus Båth.
4. *Modern Global Seismology*,Academic Press (Elsevier), 1995 - Thorne Lay & Terry C. Wallace.

Websites and eLearning Sources:

1. https://youtu.be/3_D__gydPjs?si=h4Bb2ysTYEwx8yg2
2. https://youtu.be/0FUWsQOsRSU?si=mwvvIREVf4KENxVn
3. https://youtu.be/9uLTSNMeqa0?si=PJ6r3uuAbIU6Wrbv

COs and Bloom's Taxonomy Mapping – 26PH103		
Course Outcomes	**On completing U.G. program the students will be able to**	**BTL**
CO1	Recall and list fundamental concepts, laws, and equations related to seismology, including Snell's law, travel times, and the basic principles of seismic waves.	K1
CO2	Explain the principles behind seismic wave propagation and the geological features affecting travel paths and velocities.	K2
CO3	Apply theoretical concepts and mathematical techniques to interpret seismic refraction and reflection data in laboratory settings.	K3
CO4	Analyze collected seismic data to identify patterns and correlations, leading to informed interpretations of subsurface geological structures.	K4
CO5	Critically evaluate seismic data processing methods and create interpretative models based on their findings from seismic surveys.	K5, K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6 - Create

Relationship Matrix – 26PH103													
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**						**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	
CO1	3	1	2	1	1	1	3	1	2	1	1	1	1.50
CO2	2	3	2	1	1	1	1	3	2	2	1	1	1.67
CO3	2	2	3	2	1	1	1	2	3	2	1	1	1.75
CO4	2	3	2	1	1	1	1	2	2	3	2	1	1.75
CO5	3	2	3	3	2	3	1	2	3	2	3	3	2.50
												Total	1.83

Mean Score: 3- High, 2- Medium/Moderate, 1-Low