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Q(1) What Causes earth—quakes? If the Richther magnitude reaches at 8 or above what will be the consequences? Differeniate primary and secondary waves?

Ans: ~~Coo~~ Causes of earthquakes:

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

An 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, there is an earthquake that releases energy in waves that travel through the earth's crust and cause the shaking that we feel.

Consequences of earthquake magnitude 8 or more:

Magnitude of earthquake 8 or more result total destruction of buildings bridges and roads.

A magnitude 8 release 1000 times more energy than a magnitude 6, but it releases that energy over a larger area and for a longer time. Magnitude 8 or more

is great earthquake. It can totally destroy communities near the epicenter.

Difference between primary and secondry waves.

P- Waves	S- Waves
1) Primary waves travel faster, move in a push full pattern.	Secondry waves travel slower move in an up and down pattern.
2) Travel through solid, liquids and gases.	Travel through only solids.
3) P- waves travel faster	S. waves travel slower.
4) P- waves are Compression waves	S. waves are Shear waves.
5) First wave to hit seismographs.	Second wave to hit Seismographs.
6) Shake the ground back and forth.	Shake the ground vertically and horizontally.
7) ~~Spp~~ Speed are 330 m/s in air, 1450 m/s in water and about 500 m/s in granite.	S-waves lag behind P- waves as they travel 1.7 times slower.

Q(2) Describe the role of geology in selection of sites for dam and reservoirs?

Ans:- Geological investigation for selection and locating dam site is one of the most significant studies which should be carried out in different scales and stages before deciding the best location for dam.
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 ~~geog~~ geological conditions are fully unterstood as much as possible.
The role of geological investigations in dam siting is to elucidate the consequences when the investigations are inadequate and/~~or~~ or the aquired data is miss-interpreted which means the interpretation of the acquired data ~~is~~ was not relevantly performed. Accordingly wrong conclution may be achieved.

A geological servey is the systematic investigation beneath a given piece of ground for the purpose of creating a geobgical map or model.
Before construction, geological mapping is

must for the site or surface of construction to show geological features like rock units or geologic strata. The geologist see the slope stability of the area, water content, nature of rock, soil erosion, soil types, Altitude and climatic parameter for selecting a site for dam or reservoir

Q(3) What are the different types of mass wasting? Also explain the protective measures of landslides?

Ans: Types of mass wasting:

Fast moving:

1) Slumps:
A types of slides wherein downward rotation of rock or regolith occures along a curved surface due to overstepenning.

2) Rocks and Debris slides
Happens when rocks or debris slide down a pre-existing surface.

3) Rock and Debris Fall.
Happens when a rock falls down the slope. Debris falls are similar except they involve a misture of soil, regolith and rocks. At the base there is an accumulation of fallen material termed talus.

4) Flow:
Flow of soil and regolith containing a large amount of water.

Slow Moving.

5) Creep:
The gradual downhill movement

of soil and regolith.

6) Solifluction:
It is ~~flot~~ flow of saturated soil downslope at a rate of a few millimeters or a few centimeters per day or per year.

7) ~~Flowing~~ Permafrost:
Slow landslide due to slowly melting of permanently frozen ground.

Protective measure of landslide:

1) Improving surface and subsurface drainage.
Water is a main factor in landslides, improving surface and subsurface drainage at the site can increase the stability of a landslide prone slope. Surface water should be diverted away from the land slide pron region by channeling water in a lined drainage ditch or sewer pipe to the base of the slope.

2) Excavation of head:
Removing the soil and rock at the head of the landslide decrease the driving pressure and can slow or stop landsliding.

3) Rock bolts.
Rock bolts can be used to stabilize coherent masses.

4) Buttressing the toe: If the toe of the landslide is at the base of the slope, fill can be placed over the toe and along the base of the slope. The fill increase the resisting forces along the failure surface in the toe area.

5) Preserving vegetation:
Trees, grasses, and vegetation can minimize the amount of water infiltrating into the soil, slow the errosion caused by surface water flow and remove water from the soil.

6) Retaining wall:
Retaining wall can catch debris or stabilize regolith.

