INTRODUCTION:-

Rock Mechanics is the theoretical and applied science of behaviour of rock. It is that branch of mechanics, which is concerned, with the response of rock to the field of its environment. **These techniques apply to surface excavation as well as underground.** It has important role in mine planning and design. **selection of mining methods, optimum slope angle, design of support system, drilling and blasting parameters** (Figure 1)**.**

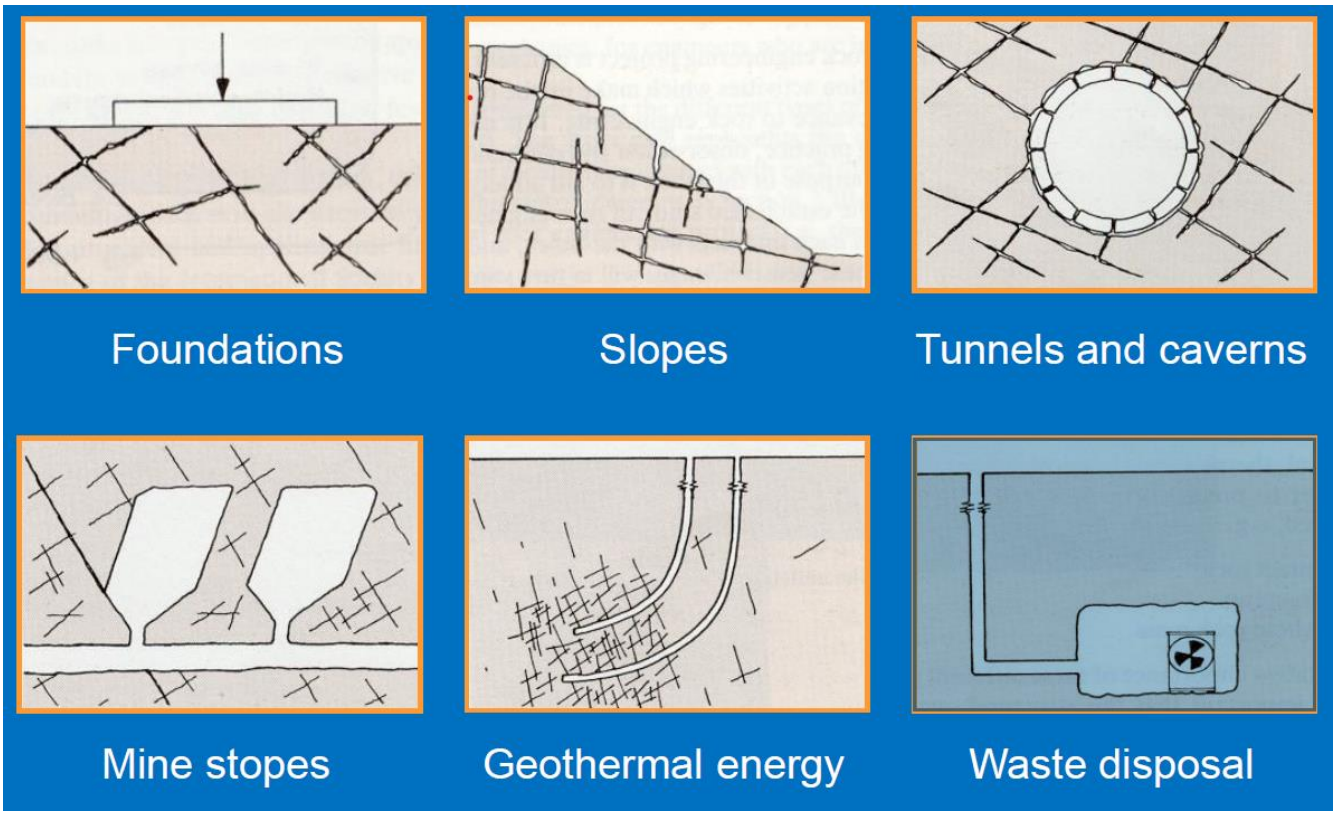


Figure 1. Rock mechanics and rock engineering: The wide variety of types of engineering projects

