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Question 1

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

Earthquake

Any sudden shaking of the ground caused by the passage of seismic waves through Earth's rocks. Seismic waves are produced when some form of energy stored in Earth's crust is suddenly released, usually when masses of rock straining against one another suddenly fracture and "slip." Earthquakes occur most often along geologic faults, narrow zones where rock masses move in relation to one another

Causes of Earthquake

There are various causes that can lead to an earthquake.some of them are given below

- Tectonic resulting in fault displacement
- Magmatic,under surface movement can cause minor earthquake.
- Volcanic eruption can also result in low to mid range earthquake.

Richter scale:

The Richter magnitude scale measures the amount of seismic energy released by an earthquake.The maximum range of Richter scale is 9

8 scale earth quake

Total Destruction of Roads Buildings and Bridges.

Consequences

No buildings roads and bridges will be left very few will be left.

Landslides

Landslides will occur in hilly areas.which will destroys the roads and a dager to human bei**ngs.**

Earthquake and tsunamis.

As comapore to tsunami it will be worst than tsunami.

- It will be the deadliest earthquake of all the time.moreever this will be have massive economic impact and larger loss of life.

Primary and Secondary wave

Primary Wave

- It is Highwave Frequency.
- It is shortwave length.
- It is longitudinal Waves.

- It can pass through solid and liquads.
- Move forward and backward as it cpompressed and decompressed.
- Primary wave is faster.
- First primary wave arrives.

Secondary waves

- It is High frequency.
- It is Shortwave length.
- It is trasverse wave
- It cannot move through Liquad
- It can move in all direction from their sourcesecondary wave is more slower than primary waves.
- After primary wave secondary waver arrives.

Question 2

Describe the role of geology in selection of sites for dams and reservoirs?

Answer

Dams

A dam is a barrier that stops or restricts the flow of water or underground streams. Reservoirs created by dams not only suppress floods but also provide water for activities such as irrigation, human consumption, industrial use, aquaculture, and navigability.

Introduction

Dams are engineering structures constructed for different purposes. They are of different sizes, shapes, and types. In all cases, many essential studies should be carried out before deciding the location, type and size of dam.
Among those studies is the geological investigation which should be carried out of deduce the geological condition in the most relevant site, depth of the foundation and their types of the expected geological hazards.
Without proper geological investagations, the sitting of a dam will cause serious hazards during construction and during commissioning of the dam.
the location of the dam site and its foundation are built over a highly karstified area, where gypsum and limestone beds

are exposed and exist deep under the ground surface, and even deeper than the foundation.

Geological consideration in the selection of dam site investigation.

- **Finding art of a Narrow river valley**
- **Identification of badrock**
- **Structural geology of the valley and adjacent ridges.**
- **Components rock to offer stable foundations**
- **Suitability of different types of rocks**
- **Influence of weathering effect**
- **Effect of occurance of intrusions**
- **Effect of fracturing**
- **Effect of associated geological structures**
- **Indentification of leakage Leakaged below dams**

RESERVIOR:

• A reservoir usually means an enlarged natural or artificial lake, storage pond or impoundment created using a dam to store water.

• Reservoirs can be created by controlling a stream that drains an existing body of water.

• They can also be constructed in river valleys using a dam.

Perposes of reservoir

- **Reservoirs may be managed to balance some or all of the following activities**

- **Irrigation**
- **Navigation**
- **Hydroelectric power generation**
- **Environmental management**
- **Soil erosion**
- **Flood control**
- **Water supply**
- **Purpose of a Reservoir**

Competent rocks to offer Stable Foundations

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 beciding the best location for dam.

Therefore, an adequate assessment of site geologic and geotechnical condition is one of the most significant aspects of a dam safety evaluation.

Evaluation of the safty of a new dam requires, among other things, that its site, abutment, foundation and reservoir have been adequately examined, expored, and investgated so that the geological conditions are fully understood as much as possible.

The important requirement here is that there should be no fear of leakage when the ground in under pressure with full head of water in the reservoir. Generally at many sites suitable for impounding reservoirs, we find superficial deposits such as peat, alluvium and even glacial drifts are present and these overly the solid rock.

Question 3.

