GUJARAT TECHNOLOGICAL UNIVERSITY

MINING ENGINEERING
ROCK MECHANICS
SUBJECT CODE: 2152204
B.E. 5th SEMESTER

Type of course: Undergraduate

Prerequisite: NA

Rationale:
Mining engineers will be responsible to supervise the operation of driving various kinds of safe & stable underground opening. They should be able to select the suitable shape & size of opening with suitable drilling pattern, explosives & shot firing with its tools. This subject provides them basic knowledge of stress concentration fields, rock strength, its associated problems & remedies which will make them able to supervise & drive safe & stable underground opening.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		ESE (V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	2	6	70	20	10	20	10	20	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Definition, Application of Rock Mechanics.	**04**	**06**
2	**Stress and Strain in Rock:** Analysis of stress, strain and constitutive relations in isotropic and anisotropic rock under static and dynamic loading.	**06**	**10**
3	**Physico - mechanical Properties of Rock:** Determination of physical properties, Strengths, Strength indices and static elastic constants,Parameters influencing strength, Abrasivity and of its determination, Specific gravity, Hardness, Porosity moisture content, Permeability, Swell index, Slake durability, Thermal conductivity.	**08**	**14**
4	Dynamic Properties of Rock and Rockmass.	**06**	**10**
5	**Time Dependent Properties of Rock:** Creep deformation and strength behaviour, Creep test and archeological models.	**06**	**10**
6	**Behaviour of Rockmass:** Rockmass structure, Classification in- situ elastic properties and strength determination.	**06**	**10**
7	**Failure Criteria for Rock and Rockmass:** Mechanics of rock failure, Coulomb, Mohr and Griffith criteria, Empirical criteria.	**06**	**10**
8	**Pre-mining State of Stress:** Sources, Methods of determination including overcoring and hydro-fracturing methods.	**06**	**10**

9	**Physico-Mechanical Properties of Soil:**Physical properties including consistency and gradation: Classification of engineering soils,Engineering properties of soils compressibility, Consolidation, Compaction and strength.	**06**	**10**
10	**Ground Water:** Influence of water on rock and soil behavior, Permeability of rocks, Measurement ofpermeability, Ground water flow in rockmass, Measurement of water pressure.	**06**	**10**

Suggested Specification table with Marks (Theory):1

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**15**	**10**	**10**	**10**	**10**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Rock Mechanics, B. P. Verma.
2. The elements of Mechanics of Mining Ground (Vol I & II), Dr. B. S. Verma.
3. Design Criteria for drll rigs equipments of drilling techniques, C. P. Chugh.
4. Ground Control in Mining, S. K. Sarkar.

Course Outcome:

After learning the course the students should be able to:

The course content should be taught with the aim to develop required skills in the students so that students are able to acquire following competency:

- Resolve problems related to strata stability for safe underground and surface mining operations using knowledge and skills of rock mechanics.

List of Experiments:

1. To study Physico - mechanical Properties of Rock.
2. To study Dynamic Properties of Rock and Rockmass.
3. To study Failure Criteria for Rock.
4. To study Physico-Mechanical Properties of Soil.
5. To study pre-mining and post mining stresses.

Design based Problems (DP)/Open Ended Problem:

Visit to an underground mines and study & observe the various types of opening in mines. Stress concentration on opening and also study of various types of rocks.

Major Equipment:

1. Models.
2. Chart

List of Open Source Software/learning website:

1. Wikipedia.
2. www.youtube.com

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.