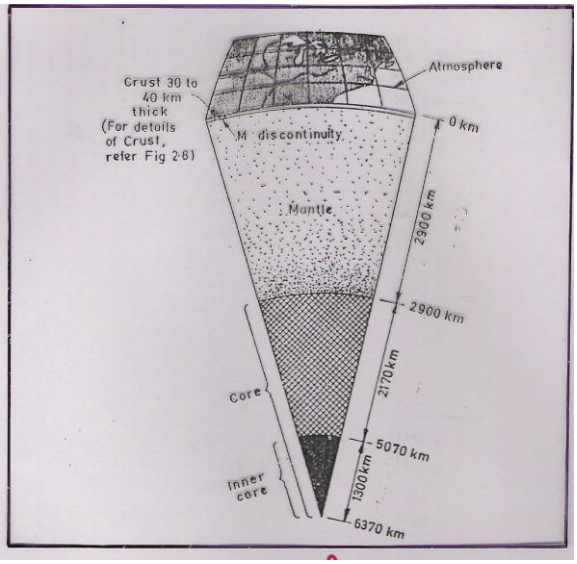
1st Internals solution

Engineering Geology- 15CV35

1.



The Crust: - Is the topmost shell of the earth, which has a thickness of 30-40 km in the continents and 5-6 km in the oceans. There is a striking variation in the materials or rocks, as they are called, composing the crust over the continents and ocean floors. The oceanic crust is made up of heavier and darker rocks called basalts compared to light-colored and light-density, granitic rocks of the continental crust. When considered as a part of the total structure of the earth, crust makes only an insignificant part represented by a thin layer, similar to the skin of an apple. As regards he chemical composition of the crust, analyses made by Clarke and Gold Schmith, using rocks from different geographic regions of the crust have all shown that when expressed in terms of oxides, the crust has Silica as the most dominant component, its value lying above 50% by volume in the oceanic crust and above 62% in the continental crust. Alumina is the next important oxide, varying between 13-16% followed by Iron Oxides (8%), Lime (6%), Sodium (4%), Magnesium (4%), Potassium (2.5%) & Titanium (2%). The crust itself shows a complicated structure both in make-up and compositional variations.

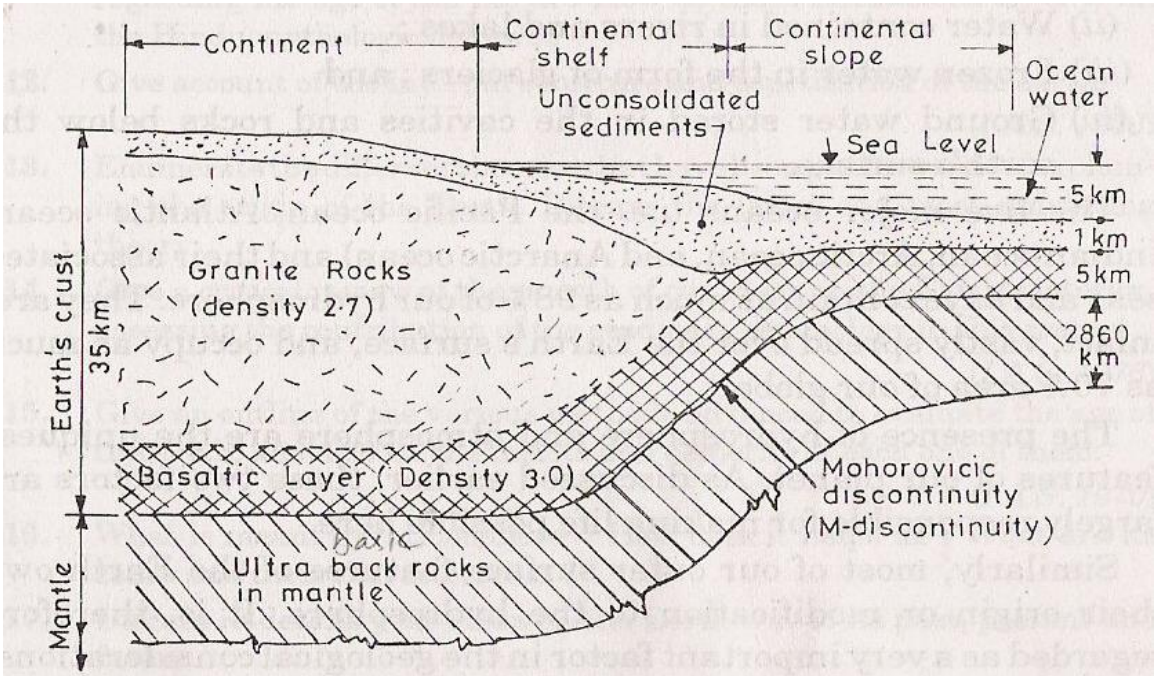


Fig. 2.8. Diagram showing the X-section of Continent and Ocean Basins (vertical scale shown exaggerated)

