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Section: B

paper: Geology

Dept: Civil

Engineering

Q No 1

What causes earthquakes? If the Richter magnitude reaches 8 or above what will be the consequences? Differentiate primary & Secondary waves?

Ans

Causes of earthquakes:

Earthquakes are usually caused when rock underground suddenly breaks along a fault. This sudden release of energy produce seismic wave under earth surface. These seismic wave comes to surface of earth. ~~that~~ If the seismic wave ~~the~~ comes to the earth surface than it cause earthquakes. If the Richter scale magnitude reaches to 8 or above than it can damage



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every thing on the earth. e.g  
building, houses on the earth,  
& also it can damage other  
things e.t.c

Primary waves :-  $\rightarrow$

(i) primary waves  
travels faster than the secondary  
wave.

(ii) p-waves can move through  
solids, liquid & gas.

(iii) they shake the ground  
back & forth.

(iv) p-waves cause less  
damage due to the smaller  
size.

Secondary waves :-  $\rightarrow$

(i) Secondary waves  
travels slower than the primary  
waves.

(ii) p-waves can move only  
in solids.

(iii) they shake the ground  
up-and-down pattern.



(iv) S-waves cause more damage than the P-waves B/c of their greater size.

Q.No3

What are the different type of Mass wasting? Also explain the protective measures of Landslides?

Ans

Type of Mass Wasting :->

Fast movements

(i) slumps

(ii) Rock & Debris Fall

(iii) Rock & Debris Slides

(iv) Flow.

Slow movement

(i) Creep

(ii) Solifluction

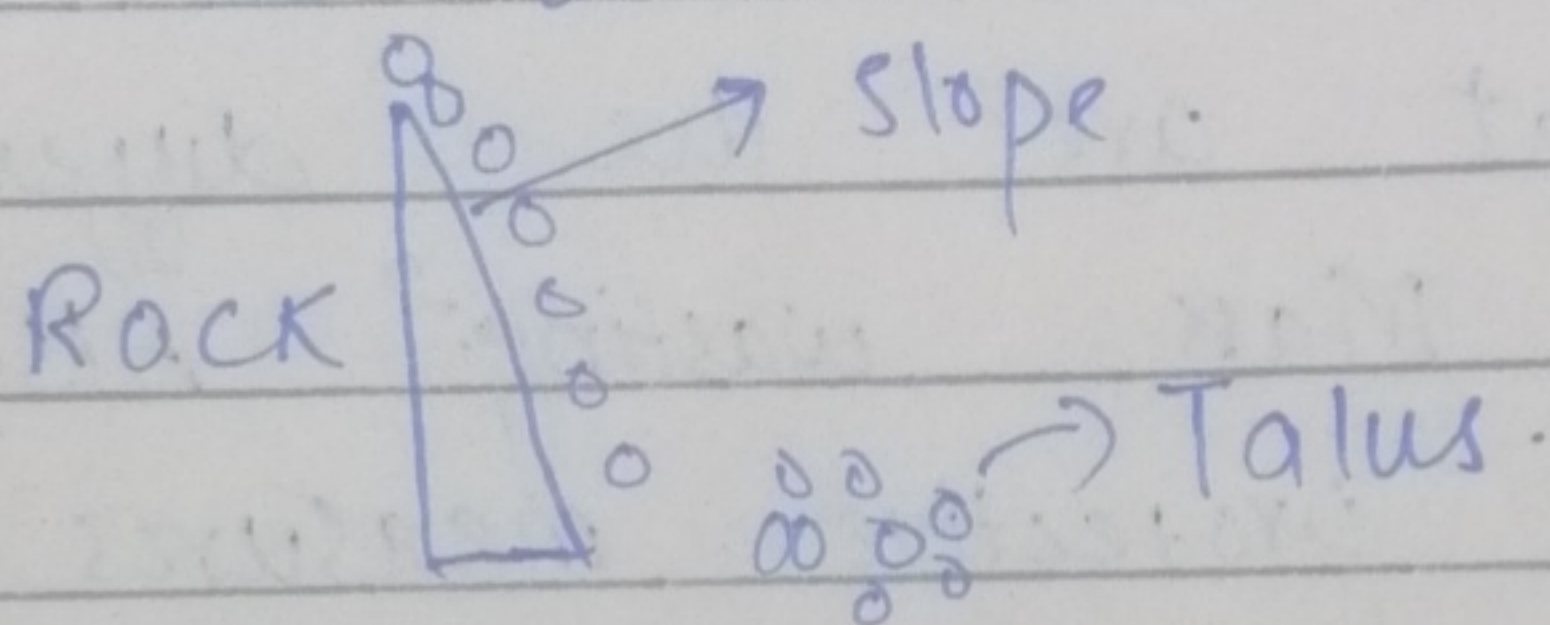
(iii) permafrost.