In the practice of constructing engineering structures, such as buildings, tunnels and slopes, an interaction takes place between the ‘ground’ and the engineering structure. The knowledge of the consequences of the influence of the ‘ground’ on the engineering structure and vice versa are often critical for the economic and safe design of an engineering structure. In particular, the mechanical response of the ‘ground’ under influence of the engineering structure should be known before an engineering structure is built. ‘Ground’ is a very broad term. The

'ground' is any natural material present at the site where the engineering structure is to be built on or in. 'Ground' is normally divided in **'soil' and 'rock'. 'Soil' consists of loose particles not cemented together whereas the particles in rock are cemented together, resulting in a tensile strength.** This difference in characteristics between 'soil' and 'rock' has also resulted in the development of different methodologies for the calculation of the mechanical behavior of the 'soil' or 'rock'. Most 'rocks' are not continuous, but contain fractures, faults, bedding planes or more general: 'discontinuity1 planes' that divide the 'rock' into blocks of rock bounded by discontinuities. The whole array of blocks of rocks and discontinuity planes is then designated the 'rock mass' or 'discontinuous rock mass' (Figure 2).

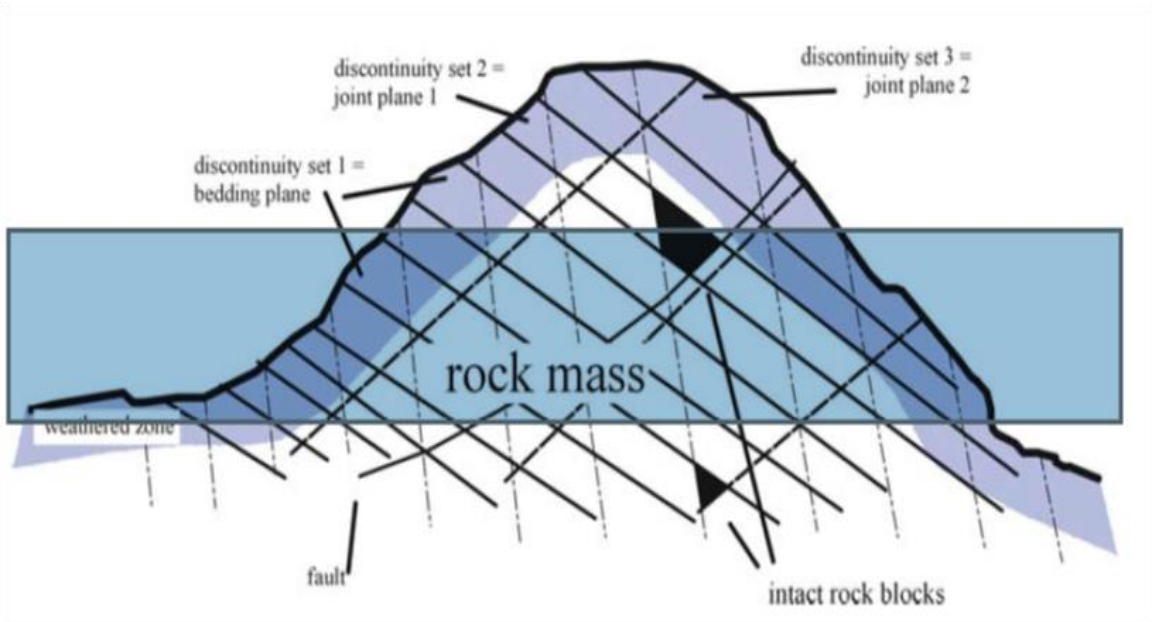


Figure 2. Intact rock vs. rock mass

Primary Rock Types by Geologic Origin

	Sedimentary Types		Metaphorphic		Igneous Types	
Grain Aspects	Clastic	Carbonate	Foliated	Massive	Intrusive	Extrusive
Coarse	Conglomerate Breccia	Limestone Conglomerate	Gneiss	Marble	Pegmatite Granite	Volcanic Breccia
Medium	Sandstone Siltsone	Limestone Chalk	Schist Phyllite	Quartzite	Diorite Diabase	Tuff
Fine	Shale Mudstone	Calcareous Mudstone	Slate	Amphibolite	Rhyotite	Basalt Obsidian

