Rock Mechanics - Web course

COURSE OUTLINE

The objective of the course is to provide basic knowledge of Rock Mechanics and will help to understand the design aspects of various structures in/on rock like tunnels and other underground openings, slopes etc.

The aim is to provide a comprehensive understanding to the rock engineering subject, including determination physicomechanical properties of intact rock and rock mass, rock discontinuities, stresses and deformations around the excavation, insitu stresses and failure mechanisms in rocks.

This course intend to introduce the basic concept of rock mechanics, principles and applications to both undergraduate and post graduate students with special attention to some advanced topics which is going to attract not only post graduate student, will also be very helpful for researchers in the area.

The course also intends to cover topics on foundation on rocks, rock supports and reinforcements and also an overview of the numerical modeling of some case studies on underground openings and slopes.

Contents:

Classification of Rocks and Rock masses, Laboratory and in-situ testing of rock, insitu stresses and their measurement, Analysis and design of underground openings, Failure criteria for rock and rock masses.

Strength and deformability of jointed rock mass, Stability of rock slopes, Foundation on rocks. Methods to improve rock mass responses, numerical modeling of rock and rock masses.

COURSE DETAIL

Sl.No.	Topic	No. of Hours
1.	Classification of Intact rock and Rock masses, Strength and modulus from classifications.	04
2.	Physico mechanical properties, Laboratory tests for various physical and mechanical properties. Field shear test, Deformability tests in rock mass, State of stress in the ground.	05
3.	Insitu stress, various methods of stress measurement, Hydrofracturing technique, Flat jack technique, Overcoring technique.	04
4.	Underground opening in infinite medium, Elastic and elasto-plastic approach. Stress concentration for different shapes of opening, Zone of influence.	04

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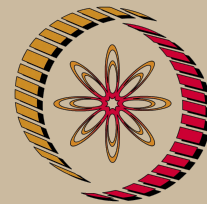
Civil Engineering

Additional Reading:

1. Related codes and manuals from International Society of Rock Mechanics, ASTM and Bureau of Indian Standards.

Coordinators:

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5.	Failure criteria for rock and rock masses, Mohr-Coulomb Yield Criterion, Drucker-Prager Criterion,Hoek-Brown Criterion, Tensile Yield Criterion.	06
6.	Strength and deformability of jointed rock mass, Fracture strength of jointed rock mass. Shear strength of Rock joints, Deformability of Rock joints, Concept of joint compliance.	04
7.	Stability of rock slopes, Modes of failure, Plane failure, Wedge failure, Circular failure, Toppling failure.	05
8.	Foundation on rocks, Estimation of bearing capacity, Stress distribution in rocks, Settlement in rocks,Pile foundation in rocks.	04
9.	Methods to improve rock mass responses, Grouting in Rocks, Rock bolting, Rock Anchors.	03
10.	Numerical modeling of rocks and rock masses, Application to tunnels, slopes.	03

References:

1. Introduction to Rock Mechanics by R.E.Goodman, John Wiley & Sons.

2. Engineering in Rocks for Slopes, Foundation and Tunnels, Editor T.Ramamurthy, Prentice Hall India Pvt. Ltd.

3. Fundamentals of Rock Mechanics, Fourth Edition, by Jaeger, Cook and Zimmerman, Blackwell Publishing.

4. Rock mechanics and the design of structures in rock, L. Obert and Wilbur I. Duvall, John Wiley & Sons, Inc.