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Q2

GEOLOGY IN CIVIL ENGINEERING

⇒ **Q** Geology is the study of Earth, the material of which it is made, the structure of those materials and the effects of the natural forces acting upon them and is important to civil engineering b/c all work performed by civil engineering involves earth and its features. Fundamental understanding of geology is so important that it is a requirement in university-level civil engineering programs.

ROLE OF ENGINEERING GEOLOGY

⇒ Systematic knowledge regarding site.

⇒ The knowledge of the geological work of natural agents such as water, wind etc.

⇒ Feature of area and possible design of foundation.

=> For a civil Engineering project to be successful, the engineers must understand the Land upon which the project rests. Geologists study the Land to determine whether it is ~~suif~~ stable enough to support the proposed project.

=> They also study water patterns to determine if a particular site is prone to flooding.

=> Some civil engineers use Geologists to Examine rocks for Important metals, oil, natural gas and ground water.

" Engineer in the systematic exploration of a site."

=> The systematic Exploration and Investigation of a new site may involve five stages of procedure.

=> These stages are =>

- ① Preliminary Investigation using Published Information and other Existing data
- ② A detailed geological Survey of the site, Possibly with a Photogeology Study.
- ③ Applied geophysical Surveys to provide Information about the Subsurface geology.
- ④ Boring drilling and excavation to provide ~~conf~~ Confirmation of the previous results and Quantitative detail, at critical points on the site.
- ⑤ Testing of Soil and Rocks to assess their Suitability, particularly their Mechanical Properties (Soil mechanics and rock mechanics) either in situ or from Samples.

⇒ In a Major Engineering Project, Each of these Stages might be carried out and

reported on by a consultant specialising in geology, geophysics or engineering (with a detailed knowledge of soil or rocks mechanics)

=> However, even where services of specialist consultant are employed, an engineer will have overall supervision and responsibility for the project.

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Volcanic

⇒ Volcanoes also can occur as a result of plate movement. A volcano is vent in the surface of the Earth through which magma (molten rock called "Lava" when it reaches the surface) and associated gases erupt. Volcano is also the term used to describe the structure produced by material ejected through the vent. Materials ejected from the vent could include:-

- Cinders - Dark colored pieces of rock thrown from a volcano
- Pumice - bubbly, frothy rock that is hardened
- Ash - Fine grained particles less than 2mm across.

Volcanoes Changes

=> Volcanoes can cause changes to the surface of the Earth in many ways. Of course lava flows and Ejection of Cinders, Pumice, and Ash build up to create cones of volcanoes and volcanic mountains. In addition, volcanic activity, such as basalt floods. Lay thick, dense layers of rock on the landscape. Volcanoes also trigger mudflows, avalanches and cracks or fissures in the Earth's surface.

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SiO₂
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⇒ The chemical composition of a rock is generally expressed in terms of different oxides like SiO₂, Al₂O₃, Fe₂O₃, FeO, MgO and CaO.

⇒ Among different oxides but Silicon dioxide is always predominant in igneous rocks.

⇒ Since silica percent is also responsible for the formation of different minerals and their association. It serves as a suitable basis for the classification of igneous rock.

⇒ When silica content exceeds 66% the igneous rocks are called acidic, when it is 52-66% the rock are called intermediate.

The basic rock have 45-52% .

⇒ Tectosilicates also known as Framework Silicates, have the highest degree of Polymerization.

⇒ Its ratio becomes 1:2

⇒ Examples are Quartz, the Feldspars, Feldspathoids and the Zeolites.

⇒ Framework silicates tend to be particularly chemically stable as a result of strong covalent bonds.

⇒ Forming 12% of the Earth's crust, Quartz (SiO_2) is the most abundant mineral species.

① Quartz = its high chemical and physical resistivity.

② Feldspar = most abundant group in the Earth's crust at about 52%.

③ Zeolites = Have distinctive crystal habits occurring in needles, plates, or blocky masses.

Page
9

Geology

13639

Q3

Weathering

Why Does ~~weathering~~ occur?

WEATHERING

=> Weathering causes the disintegration of rock near the surface of the Earth, plant and animal life. Atmosphere and water are the major causes of weathering.

=> Weathering breaks down and loosens the surface minerals of rock so they can be transported away by agents of erosion such as water, wind and ice.

=> Weathering is happens through processes or sources in the environment, including events like the roots of plants.

Weathering have 3 types

① Physical weathering

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=> In which rocks are broken down through an External Force.

=> Also known as Mechanical weathering.

=> It's caused by the change Temperature.

=> Due to Expansion and contraction rocks break up.

Physical weathering happen due to the process of.

=> changing of temperature.

=> Freezing action of water.

=> Roots growing plants which disintegrate rocks.

② Chemical Weathering

⇒ Which means rocks are broken down through a chemical reaction and change.

⇒ Decomposition and disintegration of rocks due to chemical reaction.

⇒ Water causing a change in the chemical composition of rocks.

Types of Chemical Weathering

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① Solution

② Oxidation

③ Carbonation

④ Hydration

Page

(12)

(12)

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13639
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(3)

Biological Weathering
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⇒ The action of plants and animals leads to breaking of rocks

⇒ Roots causing disintegration of rocks.

⇒ The roots of the trees ~~penet~~ Penetrate into the cracks of the rocks.

Types of Biological Weathering
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(1) Burrowing Animals

(2) Quarrying

(3) By Human Excreta.