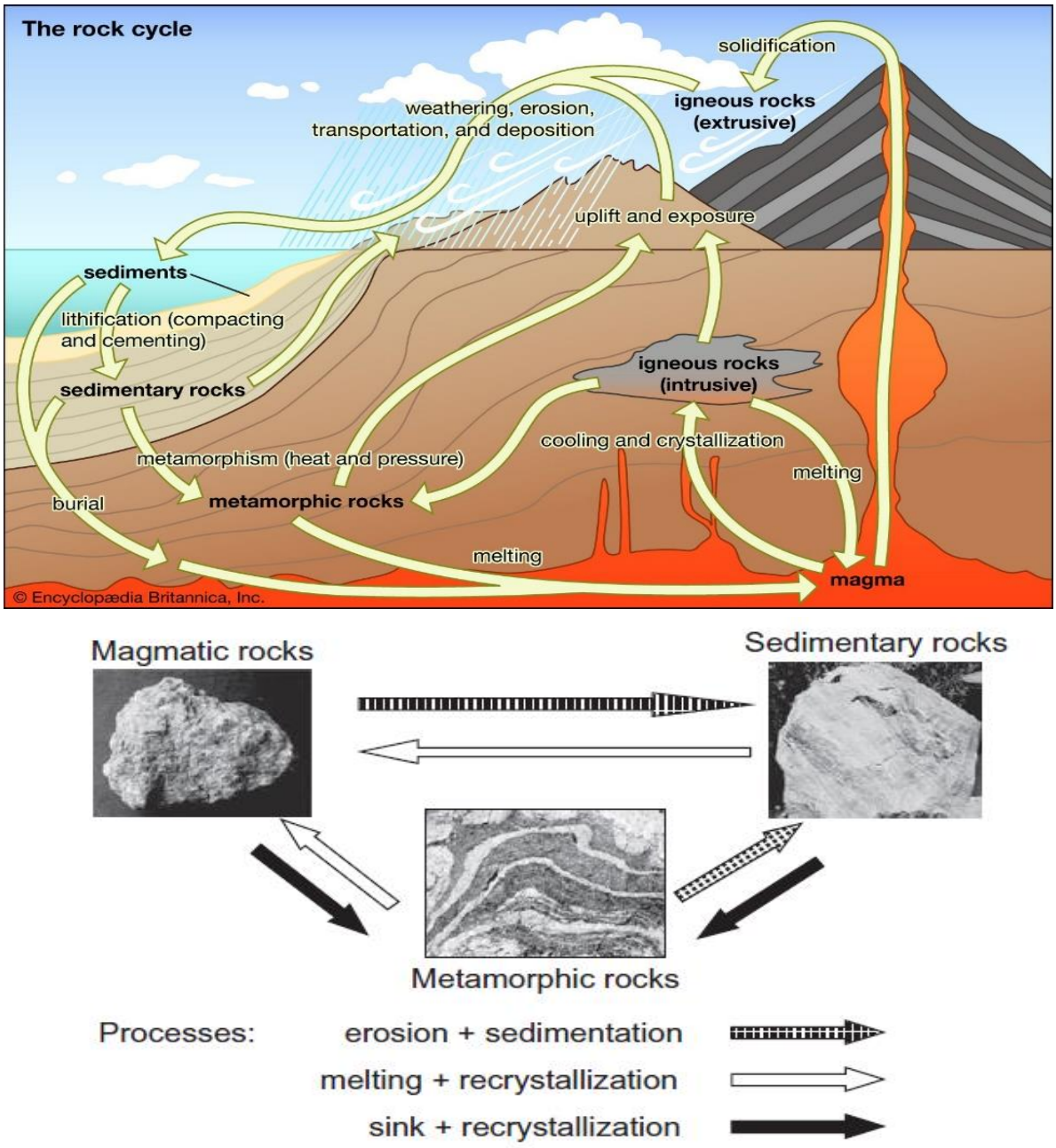
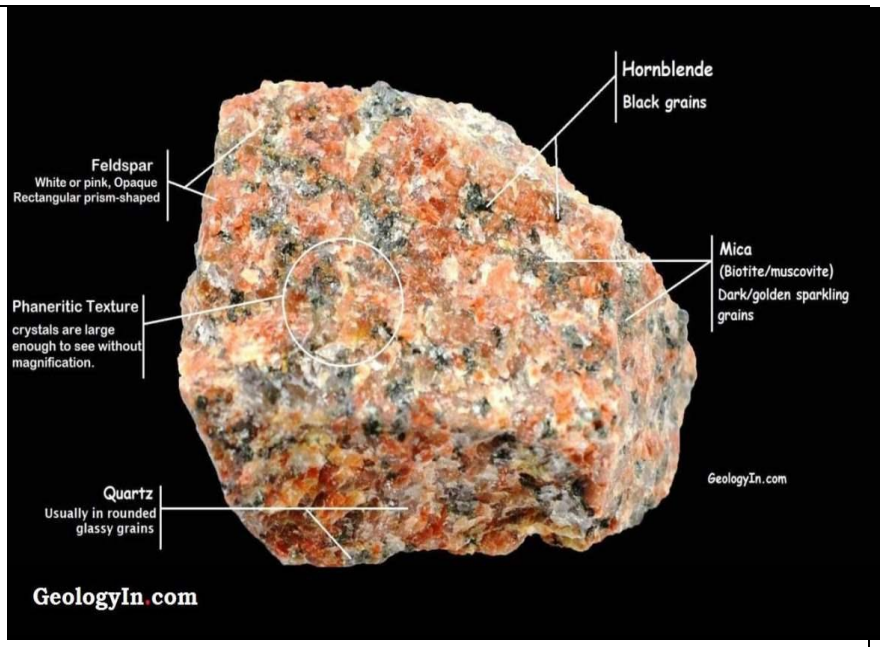


