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PAPER : ENGINEERING GEOLOGY

Q.No.1(a) Define Engineering Geology and write any five branches of geology.

Ans: Engineering Geology:-

Engineering geology is the application of the geology to engineering study for the purpose of assuring that the geological factors regarding the location, design, construction, operation, and maintenance of engineering works are recognized and accounted for. Engineering geologists provide geological and geotechnical recommendation, analysis and design associated with human development and various types of structure.

Branches of geology:-

1) Physical geology:- (Geophysics) :- Concerned with the physical processes and physical properties of the earth and its surrounding space environment and the use of quantitative methods for their analysis.

### 2) Petrology:-

Studies the origin, composition, distribution and structure of rocks.

### 3) Mineralogy:-

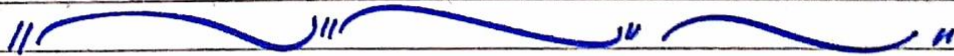
The study of minerals, its composition and properties.

### 4) Structural geology:- (Tectonic):-

The study of the three-dimensional distribution of rock units with respect to their deformational histories.

### 5) Stratigraphy:-

Studies rock layers (strata) and layering (stratification). It is primarily used in the study of sedimentary and layered volcanic rocks.



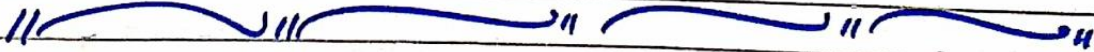
Q2b): What was the objection on tidal theory:

Ans:- Objection on Tidal theory:-

By the late 1920s, this opinion was shared by many astronomers. However, in 1925 Henry Norris Russell raised what would become fatal objections to the Jeans-Jeffreys hypothesis.

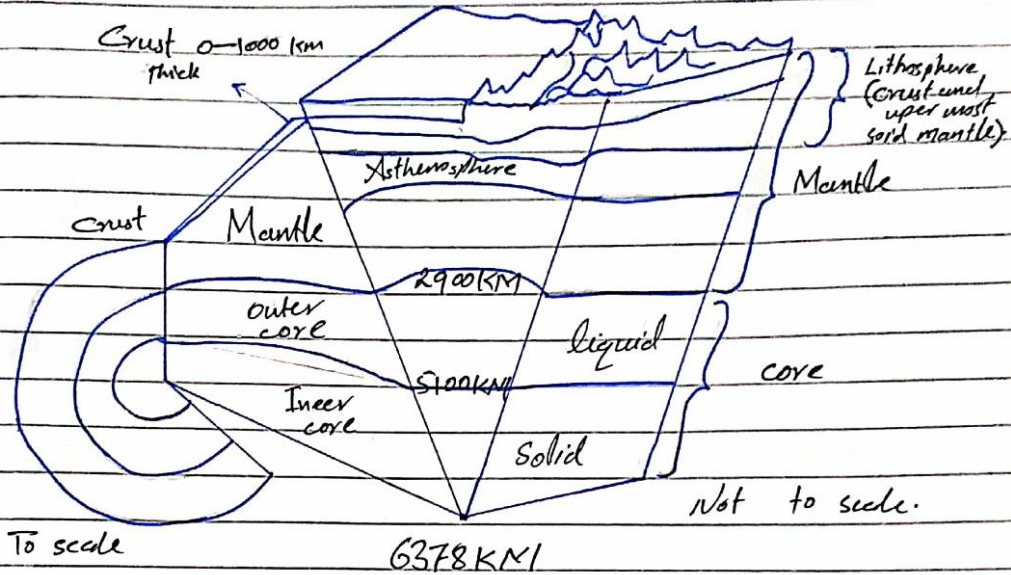
He pointed out that it was hard to see how a close stellar encounter could leave the sun, which is a thousand times more massive than the planets with such a tiny shear of the solar system's angular momentum. Furthermore, he could not understand how the planets could condense out of hot material ejected from the sun.

The former objection was put into stronger form by Russell himself in 1943 while the latter was strengthened by Russell's student, Lyman Spitzer in 1939.



Q-1

C1- Draw the interior of the earth along with labeling. Also explain each labeling in details.



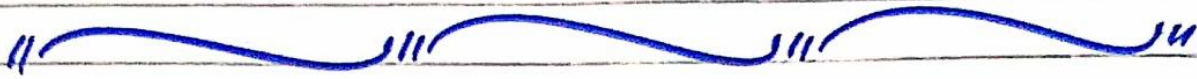
**Mantle:-** The mantle layer between the core and crust composes the greatest volume of the earth. The mantle is composed of rocks with large amount of magnesium Mg and iron Fe with some silicon Si and oxygen O.

**Core:-**

Core consist of both a solid inner core and a liquid outer core. The core both inner and outer parts is composed mainly of iron. The interior of the earth is very Hot. several thousands of degree (centigrade).

**Crust:-** Finally there is the crust on the

surface of the earth. This is the rocky layer  
on which you are currently standing.



Q

Q: What is Mohs scale of hardness and which minerals were used as a standard of comparison?

