

Name : Muhammad Atif Khan

Id : 16312

Department : Civil engineering (2nd semester)

Section : B

i):-

Causes of Earthquakes:

There are three main causes of Earthquakes :

i):- Induced Earthquakes :- caused by human activity, like tunnel construction, filling reservoirs, and implementing geothermal or fracking projects.

ii):- Collapse Earthquake :- can be caused by such phenomena as cave-ins, mostly in karst areas or close to mining facilities, as a result of subsidence.

iii):- Volcanic Earthquakes :- caused by ~~Volcan~~ active volcanism

Primary waves

- i): Type of seismic body wave in which rock particles vibrate parallel to the direction of wave travel.
- ii): Primary waves are ~~alternating~~ ⁺ alternately compressional and extensional.
- iii): P-waves causes the rocks they pass through to change in volume.
- iv): P-waves can travel through solid, liquid & gases.

Secondary waves.

- i): S-wave is which medium moves perpendicular to the direction of the travel ~~of~~ wave.
- ii): S-waves move in an up and down pattern,
- iii): S-waves travel slower,
- iv): S-waves travel through solid, and cause more damage due to their greater size.

Q/NO (3):

The Geological Investigation should include Four main topics,

- i): The geology of the dam site including the foundation for the dam itself 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
- ii): The geology of the area to be occupied by the reservoir once the dam is completed. Whether the storage area is water tight or are there areas of cavernous limestone and or gypsum which might lead to the dam not retaining water
- iii): Stability of the slopes in the dam site and reservoir are whether landslides in the reservoir are possible which might cause a wave of water to be pushed over the top of the dam.
- iv): Finding sources of the structure material which will be

Question no 3. What are the different types of mass wasting? Also explain the protective measures of landslides?

Answer.

Mudflow. Saturated soil (soil filled with water) flows down a slope.

Landslide. Large blocks of rock slide downhill.

Rotational slip. Saturated soil slumps down a curved surface.

Revegetation 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 also to stabilize coherent masses.

Q4. 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.

Ans: Fault:

Fault, in geology, a planar or gently curved fracture in the rocks of Earth's crust, where compressional or tensional forces cause relative displacement of the rocks on the opposite sides of the fracture.

Joint:

A joint is a break of natural origin in the continuity of either a layer or body of rock that lacks any visible or measurable movement parallel to the surface of the fracture.

Fold:

Fold, in geology, undulation or waves in the stratified rocks of Earth's crust. Stratified rocks were originally formed from sediments that were deposited in flat horizontal sheets, but in a number of places the strata are no longer horizontal but have been warped.

(a) cause of fault to earth crust:

1. fault can cause minor earth quakes
2. landsliding
3. mudflow etc.

(b). **Folds** form under varied conditions of stress, hydrostatic pressure, pore pressure, and temperature gradient, as evidenced by their presence in soft sediments, the full spectrum of **metamorphic rocks**, and even as primary flow structures in some **igneous rocks**.

(c). In dip **faults** which occur parallel to the dip of the **outcrop**, the most prominent **effect** observed after **faulting** and erosion of the upthrown 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).

Ans.(d) 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. TUNNELING ON THE BASIS OF Geology.

1. Hard rock tunnels

2. Soft rock tunnels

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

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

Selection of Tunnel Route (Alignment)

There might be available many alternate alignments that could connect two points through a tunnel.

the alignment having least geologically negative factors would be the obvious choice.

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. This is one of the most important aim and object of geological investigation.

Selection of Design for the Tunnel

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.

Assessment of Cost and Stability

These aspects of the tunneling projects are also closely interlinked with the first three considerations.

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.

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.