The Mantle: - At the base of the crust materials of the earth become greatly different in many properties from those overlying them in the crust. These materials appear to form a nearly homogeneous zone till a depth of 2900 km is reached. This zone of materials lying between crust and a depth of 2900 km is known a MANTLE. It is made up of extremely basic materials, called ultra basic rocks, which are believed to be very rich in iron and magnesium but quite poor in silica. Such rock names as Periodotites, Dunite. This One is characterized with a high density, increasing steadily with depth further; the mantle material is believed to be highly plastic in nature. Many of the most important geological process such as earthquakes and formation of mountains are believed to have their origin in this zone.

The Core: - It is the third and the innermost structure shell of the earth, which is clearly marked by the seismic evidence. It starts at a depth of 2900 km below the surface and

extends right up to the center of the earth at 6370 km. The material making g the core is found to be from seismic studies only strikingly different from that making the other two shells in one major aspect, in elastic properties. The material has no shear resistance,

which makes it nearer to liquid than to a solid body. It has a very high density, above 10gms/cubic centimeter, at the mantle –core boundary. Nothing can be said about the composition of the core. According to one, widely favored view, the core is made up of Iron and Nickel alloy material.

2.

HABIT

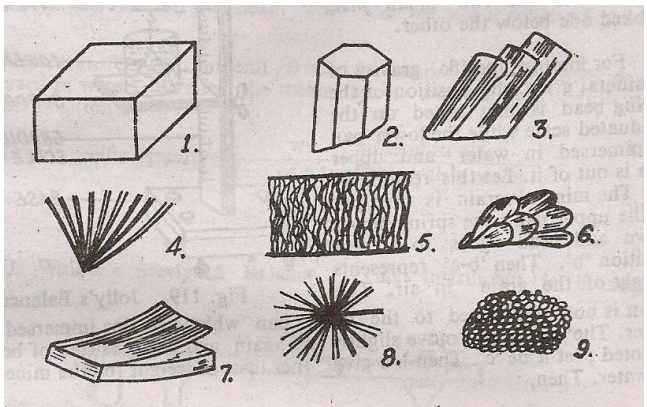


Fig. 118. Some Common Structures in Minerals
1. Tabular 2. Columnar 3. Bladed 4. Acicular
5. Fibrous 6. Reniform 7. Foliated 8. Radiating
9. Granular.

COLOUR

Minerals show great variety of colors. The color of a substance is its appearance in light and depends upon the composition and structure of the substance is its appearance in light and depends upon the composition and structure of the substance. In minerals, colors may be either of inherent of of an exotic nature; the former is related to the chemical composition and is more diagnostic whereas exotic colors are due to small traces of impurities and may vary within wide limits. Metallic minerals commonly show greater consistency in colors than the non-metallic minerals.

Some minerals show peculiar phenomena connected with color. Of these, the following are interesting and important.

PlayofColors: - It is the development of a series of prismatic colours shown by some minerals on turning about in light. The colors change in rapid succession on rotation, example: Diamond.

ChangeofColors: - It is similar to play of colors except that rate of change of colors on rotation is rather slow; each color continues over a larger space in the mineral, ex: - Labradorite.

Iridescence: - Some minerals show rainbow colors either in their interior or on their surface. This termed iridescence.

Tarnish: - Sometimes the surface color is different, rather dull, than the color of the

mineral as seen on freshly fractured surface; ex: Chalcopyrite, an ore of copper.

STREAK

The streak of a mineral is the color of its powder. This becomes important in the sense that for some minerals, the color is entirely different from that of their powder. This has been found true in certain or minerals, while most of the other minerals exhibit a white streak: and, streak does not help in distinguishing those minerals. The important minerals offering characteristic color-streak combinations are given in table.

