

IQRA NATIONAL UNIVERSITY

DEPARTMENT: CIVIL ENGINEERING

PAPER: ENGINEERING GEOLOGY

EXAM: FINAL TERM

SEMESTER: 2ND

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QUASTION:-1

What causes earthquakes? If the Richter magnitude reaches at 8 or above what will be the consequences? Differentiate primary and secondary waves?

Answer:-

➤ **Causes Of Earthquakes:-**

Anearthquakeis an intense shaking of Earth's surface. The shaking is caused by movements in Earth's outermost layers.

Anearthquakeis caused by a sudden slip-on a fault. The tectonic plates are always slowly moving, but they get stuck at their edges due to friction. When the stress on the edge overcomes the friction, there is an earthquake that releases energy in waves that travel through the earth's crust and cause the shaking that we feel.

➤ **Richter magnitude reaches at 8 or above:-**

Total destruction of buildings, bridges and roads

➤ **Differentiate primary and secondary waves**

- **Primary weves:-** The first kind of body wave is the P wave or primary wave.

They travel through the Earth's interior and can pass through both solid and molten rock. They shake the ground back and forth.

Typical speeds are 330 m/s in air, 1450 m/s in water and about 5000 m/s in granite.

- **Secondary Weves:-** The second type of body wave is the S wave or secondary wave, which is the second wave you feel in an earthquake.

S-waves lag behind P-waves as they travel 1.7 times slower. However they do more damage because they're bigger and shake the ground vertically and horizontally.

 END

QUESTION 2:-Describe the role of geology in selection of sites for dams and reservoirs?

Answer:- role of geology in selection of sites for dams and reservoirs:-

- **Detailed Geological Investigations for Dams and reservoirs Site Selection:**

- Study of Geological Toposheet.
- Study of the Area with reference to Geology.
- Study of Rock Types.
- Study of Structural Geology of the Area.
- History of the Area with reference to Rainfall Data.
- Study of Stream Channels with Diff. Order.
- Study of Seismic Data of the Area.
- Geomorphological Study.
- Preparation of Geological Map of the area in detail.
- Study of Core Drill Data and its interpretation.
- Detailed Engg. Geological Properties of the area.

 **END**

QUASTION 3:- What are the different types of mass wasting? Also explain the protective measures of landslides?

Answer:- **mass wasting type:-**

❖ **Main two category** :- Fast movement s and Slow Movements:

➤ **Fast Movements:-**

Slumps.

Rocks and debris fall.

Rock and debris slides.

Flow.

➤ **Slow Movements:**

Creep.

Solifluction.

Permafrost.

Protective Measures Of Landslides:

Draining water from slopes.

Re-vegetation with plants that have deep roots.

Terracing redistributes mass along a slope and reduces the slope angle.

Retaining wall can catch debris or stabilize regolith.

Rock bolts can be used to stabilize coherent masses.

 END

QUASTION 4:- Differentiate fault, joint and fold?

- (a) What do the normal faults cause to the crust of the Earth?**
(b) Folds develop in which type of rock?
(c) What is the effect of faulting on outcrop?
(d) Where should a site for a civil engineering project be located? a) On faulted zone b) on folded strata c) On a joint d) Must be avoided to possible extent to be built on all three.

Answer:-

a) Normal Faults Cause To The Crust Of The Earth:-

Falt where the hanging wall moves down relative to the footwall.

Due to the tensional strees normal faults are created in a series. In such a case the down- dropped blocks from grabens and the uplifted blocks form horsts.

b) Folds develop in rock:-

Fold developed in sedimentry rock. a fold occurs when one or a stack of originally flat and planar surfaces, such as sedimentary strata, are bent or curved as a result of permanent deformation.

C) Effect Of Faulting On Outcrop:-

In dip faults which occur parallel to the dip of the outcrop, the most prominent effect observed after faulting and erosion of the up thrown block is a horizontal shift between the two parts of the outcrop. ... Explanation: Oblique faults with downthrow to the left side result in an offset with an overlap.

d) Fault, Fold And Joint to possible extant for Civil Engineering Project:-

1. Fault :-

From the civil engineering point of veiew, fault are the most unfaverble and undesrible geological structure at the site for any given purpose .

Therefore fault are necessarily investagate with special care in dealing with major construction.

b) Fold:-

Folds are one of the most common geological structures found in rocks. When a set of horizontal layers are subjected to compressive forces, they bend either upward or downward. The bend noticed in rock is called a fold.

Therefore, folds are necessarily investigated with special care in dealing with major construction.

c) Joint:-

Fractured along which no displacement is occurred is called joint.

Therefore, joints are necessarily investigated with special care in dealing with major construction.

 End

QUASTION 5:- Describe tunneling on the basis of geology? Also determine geological investigation for tunnels?

Answer:- Tunneling On The Basis Of Geology:-

- ❖ Two types in the basis of geology:-Hard rock tunnels, Soft rock tunnels.
 - **Hard rock tunnels:-** Tunneling through hard rock almost always involves blasting.
 - **Soft rock tunnels:-** Soft Ground (Earth) Workers dig soft-ground tunnels through clay, silt, sand, gravel or mud etc.
- ❖ Geological investigation for tunnels:

➤ **These determine to a large extent solutions to following engineering problems connected with tunneling:**

(a) Selection of Tunnel Route (Alignment):

There might be available many alternate alignments that could connect two points through a tunnel. However, the final choice would be greatly dependent on the geological constitution along and around different alternatives. The alignment having least geologically negative factors would be the obvious choice.

(b) Selection of Excavation Method:

Tunneling is a complicated process in any situation and involves huge costs which would multiply manifolds if proper planning is not exercised before starting the actual excavation. And the excavation methods are intimately linked with the type of rocks to be excavated. Choice of the right method will, therefore, be possible only when the nature of the rocks and the ground all along the alignment is fully known. This is one of the most important aim and object of geological investigations.

(c) Selection of Design for the Tunnel:

The ultimate dimensions and design parameters of a proposed tunnel are controlled, besides other factors, by geological constitution of the area along the alignment.


Whether the tunnel is to be circular D-Shaped, horse-shoe

Shaped or rectangular or combination of one or more of these out lines, is more often dictated by the geology of the alignment than by any other single factor. D-shape or horse-shoe shape may be conveniently adopted but these shapes would be practically unsuitable in soft ground or

Even in weak rocks with unequal lateral pressure. In those cases circular outline may be the first choice.

(d) Assessment of Cost and Stability:

These aspects of the tunneling projects are also closely interlinked with the first three considerations. Since geological investigations will determine the line of actual excavation, the method of excavation and the dimensions of excavation as also the supporting system(lining) of the excavation, all estimates about the cost of the project would depend on the geological details.

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