

SYED JAWWAD

7386

GEOLOGY

SECTION - A

Question 1

①

- Earthquakes =

When the crust of Earth is shaking, it is known as an earthquake. Its intensity varies depending on Richter scale, also energy is released known as seismic energy.

- Causes of Earthquake =

Earth consists of tectonic plates beneath. They are always moving. Sometimes tectonic plates collide or rub against each other. There are chances that their ridges get stuck because of friction held by gliding of plates. When friction is over by the stress on ridges, an earthquake happens. The reason we feel the shaking of earthquake is because of seismic energy.

- Consequences of Richter magnitude at 8 or above: If the Richter magnitude reaches at 8 or above, the consequences will be that maximum destruction would take place especially of infrastructures like houses, buildings, flyovers etc

Richter magnitude Scale: It gives us information^② about the intensity of Earthquaking by measuring the amount of seismic energy is produced or released.

8 Richter magnitude is the highest. It can ruin a place, and the damage can also be unbearable.

Primary Waves

- It is also known as wave P.
- It is a kind of body wave.

- They shake the ground back and forth.

- They travel faster than S waves.

- It is the first or primary wave we will feel on earthquake.

- P waves are smaller as compared to S waves.

Secondary Waves

It is also known as S wave. It is also a kind of body wave.

They shake the ground vertically and horizontally.

They travel slower than P. waves, (approximately 1.7 times).

It is the second wave we will feel on earthquake.

S waves are bigger.

Question No. 2

(3)

The role of geology in selection of sites for dams and reservoirs are; Firstly we keep the four important aspects in our mind are:-

1. Topography
2. Technical
3. Construction
4. Human Welfare.

• Human Welfare:- Geologist doesn't keep ^{only} the geology on mind, while selecting a site they are also conscious about human welfare.

If the site becomes a failure or is being destroyed or is destructed, people should be ~~have~~ less effected, by it.

• Constructionally:- If the materials which are used for the construction of site are farther, it would increase the price of the project. It will happen because the materials turn out be unavailable, or not easily reached or available.

* Technically:- The most important technical factors include: ~~stability, strength and~~

- impermeability
- strength
- stability

• Impermeability:- The more the impermeable site is the more it is better for storing of goods or inventories.

• Strength: The more strength the site has in terms of its rocks especially, the more it is manageable for the architect or respective people involved.

• Stability: It is the most important factor because the more the stable site is the more it will be able to endure failures or seismic shocks etc.

* Topographically:- This is the most important factor. The selected place should be qualified or appropriate for construction.

On a standard level it is necessary that the quantity of water should be easily stored in the reservoir which creates the upstream. For this purpose the area available should be small and narrow with enough storage of stored water. (5)

Location of spillway:- Spillways are made to pass flow of floods if the gorge of the river is narrow there might not be more width to make a spillway. Therefore, a new location has to be found.

River Diversion:- To make way for construction of dam and any changes in construction schedule, river diversion should be made at a particular side.

Sedimentation:- To know the rate at which the reservoir gets filled up with water, the average quantity of sediment carried by the river should be known.

Question No. 3

(6)

Mass Wasting:- It is a process which happens under the action of gravity.

In this rocks, regolith, soil or sand etc ^{move} downslope as mass.

Types of Mass Wasting:-

They are basically divided into two types

1. Fast movements
2. Slow Movements:-

Fast movements:- As the name includes that the mass wasting/movement activity would be fast. It includes.

- Rock and Debris fall and Slides.
- Flow
- Slumps

Slow Movements:- It aware about the slow mass movement. It includes:-

- Creep
- Solifluction
- Permafrost

Fast Movement:-

(7)

- ① Flow:- It awakes about the flow of substances like soil or regolith, which happens due to involvement of immense water.
- ② Slumps:- It comes in the category of slides. It happens because of oversteepening, in this the substance such that rock moves in a downward way specifically rotationally also in collaboration with a curved surface.
- ③ Rock and Debris fall:- The names tells vividly about the fall of rock pieces and debris which is a blend of soil, rocks and regolith, moving down the slope.
- ④ Rock and Debris Slides:- This indicates about the activity of rocks and debris where they slide down of the ^{already} formed surface. In this case there is a proper surface and orientation.

~~Down~~ Slow Movement:-

- ① Creep:- It awakes about the slow movement of substances like soil and regolith in a downhill manner.