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(i) Rock and Debris Fall :-> it is

a type of mass wasting in which rock & debris fall on a slope under the influence of gravity. At the base the fallen material is termed as Talus.



(ii) Flow :->

Flow is also the type of mass wasting that involves the movement of material down a slope in the form of liquid. When material on a slope becomes saturated with water, making it much heavier, it may develop into a debris flow or mud flow.

The flow of material, a slurry of rock & mud, may pick up trees, cars, & even houses. The



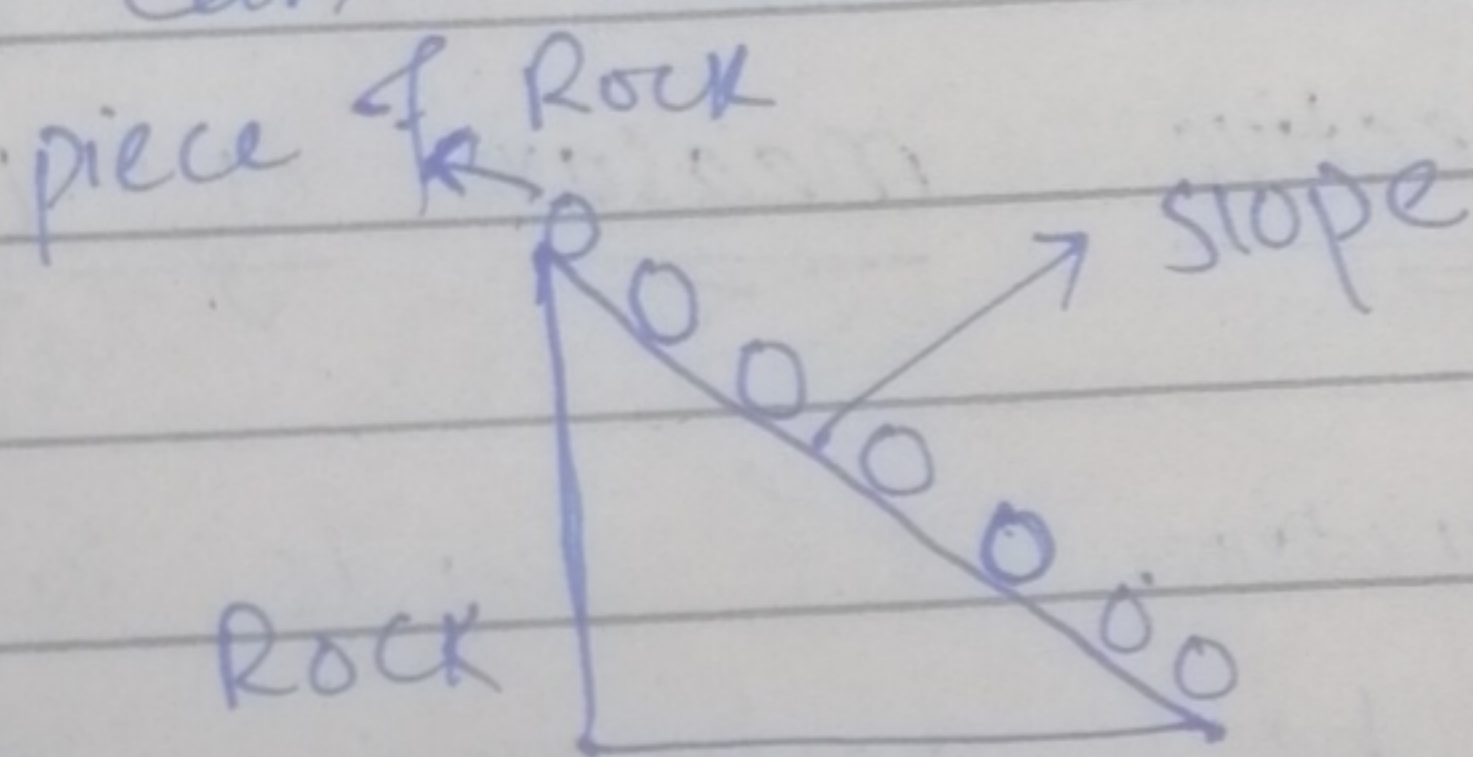
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The debris flow can often block streams causing flooding as their path is diverted.

