Engineering Geology

1.1. Course Number: GE411

1.2. Contact Hours: 2-0-2   Credits: 8

1.3. Semester Offered: 4th Year-Odd

1.4. Prerequisite: Basic knowledge of Mathematics, Physics, and Geology

1.5. Syllabus Committee Members: Dr. Alok Kumar Singh & Dr. Hemant Kumar Singh

2. **Objective:** The Course aims to make to the students well-versed with the strength of Engineering Geology and its applications in the various field of engineering.

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

Unit	Topics	Sub-topics	Lectures
1	Introduction	Introduction, scope, historical background, Importance, Recent trends and developments of Engineering Geology, stress & strain, elasticity (elastic constant), Rock material behavior under loads, Engineering properties of rocks and soils, and their classification, Engineering properties of weathered and anisotropic rocks, Discontinuities in rock masses, Rock mass behavior and its classification.	12
2	Geological Investigation for site selection of major structures	Systematic investigations for dams, reservoir, tunnels, and bridges – reconnaissance, Detailed, Pre-construction and Construction investigations	6
3	Dams, reservoirs, Tunnels, and bridges	Types and classification, forces acting on the dam body, reservoir induced seismicity, Foundation rock and abutment problems- abatement technology, reservoir area problems (such as assessment of mineral resources, agriculture, forest, silt survey, reservoir life and rehabilitation sites), Tunnels- types, tunnel support design, tunnel linings, TBM, Bridges: Types, abutment and foundation problems across river and valley crossing, geological investigations for construction of bridges.	7
4	Landslides and types of mass movements	Types and classification, Cause and mechanism, Subsidence and settlements.	5
		Total	**30**

List of experiments
- Laboratory determination of engineering properties of rocks.

- Plotting of filed investigated data on graph sheets using stereo net projection.
- Plotting of Mohr's Circle on graph sheet.
- Rock material and rock mass classification.

4. Readings:

4.1. Textbook:

- Bieniawski, Z. T. (1989): Engineering Rock Mass Classification, John Wiley.
- Goodman, R.E. (1980): Introduction to rock mechanics.
- Jagger, J. C. and Cook, N. G. W. (1979): Fundamental of rock Mechanics, Champman & Hall.
- Johnson, R. B. and DeGraff, J. V. (1988): Principles of Engineering Geology, John Wiley.

4.2. Reference Books:

- Beavis, F. C. (1985): Engineering Geology.
- Bell, F. G. (1999): Geological Hazards, Routledge, London.
- Bieniawski, Z. T. (1989): Engineering Rock Mass Classification, John Wiley.
- Bryant, E. (1985): Natural Hazards, Cambridge University Press.
- Goodman, R.E. (1980): Introduction to rock mechanics.
- Jagger, J. C. and Cook, N. G. W. (1979): Fundamental of rock Mechanics, Champman & Hall.

5. Outcome of the course:

On successful completion of this course, students will be able to:

- Understand applicability of engineering geology in various filed of engineering.
- Understand different state of stress and strain in rock materials and rock masses
- Know the rock material and rock mass behavior to characterize the different site for construction of major engineering projects like Dams, Reservoirs, Tunnels, and bridges.