② Solifluctation:- It talks about the gradual movement of saturated soil or other substances downslope. It occurs yearly or daily per centimeters or millimeters. ⑧

③ Permafrost:- In this a part of the earth is frozen, it slowly landslide due to melting.

* Protective Measures of landslide:-

By taking protective measures we can reduce landslides, which are:-

1. Use of Rock Bolts.
2. Formation of Walls.
3. Terracing
4. Vegetation or Revegetation
5. Drainage of water.

①. Use of Rock Bolts:- By using rock bolts we can work on stabilization of coherent masses. ⑨

②. Formation of Walls:- By making strong walls, we can control debris or regolith.

③. Terracing:- It's a beneficial way of lessening burden on slope. It also impacts the slope angle. It helps in dealing with debris. The mass on the slope is shared equally by steps.

④. Vegetation or Revegetation:- We can control or prevent landslides before if we focus on vegetation. If landslides happen on an area, we should opt for revegetation especially of deep roots plants. They help in stabilization of a plane who is in risk or prone to failure.

⑤. Drainage of water:- If we would own the drainage of water from slopes. It would highly impact on reduction of landslides.

Question No. 4

(10)

Fault

When a rocked layer or ground have breaks or fractures and it has also moved away or displaced from its place. It is called Fault

Joint

When ground have breaks or fractures but still it hasn't moved from its place is called a joint.

Fold

When a force exerts compressional pressure on the layer. The layers strains in a downward and upward way. It is called folds.

Question No. 4(a)

The causes that the normal faults do to Earth's crust are that firstly hanging walls move down compared to footwall. Also grabens known as down blocks and horsts known as up block are formed in a series. There are also chances of formation of half grabens. They are relying on a fault from one side.

Question No. 4(b)

(11)

Ans:- Folds can develop in any type of rocks. It can be on sedimentary (especially), igneous and metamorphic. And any type of folds can occur. They might be anticline or syncline etc.

Question No. 4(c)

Ans:- The effect of faulting on outcrop is that the rocked layer or ground is lifted up, repetitions in ground might also take place, in a specific orientation and displacement. There would also be change in the continuation of ground. Some places or areas in ground would also be left out.

Question No. 4(d)

A site for a civil engineering project should be located.

1. On a faulted zone:- Civil Engineering structures may collapse due to earthquakes faults are associate with them. If faulting

is active, the place is unstable. Also (12)
faulting properties involves recurrence.

Also they are not safe hence they zone becomes
b, on a faulted strata:- unfit foundation sites.

The competence of rocks is reduced
because of the fault on strata. There
are chances of landslides etc. So it is
unqualified location or site.

c, On a joint:- If an improvement in the
site is done, then this place can be
qualified for the building of a
civil engineering structure.

d, Must be avoided to possible extent to be
built on all three:- It is better not to
built civil engineering structures or
projects because they are dangerous
locations.

Tunneling: Tunnels are part of communication, they come in the category of routes. Tunnels highlighting factor is that they are underground ways. They are also enclosed except the entrance and exist. It also doesn't disturb the rest scenery which consists of soils, rocks etc.

This is how geology describes tunnels. Also there are many types of tunnel and they are quite beneficial for human race.

Geological Investigation for tunnels:-

This is how we determine geological investigations for tunnels:-

- Selection of tunnel route (alignment):-

There could be a lot of alternative alignments connecting two points to form a tunnel but obviously the alignment

with least negative factors would be chosen. (14)

- Selection of Excavation Method:-

Tunneling is expensive, until and unless proper plan to for less ~~plan~~ cost is executed and the plan depends upon the type of rocks used. The right choice will be made if the nature of rocks and its alignment is fully known. This is one of the most important goal of geological investigation.

- Selection of Design for tunnel:-

The design of the tunnel is decided under the geological constitution where the decision is made if the tunnel is to be made circular, D-shaped, horse-shoe shaped or rectangular or its combination. D-shaped or Horse shoe shaped is may be adopted but not suitable for soft ground or weak rocks.

- Assessment of cost and stability:-
This aspect of the tunnel project is also crucial, as compared to the above mentioned considerations. This decides the cost of project and the geological details.
- Assessment of Environmental Hazards:-
The process of tunneling requires an area which is distributed through different ways. Cutting, drilling, blasting of ground causes pollution especially dust or may interfere with water supply.