A good example of a flow landslide is Glen ogle, Stirlingshire etc.

(iii) Rock & Debris Slides →

it is also a type of mass wasting in which rock & debris can slide on the slope.



The piece of rock can slide on the slope.

If the rock is weathered than the ~~particled~~ pieces of rock become loose B/c of these reason the pieces of rock slides on the slope due Gravity.

(iv) Slumps →

it is also a type of mass wasting that occurs



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when a coherent mass of loosely consolidated material or a rock layer moves a short distance down a slope. Movement is characterized by sliding along a concave upward or planar surface. Causes of slumping includes earthquakes & shocks, thorough wetting, freezing & thawing, & loading of slope.

Protective measure of landslide →

- ① Construction of roads & dams should be restricted to fragile areas.
- ② reduce the slope angles.
- ③ people should be aware of the cause of the landslide.
- ④ Reinforcement of floors slabs & external wall in existing buildings.
- ⑤ Installation of drainage pipes for rainwater, slope drainage.
- ⑥ The use of slopes prone to landslide must be avoided, or uses



Suitable modified.

(7) Hydraulic & electrical connections must be flexible.

(8) planting of slopes that are vulnerable to landslide with deep-rooted trees & shrubs.

Q No. 4

Differentiate fault, joint & fold?

(a) what do the normal fault do to the crust of the earth.

(b) ~~to~~ Folds develops in which

Type of Rock.

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

(d) where is the 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 built on

all the three.

Ans

Fault → when fracture & displacement is occurred in rock strata.



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that it is called fault.

(2) joint :- →

A fracture is a crack in the rock without any displacement than it is called joints.

(3) Fold :- →

In structural geology, a fold occurs when one or a stack of originally flat & planar surface, such as sedimentary strata, are bent or curved as a result of permanent deformation.

Synsedimentary fold are ~~that~~ those due to slumping of sedimentary material before it is lithified.

Q. No. 4 (a) what do normal fault to the crust of the earth.

Ans A normal fault is a fault in which the hanging wall moves down relative to the foot wall.

A normal fault is a result of the earth crust spreading apart. this often occurs at plate boundaries.



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But it can happen at faults in the middle of plates also.

Q.No4 (b)  
Folds develops in which Type of Rock?

Ans. Folds is occurs in the following Rocks.

(i) Sedimentary Rocks (ii) Metamorphic rocks.

Q.No4 (c)  
What is the effect of faulting on outcrop?

Ans. Explanation → In Dip fault which occurs parallel to the dip of the outcrop, the most prominent effect observed after faulting & erosion of the upthrown block is a horizontal shift b/w the two parts of the outcrop.

Q.No4 (d)  
Where should a site for a civil engineering project be located?

Ans. on fold strata But also possible on all scenarios.



Q NOS

Describe tunnelling on the Basis of geology? Also determine geological Investigation for tunnels?

Ans.

A tunnels is an underground passageway, dug through the surrounding soil or earth & enclosed except for the entrance & exist, commonly at each end. A pipeline is not a tunnel, through some recent tunnels have used immersed tube construction techniques rather than traditional tunnel boring methods.

OR.

The underground routes or passage driven to the ground without disturbing the overlying soil or rock cover.

Geological Investigation for tunnels :->

(1) Selection of tunnel Route (Alignment) :-  
 There might be available many alternative



Alignment that could connect two points through a tunnel. However, the final choice would be greatly dependent on the geological constitution along & around different alternatives. The alignment have least geologically negative factors would be the obvious choice.

## 2 Selection of Excavation Methods →

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



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of geological investigation.