Ans: Mohs scale:-

The Mohs scale is a purely ordinal scale for example, corundum (9) is twice as hard as topaz (8) but diamond (10) is four times as hard as corundum.

The below table shows the comparison with the absolute hardness measured by a sclerometer, with pictorial examples.

Mohs hardness	Minerals	Chemical formula	Absolute hardness.
1	Talc	$Mg_3Si_4O_{10}(OH)_2$	1
2	Gypsum	$CaSO_4 \cdot 2H_2O$	2
3	Calcite	$CaCO_3$	14
4	fluorite	$CaF_2$	21
5	Apatite	$Ca_5(PO_4)_3(OH, Cl, F)$	48.



Q.2(a) What is chemical weathering?

Ans: Chemical weathering:-

The erosion or disintegration of rocks, building materials etc, caused by chemical reactions (chiefly with water and substances dissolved in it) rather than by mechanical processes.

b:- What is mechanical exfoliation process.

Ans:- Mechanical exfoliation Process:-

Mechanical or physical exfoliation involves using a hard substance to manually remove dead skin cells. You have probably used mechanical exfoliation products without even realizing it if you have used cleansers or other skincare products that contain microbeads.

c Write down the factors that influence the rate of sediment deposition.

Ans:- Many factors affect the movement of sediments in streams. Gradient (slope), discharge, and channel shape influence a stream's velocity and the erosion and deposition of sediments. The watershed of a stream is the area drained by a stream and its tributaries (small feeder streams).

Q:- find out which cube will have more rate of weathering and why.

Ans:- The cube having  $48\text{cm}^2$  area will have more rate of weathering because the surface area that is exposed to atmospheric conditions which causes weathering is more than the other cube having  $24\text{cm}^2$  area.

Q3 Define igneous rocks and explain classification of igneous rocks in detail.

Ans: Igneous Rocks:-

Igneous rocks are rocks formed from the crystallization of a liquid (magma rock). Igneous rocks may be divided into two categories: Intrusive or plutonic rocks crystallize from magma beneath the earth's surface. Extrusive or volcanic rocks crystallize from lava at the earth's surface.

Classification of Igneous Rocks:-

Igneous rocks are classified according to mode of occurrence, texture, mineralogy, chemical composition, and geometry of the igneous body. The classification of



the many types of different igneous rocks can provide us with important information about the conditions under which they formed.

Two variables used for the classification of igneous rocks are particle size, which largely depends on the cooling history, and the mineral composition of the rock.

Igneous rocks are classified on the basis of the following:

### Texture:-

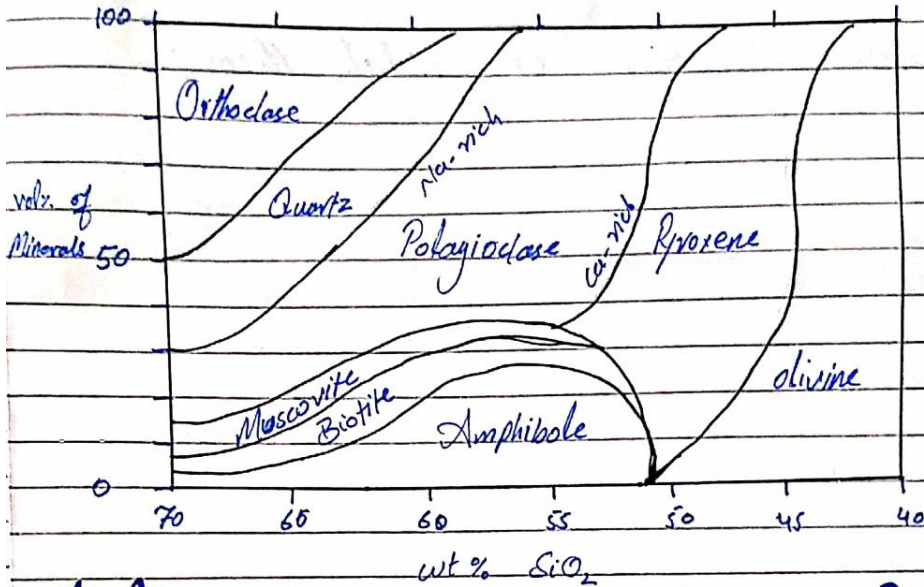
Texture is an important criterion for the naming of volcanic rocks. The texture of volcanic rocks, including the size, shape, orientation and distribution of mineral grains and the intergrain relationship will determine whether rock is termed a tuff, a pyroclastic lava or a simple lava.

### Chemical classification and petrology:-

Igneous rocks can be classified according to chemical or mineralogical parameters:

Chemical: Total alkali-silica content (TAS-diagram) for volcanic rock classification used when modal or mineralogic data is unable to be determined due to the small size.

Volcanic: Rhyolite Dacite Andesite Basalt Komatiite  
 Plutonic: Granite Granodiorite Diorite Gabbro Peridotite.



Alkali vs silica classification of igneous Rock.

