Rock Mechanics-I

Code	Credit Hours
CE-884	3-0

Course Description

This course is design to give the student knowledge about the behavior of the rock under different conditions.

Course Objectives

Course focuses on the understanding of rock mechanics with emphasis on geological composition its strength properties and study of rock for foundation and stability point of view

References / Textbooks

1. Sivakugan, N. Shukla, S.K. & Das, B. (2013) Rock Mechanics, An introduction. CRC Press, Taylor & Francis Group
2. Goodman R. E (1989), Introduction to Rock Mechanics, John Willey.
3. Hoek, E & Brown, E.T (1980), Underground Excavations in Rock, Spon Press.
4. Singh, B., & Goel, R. K. (1999). Rock mass classification: a practical approach in civil engineering (Vol. 46). Elsevier.
5. Debasis, D., & Kumar, V. A. (2016). Fundamentals and applications of rock mechanics. PHI Learning Pvt. Ltd.
6. Hoek, E., & Brown, E. T. (1997). Practical estimates of rock mass strength. International journal of rock mechanics and mining sciences, 34(8), 1165-1186.

Prerequisites

Nil

Assessment System for Theory

Quizzes	10-15%
Assignments	5-10%
Mid Terms	25-30%
Project	0-10%
ESE	45-50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	Course Outline, objectives, teaching plan, assessment method, concepts review.
2-5	Geologic Exploration, Rocks and Minerals Classification.	Ground Investigation. Objective of Site investigation. Cost. Important of Ground Investigation. Implementation of GI. Stages of

		GI. Application of Geophysical Methods on GI. Rock Cycle and Classification Common Structural on Magma. Bowen's Reaction Series. Common Rock-Forming Minerals. Minerals & Rocks. Igneous rock. Plate Tectonic. Sedimentary Rock. Metamorphic Rocks. Types of Metamorphism
6-8	Index Test and Rock Strength. Shear Strength of Rock Joints. Triaxial Properties	Engineering Properties of Intact Rock. Concept, Process and Size of Rock Coring. Rock quality designation (RQD). Rock Test. Point Load Strength Index Test. Brazilian Indirect Tensile Strength Test. Schmidt Hammer Test. Uniaxial compressive strength test. Direct shear strength. Triaxial test. Slake durability test
9	**MID TERM**	
10-11	Structural Geology	Plate Tectonic. Joints. Fold. Faults. Discontinuity. Orientation (Attitude), Dip direction. Dip angle. Spacing. Frequency. Persistence. Roughness. Aperture. Filling. Seepage. True dip. Apparent dip. Wall strength. Discontinuity sets. Block size. Strike. Azimuth Quadrant. Classification / Quantitation of the Factors Affecting Discontinuities.
12-14	Slope Stability Analysis	Spherical Presentation of Geological Data. Coordinate System with Longitudes and Latitudes. Spherical Projection. Equal area projection. Equal angle projection. Projections of great circles on horizontal planes. Equatorial and polar stereonets. Rock slopes. Slope Failure Mechanisms and Kinematic Analysis
14-16	Rock Mass Classification.	Introduction. Soil Strength vs Rock Strength. Factors Affecting Discontinuities. Rock Mass Rating (RMR). Q-system. Geological Strength Index (GSI)
17	Stress Strain - Strength Properties. Failure Theories.	Introduction. In situ strength. Mohr–Coulomb Failure Criterion. UCS at Soil and Rock. Hoek–Brown Failure Criterion
18	**End Semester Exams**	