19CE4601B - ROCK MECHANICS

Course Category:	Program Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	19CE3405 - 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	**Understand** the Rock properties and laboratory tests	K2
CO2	**Understand** the In-situ stresses and over coring techniques	K2
CO3	**Understand** the Shear strength and stability of rock slopes	K2
CO4	**Understand** the Wedge failure and foundations on rocks	K2
CO5	**Understand** the Grouting and numerical modelling	K2

Contribution of Course Outcomes towards achievement of Program Outcomes

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

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	Insitu 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, Wedge 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, Rock Anchors. Numerical modelling of rocks and rock masses, Application to tunnels, slopes.	**CO5**

Learning Resources

Text Books	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	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/ 2. http://jntuk-coeerd.in/