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

Answer:

Types of mass wasting:

Downslope mass movement of rock,Regolith,and soil under the influence of gravity(exclude material transpoted downslope by streams winds etc)

OR

Mass wasting, also known as slope movement or mass movement, is the geomorphic process by which soil, sand, regolith, and rock move downslope typically as a solid, continuous or discontinuous mass, largely under the force of gravity, frequently with characteristics of a flow as in debris flows and mudflows.

Types of Mass wasting.

Mass wasting triggered by

Saturated water

Overstep sloped

Earthquake

Removel of vegetation

Removal of support

- **Fast movements are**
- **Slumps**
- **Rock and debris falls**
- **Rock and debris slides**
- **Flow**
- **Slow movements**
    - **Creep**
    - **Solifluction**
    - **Permafrost**

- **Rock and debris falls**

    It happen when rocks or debris slide down a prexisting surfaces.

- **Rock and debris falls**

When a piece of rocks falls down the slope debiris fall are similar except they evolve a mixture of soil,regoilth rocks. The accumulation of rock debris at the base of a steep slope is called talus.

- **Slumps**

It is a type of slides wherein downwardrotation of rock or regolith occurs along a curved surfaces due to overstepenning.

- **Flow**

Flow of soil and regolith containing a large amount of water.

- **Creep**

The gradual downhill movement of soil and regolith

Or

A slow, gradual movement of soil or regolith downhill over time is called **creep**

- **Solifluction**

Is a flow of saturated soil downslope at rate of a few millimeters or a few centimeters per day or per year

Or

A variety of earthflow called **solifluction** is the flow of watersaturated earth material over an impermeable surface such as permafrost

- **Permafrost**

Slow landslide due to slowly melting of permanently frozen ground.

- **Debris flows.**

are defined as mass-wasting events in which turbulence occurs throughout the mass. Varieties of these are called earthflows, mudflows, and debris avalanches.

Mudflow

A mudflow **is** a liquidy mass of soil, rock debris, and water that moves quickly down a well-defined channel. Generally viscous and muddy colored, it can be powerful enough to move large automobiles and buildings.

Reducing risk of landslides

- Drainage water from slopes
- Revegatation 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.

Question 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)Differentiate fault, joint and fold?

Fault:

A fault is a fracturing along which there is visible offset of movements by shearing.

Or

A fault is a fracturing along which there is a relative movements between the two opposite blocks.

Joint:

It is the opening of between the two rocks bodies in which there is no absorvable movement**.**

(a) What do the normal faults cause to the crust of the Earth?

In normal fault the rock body moves away From each other as the forces on The Rock bodies are directed that way so The normal fault diverge the earth plates or fault blocks.

(b) Folds develop in which type of rock?

Fold devolops mostly in ductile rocks having plasticity and don't break easily.

(c) What is the effect of faulting on outcrop?

Faulting effects The out crops in Many way defending upon the types of fault .In case of normal faults The Rock bodies at the out crop moves away from each other which May exposed to sever weathering .Reverse or thrust fault converge the fault blocks above each other in which the fault planes may get powdered.n case of strick slip faults the rock Bodies get displaced longitudinally.

(d) Must be avoided to possible extent to be built on all three.

(d)Fault: from the civil engineering point of view. Fault are the most unfavorable and undesrble geological structure at the site for any given purpose. Therefore fault are necessary investigate with special care in dealing with major construction.

Fold: folds are one of the most commen geological structure found in rocks, when a set of horizontal layers are subjected to

compressive forces. The bend either upward or downward. The bend noticed in rock are called fold.

Joint : fractured along which no displacement is occurred is called joint. Therefore joint are necessarily investigate with special care in dealing with major construction.

Question 5:

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

Answer:

TUNNEL

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

Types of tunnel

1)Hard rock tunnels

2)Soft rock tunnels

Soft ground earth workers dig soft grounf tunnels through clay slit,sand,gravel,or mud.

Hard rock tunneling through hard rock almost always involves blasting

These determine to a large extent solutions to following engineering problems connected with tunnelling:

(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.

Assessments of eenvirnment hazard

The process of tunneling,weathering through rock or through soft ground and for what so ever purpose, involves disturbing the environmental of an area in more than one way.