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SECTION:- A

SUBJECT :- ENGINEERING GEOLOGY.

DEPARTMENT :- Bs (CIVIL ENGINEERING)

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QUESTION N0 1:-

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

ANSWER:=

The earthquake causes:

The earthquake is 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.

The Earth’s crust consists of seven large lithospheric plates and numerous smaller plates. These plates move towards each other (a convergent boundary), apart (a divergent boundary) or past each other (a transform boundary).

Earthquakes are caused by a sudden release of stress along faults in the earth's crust. The continuous motion of tectonic plates causes a steady build-up of pressure in the rock strata on both sides of a fault until the stress is sufficiently great that it is released in a sudden, jerky movement. The resulting waves of seismic energy propagate through the ground and over its surface, causing the shaking we perceive as earthquakes.

Richter magnitude reaches at 8 or above

The Richter magnitude scale measures the amount of seismic energy released by an earthquake.

When it reaches at 8 or above, the total destruction of building, bridges and roads.

Differentiate primary and secondary waves:

Primary waves:

- 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.

Secomadry waves:

wave of energy that travel through the earth by causing particles in rocks to move in right angle to the direction of the wave secondary wave travel 1.7 time slower but however they do more damage because they bigger and shake the ground horizontally and vertically .

QUESTION NO 2:-

describe the role of geology in selection of site for dams and reservoirs?

ANSWER:

1.Topographical Studies.

2.Reservoir Location.

3.Petrology studies.

4.Mineralogy Studies

5.Structural Geological Studies.

6.Geological Factors Like

Conditions, Water tightness of Foundation reservoir,availability of construction material.

7.General examination of rocks.

8.Indirect study methods for subsurface

investigations.

9.Preliminary Drill Hole Study

Geological investigation for selecting and locating dam sites is one of the most significant studies which should be carried out in different scales and stages before deciding the best location for a dam. Therefore, an adequate assessment of site geologic and geotechnical conditions is one of the most significant aspects of a dam safety evaluation. Evaluation of the safety of a new dam requires, among other things, that its site, abutments, foundation and reservoir have been adequately examined, explored, and investigated so that the geological conditions are fully understood as much as

possible.

The geological investigations should include four main topics; these are

1. The geology of the dam site including the foundation for the dam itself and the sites for other structures such as spillway, diversion tunnel and outlet works. To check whether the dam foundation has sufficient strength and durability to support the type of dam proposed, whether the foundation is watertight, especially, when karstified rocks occur in the site and in deeper horizons bellow the foundations.
2. The geology of the area to be occupied by the reservoir once the dam is completed. Whether the storage area is watertight or are there areas of cavernous limestone and gypsum which might lead to the dam not retaining water.
3. Stability of the slopes in the dam site and reservoir area whether landslides into the reservoir are possible which might cause a wave of water to be pushed over the top of the dam
4. Finding sources of the construction materials which will be needed to build the dam in nearby

areas of the dam site including all required types like: aggregates of different types and sizes, filling materials in the core and both surfaces if the dam is of earth-fill type

The main aim of this article is to shed light on the role of the geological investigations in dam siting and to elucidate the consequences when the investigations are inadequate and/or the acquired data is miss-interpreted, which means the interpretation of the acquired data Dam _case is presented as a good and unique example for inadequate geological investigation in dam siting and the consequences which were the reason for calling the dam.

QESTIOIN NO 3:=

What are the different types of mass wasting? Also explain the protective measures of landslides?

Ans. The types of mass wasting:

Fast movement mass wasting

- Rock and Debris Fall
- Rock and debris slides
- Slums
- Flow

Slow movement mass wasting

- Ceep
- Solifluction
- Permafrost

The protective measures of landslides:

➢ Draining water from slopes

➢ Revegetation with plants that have deep roots. So the root of that plants stabilize the potential failure plane.

➢ Terracing redistributes mass along a slope and reduces the slope angle. It reduce the load and catch debris.

- Retaining wall that can catch debris or stabilize regolith . any trapped debris the retaning wall stop it.

  Rock bolts can be used to stabilize coherent masses.

QUESTION NO 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.

ANSQWER:-

Differentiate fault, joint and fold

Fault:

Fracturing and displacement of rock strata.

Joint:

Fracture along which no displacement has occurred.

Fold:

In response to compression force the strata may bend and buckle these are called fold

a) . what do the normal faults causes to the crust of the earth.:=

Fault where the hanging wall moves down relative to the footwall. due to the tensional stress normal faults are created in a series. In such a case the down dropped blocks from grabens and the uplifted blocks from horsts.

Half grabens are a geological structure where it is bounded by fault from one side.

b) fold develop in which type of rock.. := The folds may develop in any type of rock and may be of any shape and flexures.

c) what is the effect of faulting on outcrops :-
Faulting is essentially a processs of rupturing and displacement along the plane of rupture. Its effects may involve changes in the elevation of the ground,

omission of some strata where they are normally expected, repetition of some strata in a given direction and displacement and shifts in the continuity of the same rocks in certain regions.

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:-

Must be avoided to possible extent to be built on all three.

QUESTION NO 5:-

Describe tunneling on the basis of geology? Also determine geological investigation for tunnels?

ANSWER:-

Tunnels may be defined as underground routes or passages driven through the ground without disturbing the overlying soil or rock cover.

A tunnel is an underground passageway, dug through the surrounding soil/earth/rock and enclosed except for entrance and exit, commonly at

each end. A pipeline is not a tunnel, though some recent tunnels have used immersed tube construction techniques rather than traditional tunnel boring methods.

TYPES OF TUNNELS ON THE BASIS OF GEOLOGY

1. Hard rock tunnels

Hard Rock. Tunneling through hard rock almost always involves blasting.

2. Soft rock tunnels

Soft Ground (Earth) Workers dig soft-ground tunnels through clay, silt, sand, gravel or mud.

Geological Investigations for Tunnels:

(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 outlines, 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.

(e) Assessment of Environmental Hazards: The process of tunneling, whether through rocks or through soft ground, and for whatsoever purpose, involves disturbing the environment of an area in more than one way. The tunneling methods might involve vibrations induced through blasting or ground cutting and drilling, producing abnormal quantities of dust and last but not the least, interference with water supply system of the nearby areas.