LUSTER

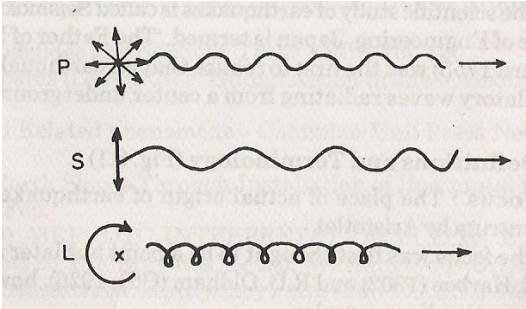
The shining surface of a mineral is called it luster. The different types of luster and their examples are given in a tabular column.

S.No..	Type of Luster	Description	Example
1	**VITEREOUS LUSTER**	A mineral having a glassy shine	Quartz and Calcite
2	PEARLY LUSTER	A mineral having a pearly shine	Muscovite Mica
3	METALLIC LUSTER	A mineral having a metallic shine	Magnetite
4	SILKY LUSTER	A mineral having a silky shine	Asbestos
5	RESINOUS LUSTER	A mineral having a greasy, oil shine	Talc
6	ADAMANTINE LUSTER	A mineral having a diamond like shine	Diamond

HARDNESS

MINERAL	HARDNESS	
TALC	1	Can be scratch even by finger nail
GYPSUM	2	Can be scratch even by finger nail
CALCITE	3	Can be scratch even by finger nail
FLUORITE	4	Can be scratch by penknife
APATITE	5	Can be scratch by penknife
ORTHOCLASE	6	Can be scratch by penknife
QUARTZ	7	Can not be scratch by penknife
TOPAZ	8	Can not be scratch by penknife
CORUNDUM	9	Can not be scratch by penknife
DIAMOND	10	It can be scratch by another diamond

3. The strain energy released by an earthquake sets up several types of pulses (wave motion) at the focus. These called seismic or earthquake waves travel in all directions in different paths, modes and speeds proportional to the densities of the materials through which they travel. The speed increases with density.



When the waves reach the ground surface they spread out in ever widening circles around the epicenter like water waves from a point of impact in a pond and cause that span of the ground to shake.

P-waves (primary or push and pull waves): - These are high frequency short wavelength longitudinal compressive type, like sound waves. These take the quickest path and are transmitted by oscillations in the direction of propagation. P-waves travel through solids, semi-solids and liquids, i.e the crust the mantle and the core of the earth at speeds 5 to 15km/s

S-waves (Secondary or shake waves): -These are high frequency short wave-length transverse eaves like polarized light transmitted by oscillations perpendicular .

4.

Anti cline

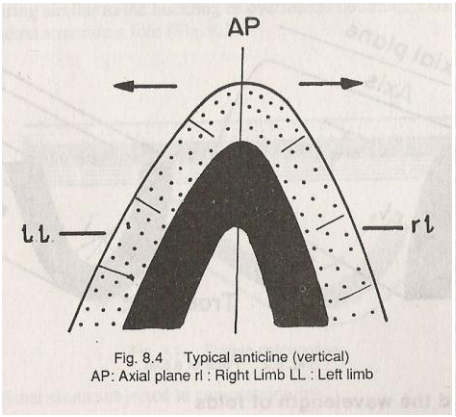


Fig. 8.4 Typical anticline (vertical)
AP: Axial plane rl : Right Limb LL : Left limb

Syncline

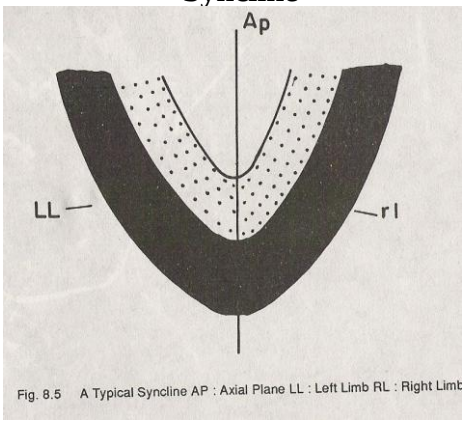
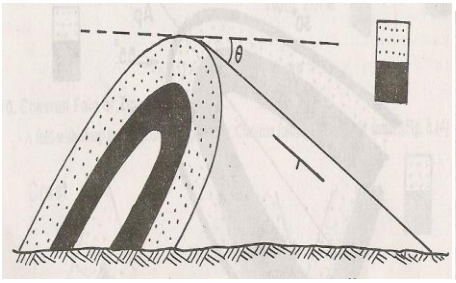
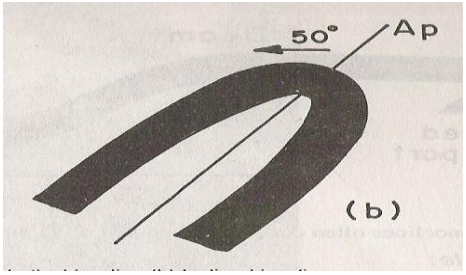


