



ROCK ENGINEERING

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Department of Civil
Engineering IIT Roorkee

PRE-REQUISITES : Soil Mechanics-1, Soil Mechanics-2

INTENDED AUDIENCE : Any Interested Learners

INDUSTRIES APPLICABLE TO : This is the basic course in the area of Rock Mechanics and Rock Engineering. This will provide knowledge of analysis and design of tunnels, caverns, slopes and foundations on rocks. Industries involved with infrastructure development in hilly terrain and mining shall recognize /value this course.

COURSE OUTLINE :

This course is the basic course in the area of Rock Mechanics. This will provide the knowledge of overall behavior of rocks and rock masses. This course will enable the students to acquire basics of analysis and design of tunnels, caverns, slopes, and foundations on rocks.

ABOUT INSTRUCTOR :

Prof. Priti Maheshwari, Professor in Department of Civil Engineering, IIT Roorkee, has her research interests in Soil-Structure Interaction, Ground Engineering: Modeling and Analysis, Statistical /Probabilistic Approaches to Strength Criteria for Rocks and Rock Masses. She has been teaching various UG/PG/PhD courses pertaining to Geotechnical Engineering for more than last 15 years and well appreciated by the students for her systematic approach towards teaching. She has supervised 04 Doctoral and 20 Masters Theses. She has one chapter in book titled Geotechnical Engineering Handbook, 49 research publications in National and International refereed journals to her credit.

COURSE PLAN :

Week 1: Rock Formation: rock forming minerals, identification, geological classification of rock, geological structures, faults, folds, joints.

Week 2: Stereographic Project of Geological Data: Principle of equal area net, representation of a line, plane, intersection of two planes, other applications.

Week 3: Laboratory Testing of Rocks: Determination of physical properties, uniaxial compressive strength test, tensile strength test, oblique shear test, triaxial test, slake durability test, stress-strain responses of rocks.

Week 4: Engineering Classification of Rocks & Rock Mass: Deere and Miller classification, concept of rock mass, rock quality designation, rock mass rating, rock mass quality, geological strength index and applications in civil engineering projects.

Week 5: Engineering Classification of Rocks & Rock Mass: Deere and Miller classification, concept of rock mass, rock quality designation, rock mass rating, rock mass quality, geological strength index and applications in civil engineering projects. (Cont'd)

Week 6: Engineering Classification of Rocks & Rock Mass: Deere and Miller classification, concept of rock mass, rock quality designation, rock mass rating, rock mass quality, geological strength index and applications in civil engineering projects. (Cont'd)

Week 7: Strength Criteria for Rocks & Rock Mass: Mohr-Coulomb criterion, Hoek and Brown criterion, Bartons theory.

Week 8: Tunneling: Ground conditions in tunneling, application of stereographic projections, elastic analysis under uniaxial, biaxial and hydrostatic conditions, Concrete lining: elastic analysis, elasto-plastic analysis: Tresca criterion, rock mass-tunnel support interaction analysis, design of support system.

Week 9: Tunneling: Ground conditions in tunneling, application of stereographic projections, elastic analysis under uniaxial, biaxial and hydrostatic conditions, Concrete lining: elastic analysis, elasto-plastic analysis: Tresca criterion, rock mass-tunnel support interaction analysis, design of support system. (Cont'd)

Week 10: Rock Slope Stability Analysis: Modes of failure, limit equilibrium approaches, application of stereographic projections, remedial measures.

Week 11: Foundations of Weak Rocks: Bells approach, bearing capacity based on classification approaches, UCS, plate load test, special considerations, dam foundations.

Week 12: Foundations of Weak Rocks: Bells approach, bearing capacity based on classification approaches, UCS, plate load test, special considerations, dam foundations. (Cont'd)