

Non-Destructive Testing and Its Application

1.1. Course Number: GE524

1.2. Contact Hours: 3-0-0 Credits: 9

1.3. Semester Offered: 5th Year-Odd

1.4. Prerequisite: Physics, Mathematics, Seismic methods, electromagnetic methods

1.5. Syllabus Committee Members: Dr. Satish Sinha and Dr. Piyush Sarkar

2. Objective: The objective of this course is to familiarize the students with various geophysical field procedures.

3. Course Content: Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topics	Lectures
1	Basic Theory	Introduction to geophysical field techniques. Physical properties of minerals and rocks.	3
2	Gravity Survey	Stable and unstable gravimeters, Mottsmith, Worden, Lacoste & Romberg, Hartley, Askania and Gulf gravimeters, field procedure and reduction of gravity data.	8
3	Magnetic and Electromagnetic survey	Schmidt type magnetometers, field due to point pole and dipole, field practices and corrections. EM profiling and sounding.	8
4	Electrical survey and GPR	Elements of SP, IP and resistivity methods, Wenner and Schlumberger configurations, methods of resistivity profiling and sounding, theory of images, Tagg's method of interpretation. Introduction to GPR, data acquisition, and interpretation.	8
5	Non-destructive Seismic survey	Elementary principle of reflection and refraction methods, two layer reflection and refraction problems including inclined layer, fundamentals of conventional seismic instruments, fan shooting, profile shooting, continuous profiling and correlation methods of surveying.	8
6	Radiometric Survey	Physical and geological principles of radiometric method, successive disintegrations and equilibrium conditions, GM counter, scintillation counter and gamma ray spectrometer.	5
Total			40

4. Readings:

4.1. Textbook:

- Dobrin & Savit : Introduction to Geophysical Prospecting
- Parasnis : Principle of Applied Geophysics
- Telford et al : Applied Geophysics

4.2. Reference books:

- Sharma : Geophysical Prospecting for Geologists and Engineers
- Israel & Krebs : Nuclear Radiation in Geophysics

5. Outcome of the course:

On successful completion of this course, students will be able to use various field instruments and gain knowledge on the complete geophysical field procedures.