Fig. 8.5 A Typical Syncline AP : Axial Plane LL : Left Limb RL : Right Limb

Plunge Of a fold



Isoclinal fold



Chevron fold

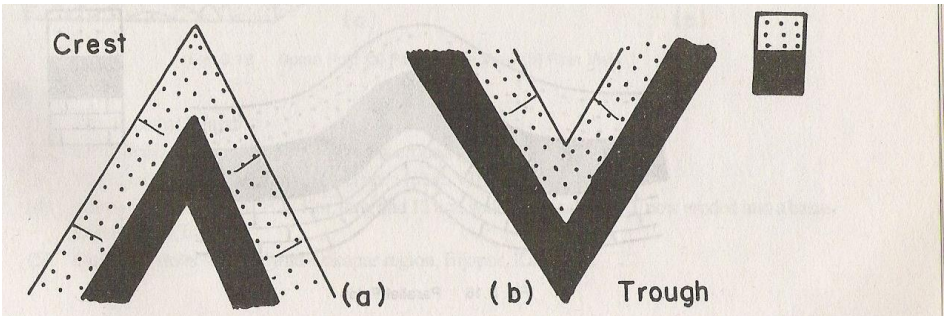
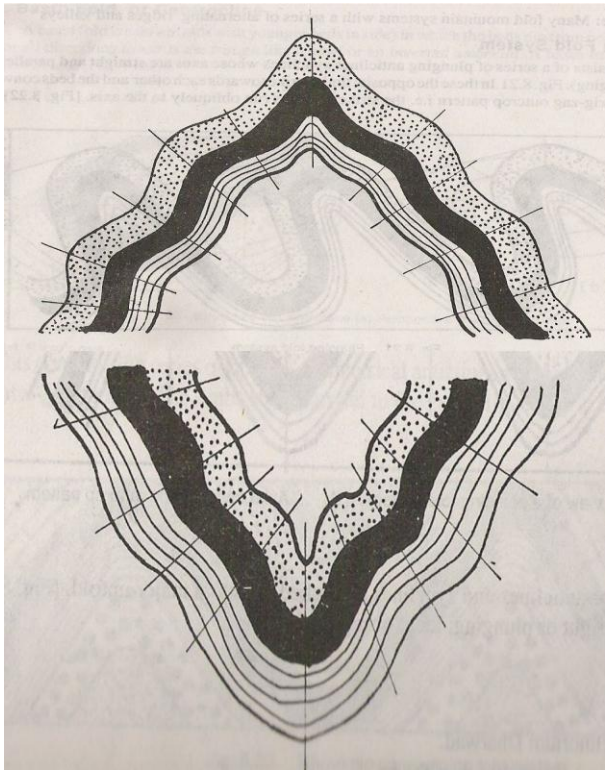


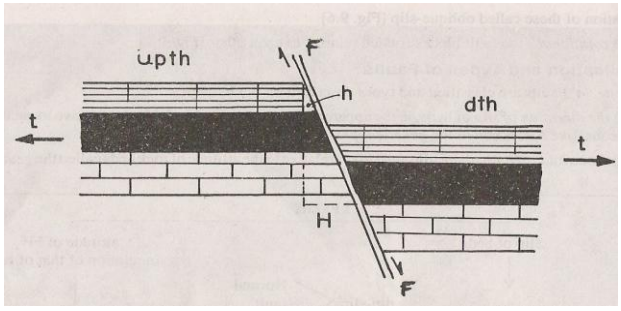
Fig. 8.14 Chevron foldswigh sharp and angular crest and trauglar (a) Chevron anticline (b) Chevron Syncline

Anticilnorium and Synclinorium

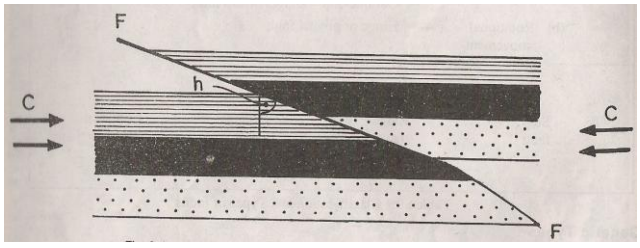


5. **Types of Faults.**

Normal Fault:



Reverse Fault:



Strike Slip fault: