

ROCK MECHANICS

SCOPE OF ROCK MECHANICS

- CIVIL ENGINEERING
- MINING ENGINEERING
- PETROLEUM ENGINEERING
- GEOLOGY
- GEOPHYSICS



SCOPE OF ROCK MECHANICS

- Evaluation of GEOLOGICAL HAZARDS .. landslides, seismic etc.
- Selection of CONSTRUCTION MATERIALS
- Selection and layout of CONSTRUCTION SITES
- Analysis of STABILITY
- Design of BLASTING OPERATIONS
- Design of SUPPORT SYSTEMS
- Design of HYDRAULIC FRACTURING PROGRAMS
- Design of INSTRUMENTATION PROGRAMS
- Evaluation of EXCAVATION CHARACTERISTICS
- Studies of rock deformation at high temperatures and pressures (STRUCTURAL GEOLOGY)



APPLICATION OF ROCK MECHANICS

• SURFACE STRUCTURES

- Low rise (Housing)
- High rise (Tower blocks)
- High load (Dams, power plants, bridges)



• TRANSPORTATION ROUTES

- Highways, railways
- Canals
- Pipelines

• SHALLOW EXCAVATIONS

- Quarries
- Open pits, strip mines
- Trenches, cuttings

• DEEP EXCAVATIONS

- Mines (Temporary and Permanent)
- Tunnels (Roads, H.E.P.)
- Underground chambers (Power stations, storage, recreational)

• ENERGY DEVELOPMENT

- Petroleum
- Geothermal
- Nuclear (Power plants, Waste Disposal)
- Energy storage caverns

THE MECHANICAL CLASSIFICATION OF ROCKS

Goodman proposed a classification based on rock **TEXTURE** recognizing **four**

1. **CRYSTALLINE**
2. **CLASTIC**
3. **VERY FINE GRAINED**
4. **ORGANIC**



CHILE

CONTINUOUS

HOMOGENEOUS

ISOTROPIC

LINEAR ELASTIC



DIANE

DISCONTINUOUS

➡ pores/microfractures - vugs, joints - faults, caverns

INHOMOGENEOUS

➡ mineralogy-layering-facies

ANISOTROPIC

➡ fabric - mineral alignment-discontinuity sets

NON ELASTIC



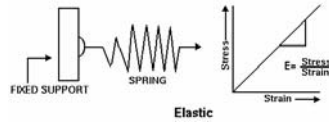
CRYSTALLINE TEXTURE

- characterized by tightly interlocked texture

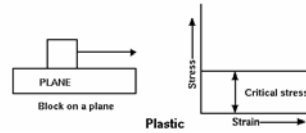
- A. **Evaporites** .. carbonates, sulphates, halides etc
- B. **Banded Phyllosilicates** .. mica schists etc.
- C. **Banded Silicates** .. some schists, gneiss etc.
- D. Plutonic igneous .. granite, gabbro etc
- E. **Porphyritic igneous** .. lavas etc.
- F. **Highly sheared** .. serpentinite, mylonite

- i. Unweathered banded silicates, plutonic and porphyritic igneous rocks tend to behave in a **BRITTLE-ELASTIC** manner under **normal** rock engineering conditions.
- ii. Evaporites and weathered crystalline silicates behave in a **PLASTIC** or **VISCO- ELASTO-PLASTIC** manner.
- iii. Banded phyllo- (sheet) silicates, banded silicates and highly sheared rocks often are very strongly **ANISOTROPIC** and **ELASTO-PLASTIC**.

IDEALISED MECHANICAL BEHAVIOUR

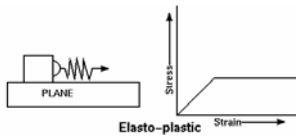


ELASTIC

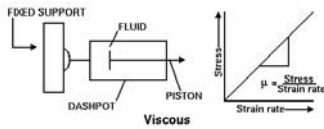


PLASTIC

IDEALISED MECHANICAL BEHAVIOUR



ELASTO-PLASTIC



VISCOUS

POTASH

