

ROCK MECHANICS

Offering branch: CE			
Course Category:	HONORS	Credits:	4
Course Type:	Theory	Lecture-Tutorial-Practical:	3-1-0
Prerequisites:	20CE3402- Geotechnical Engineering	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Assess the mechanical characteristics of rock and the outcrop strength of rock and some understanding of bedrock strength	K5
CO2	Calculate the stress concentration required to prevent the rock mass from fracturing	K4
CO3	Calculate the state of stress in a rock under restricted and unconfined conditions, as well as the stress concentration required to prevent the rock mass from fracturing	K4
CO4	Calculate the bearing capacity, settlement limit, various modes of failure, and stability analysis of rock	K4
CO5	Explain how to alter the mechanical behavior of fractured rock by employing several types of modification procedures	K2

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2		3	3	3				3	2	3
CO2	2	2	2	2		3	3	3				3	2	3
CO3	3	3	3	3		3	3	3				3	3	3
CO4	2	2	2	2		3	3	3				3	2	3
CO5	2	2	2	2		2	2	2				2	2	2
Avg.	2	2	2	2		3	3	3				3	2	3

1- Low

2-Medium

3-High

Course Content

UNIT-1	Classification of Intact rock and Rock masses, Strength and modulus from classifications. Physio mechanical properties, Laboratory tests for various physical and mechanical properties. Field shear test, Deformability tests in rock mass, State of stress in the ground.	CO1
UNIT-2	In situ stress, various methods of stress measurement, Hydrofracturing technique, Flat jack technique, Overcoring technique. Underground opening in infinite medium, Elastic and elasto-plastic approach. Stress concentration for different shapes of opening, Zone of influence.	CO2
UNIT-3	Failure criteria for rock and rock masses, Mohr-Coulomb Yield Criterion, Drucker-Prager Criterion, Hoek-Brown Criterion, Tensile Yield Criterion. 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.	CO3
UNIT-4	Stability of rock slopes, Modes of failure, Plane failure, Circular failure, Toppling failure. Foundation on rocks, Estimation of bearing capacity, Stress distribution in rocks, Settlement in rocks, Pile foundation in rocks.	CO4
UNIT-5	Methods to improve rock mass responses, Grouting in Rocks, Rock bolting, and Rock Anchors.	CO5

Learning Resources

Text Books	<ol style="list-style-type: none"> 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.
Reference Books	<ol style="list-style-type: none"> 1. Fundamentals of Rock Mechanics, Fourth Edition, by Jaeger, Cook and Zimmerman, Blackwell Publishing. 2. Rock mechanics and the design of structures in rock, L. Obert and Wilbur I. Duvall, John Wiley & Sons, Inc

**e-Resources &
other digital
material**

1. <https://nptel.ac.in/courses/105106055/>