Q(4) Differentiate faults, joints and fold?

Ans: Fold:
Fold is permenent wavelike deformation in layred rock or sediments. It is ductile deformation. In response to compression force the strata may bend and buckle these are called folds.

Faults: A results of brittle deformation. A fracture in bedrock along which rock on one side have moved relative to the other side.

Joint: A fracture on a rock without noticeable movements.

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

Ans → Due to the inclines nature of the faults plane and downward displacement of a part of the strata, normal faults cause an extension in the crust.

b) Folds develop in which type ~~of~~ rock?

Ans Folds form under varied conditions of stresses, hydrostatics pressure, Pores pressure and temperature gradient, as evidenced by their presence in soft sediments, the full spectrum of metamorphic rocks and even as primary flow structure in some igneous rocks.

c) What is the effect of faulting on outcrop?

Ans → On dip faults which occure parrelled to the dip of the outcrop, the most prominent effect observed after faulting

and errosion of upthrown block is a horizontal shift between the two parts of the outcrop.

d) Where should a site for a civil engineering project be located? a) on fault zone b) on folded strata c) on a joint d) must be avoided to possible extent to be built on all three.

Ans: We cannot locate a site for a civil engineering project on all these sites because of the following reason.

While the general information about the construction site is usually available at the planning stage of a project, it is important for the design professional and construction manager as well as the contractor to visit the site.

A poor layout can cause construction problem such as inadequate space for staging, limited access for material and personal personnel, and restriction on the use of certain construction methods. Thus, design and construction inputs are important in the layout of a facility.

Q(5) Describe tunneling on the basis of geology? Also determine geological investigation for tunnel?

Ans

Tunnel is an underground routes or passages driven through the ground without disturbing the overlying soil or rock cover.

Geological condition are among the greatest sources of unknowns prior to actual construction of underground excavations, espicially for deep tunnels in rock. These unknowns usually exist in inverse proportional to the amount, nature and quality of the geotechnical investigations. All the collected data must be interpreted inside a robust conceptual frame work that in geology primarily comes from field surveys today enhacement by new tools and methodologies for investigating and modelling

Geological investigation for tunnel:

a) Selection of Tunnel Route:

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

b) Selection of Excavation method:
Excavation method are intimately linked with the type of rocks to be excavated. Choice of the right method will, therefores, be possible only when the nature of the rocks and the ground all along the alignment is fully known.

c) Selection of design for the tunnel:
The ultimate dimensions and design prameters of a proposed tunnel are controlled, besides other factors, by geological constitution of the area along the alignment. whether the tumel is to be circular, D-shaped, horse-shoe shaped or rectangular or combination of one or more of the outlines, is more often dictated by the geology of the alignment than by any other single factor.

d) Assesment of cost and stability:
These aspects of the tumeling projects are also closely interlinked with the first three considerations. Since geological investigation will determine the line of actual excavation, the method of excavation, all estimates about the cost of the project would depend on the geological details.

e) Assessment of Enviromental Hazards:

The process of tunneling, whether through rocks or through soft ground, and for whatsever pupose, involves disturbing the enviroment of an area in more than one way. The tunneling methods might involve vibrations induced through blasting or ground cutting and drilling, producing abnormel quantities of dust and last but not the least, interference with water supply system of the nearby areas.

Now how we will perform these all above factor.

Preliminary Surveys:

The general topography of the area marking the highest and the lowest points occurence of valleys, depression, bare and covered slopes, slide areas, and in hilly regions and cold climates, the snow line.

The litho-logy of the area, meaning thereby, the composition, attitude and thickness of rock formations which constitute the area.

The hydrological conditions in the area, such as depth of water table possibility of occurence of major and minor aquifers of simple type and of artesian type and the likely hydrostatic heads along different possible routes or alignments.

The structural condition of the rock, that is, extent and attitude of major structural features such as folding faulting unconformities, jointing and shearing planes, if developed. Existence of buried valleys is also established during ~~pter~~ preliminary surveys.

It is obvious that with the help of above information, the engineers could propose a number of alternative tunnel routes to connect the two places, and in most cases, even decide about the general run of the tunnel.