

**Geotechnical Engineering
Rock Mechanics**
01GT1106 (PEC)
Objective of the Course:

- The students will be able to perform various laboratory tests on rock and classify rock mass
- Be able to predict strength of rock mass with respect to various Civil Engineering applications

Credit Earned: 3
Students learning outcomes:

After successful completion of the course, it is expected that student will be able to,

1. To conduct lab and field tests for given project.
2. To choose appropriate methods to improve stability of rock mass.
3. To estimate the foundation capacity of a rock mass.
4. To design a tunnel excavation and support systems.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
03	00	00	03	50	20	30	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of hours
1	Introduction of Rock	06
	Rocks of peninsular India and the Himalayas - Index properties and classification of rock masses, competent and incompetent rock - value of RMR and ratings in field estimations	
2	Strength/ Failure Criterion and Behaviour	12
	Behaviour of rock under hydrostatic compression and deviatoric loading - Models of rock failure - planes of weakness and joint characteristics - joint testing, Mohr - Coulomb failure criterion and tension cut-off - Hook and Brown Strength criteria for rocks with discontinuity sets.	
3	Rock Tunneling	12
	n-situ stresses and their measurements, flat jack-over-under coring methods - stress around underground excavations - Design aspects of openings in rocks - case studies.	

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4	Application of rock mechanics	12
	Rock slopes - role of discontinuities in slope failure, slope analysis and factor of safety - remedial measures for critical slopes - case studies - Reinforcement of fractured and jointed rocks - shotcreting, bolting, installation methods - case studies	
		42

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:
Reference Book:

1. Hudson J.A. and Harrison J.P., "Engineering Rock Mechanics – An Introduction to the principles", Pergamon, 1997.
2. Goodman.R.E, "Introduction to rock mechanics", John Willey and Sons, 1989.
3. Hook.E and Bray.J, "Rock slope Engineering, Institute of Mining and Metallurgy", U.K. 1981.
4. Hook.E and Brown.E.T, "Underground Excavations in Rock", Institute of Mining and Metallurgy, U.K. 1981.
5. Obvert.L and Duvall.W, "Rock Mechanics and the Design of structures in Rock", John Wiley, 1967.
6. Ramamurthy, T., "Engineering in Rocks", PHI Learning Pvt. Ltd.
7. Jaeger, J.C. and Cook, N.G.W, Fundamentals of Rock Mechanics, Chapman and Hall, 1976.