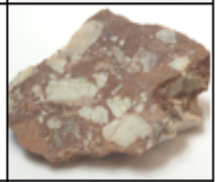
Figure 3. The Rock cycle

Example for Igneous Rocks:-

1- Granite	
2- Rhyolite	

3- Basalt	
4- Gabbro	

Example for Sedimentary Rocks:-

	Composition	Texture and Properties	
Detrital Sedimentary Rocks			
Shale	Fine rock fragments smaller than 1/16 mm	Clay-sized particles that cannot be differentiated by the naked eye. May be fissile, splits into distinctive layers	
Sandstone	Medium rock fragments between 1/16 mm and 2 mm	Composed of sand-sized rock fragments. The fragments can vary in mineralogy, including mainly quartz, along with feldspar, and clay	
Breccia	Coarse, angular rock fragments ranging in size, with the largest >2 mm	Poorly sorted mixture of rock fragments, including angular or sub-angular pebbles	
Conglomerate	Coarse, rounded rock fragments ranging in size, with the largest >2 mm	Poorly sorted mixture of rock fragments, including rounded or sub-rounded pebbles	
Chemical and Biochemical Rocks			
Limestone	Calcite crystals or microcrystalline calcite	Masses of large, interlocking calcite crystals or microscopic crystals not visible with the naked eye	
Fossiliferous Limestone	Calcareous skeletal fragments of coral or shells	Consisting of fossils or fossil fragments	
Oolitic Limestone	Calcite concretions, formed around sand or shell fragments	Aggregates of oolites, small spherical calcite concretions	
Chert	Cryptocrystalline Quartz	Microcrystalline polymorphs of quartz, formed by the recrystallization of siliceous skeletons. Conchoidal fracturing; scratches glass	
Rock Salt	Halite and sylvite crystals	Fine- to coarse-grained crystalline structure, with a salty taste and cubic cleavage	

Example for Metamorphic Rocks:-

1- Slate	
2- Phyllite	

3- Marble	

Scope of Rock Mechanics:-

1- Civil Engineering

2- Mining Engineering

3- Petroleum Engineering

4- Geology