Selection of Design for the Tunnel: →  
the

ultimate dimension and design parameter of a proposed tunnel are controlled, besides other factor, 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. Thus in self supporting & strong rock, either, D-shape or horse shape may be conventionally adopted but these shapes would be practically unsuitable in soft ground or even in weak rock with unequal lateral pressure. In those cases circular outlines may be the first choice.



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## Assessment of Cost & Stability →

These aspects of the tunnelling projects are also closely interlinked with the first three considerations. Since geological investigation will determine the line of actual excavations, the method of excavation and the dimension of excavation, all estimates about the cost of the project would depend on the geological details.

Similarly tunnels ~~deep~~ passing through hard & massive rock even when left unsupported may be regarded as stable. However those passing through difficult grounds, although these might have been massively strengthened by secondary support system, might still collapse or bulge at place or even completely fail, if geological situation is not perceived.



(5) Assessment of environment Hazards → The process of tunnelling, whether through rock or through soft ground, and for whatsoever purpose, involves disturbing the environment of an area in more than one way. The tunnelling methods might involve vibration include induced through blasting or ground cutting & drilling, producing abnormal quantities of dust & last but not the least, interference with water supply system of the nearby areas.

Q No 2

Describe role of geology in selection of sites for dams & reservoirs?

Ans.

Geology plays an important role in the selection of site for dams and reservoirs.



## Role of Geology in <sup>site</sup> dam: → Section for dams: →

Dams are barriers which are constructed across river valleys to store water. They are built mainly to control floods, for irrigating lands, for generating, and for supplying water to industries & cities. A dam that serves more than one purpose is called a "multipurpose dam". Some of the role given below

### • Geological Investigation: →

Following geological character of the area should be investigated for particular site selected for dam - Geology of are comprising of main topographical feature. natural drainage patterns, general characters & structure of rock formation, the trend & type of weathering & erosion of Area.



- Geology of site: i.e. Type of rock of the Area where dam will be built, properties of rock i.e. Chemical Composition, texture and hardness of rocks, porosity & permeability of Rocks.
- Crushing & Shearing Strength of rocks, extent of weathering of rocks.
- Thickness of the bedding planes.
- Zone of ~~fracture~~ fracture and weakness.
- water table in the Area.
- The ideal foundation should be built over a uniform formation.
- The underlying rocks should be strong enough to bear weight of dams and to withstand resultant thrust of pressure of the impounded water and weight of dams itself.
- And Also we ~~doing~~ ~~by~~ preliminary investigation for the selection of site for the dam.



Reservoirs: →

it is that place of the dams in which we store the water.

⇒ The lakes which are created due to construction of dams across rivers, are called reservoirs.

A reservoir may fail either due to excessive leakages or as a result of rapid sedimentation. Therefore, the geological investigation of a reservoir are includes mainly following factors.

- (i) Study of ground conditions.
- (ii) Study of permeability of rocks.
- (iii) Study of rate of sitting.

Ground water Condition: →

The determination of the depth of water table in a reservoir area is very important B/c it controls the leakages of water



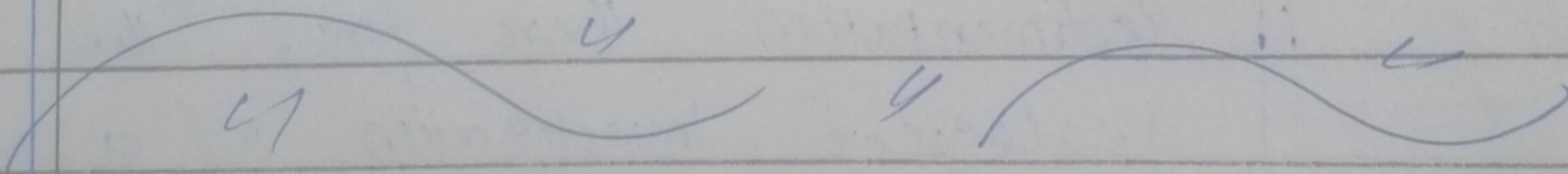
water from the reservoir.

If the water table is so near to ground ~~table~~ surfaces.

that the water level in the reservoir does not rise above

it, no serious loss by leakages will be expected.

And geology plays an important role of the selection of sites for Reservoir.



the end