

Day: M.T.W.T.F.S

Date: ___/___/___

Final term Paper
(Summer)

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Subject # Engineering Geology

Submitted to # Engr. Adeed Khan

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Q No 01

a) Define :

Focus :

The place of origin of an earthquake with the earth crust is called focus.

Epicentre :

The area lying vertically above on the ground surface over the focus is called epicentre.

Earthquake Intensity :

It is a measure of the degree of destruction caused by an earthquake. Then it is called Earthquake Intensity.

Seismograph :

The instrument used to record the earthquake vibration is called Seismograph.

Seismo gram ₃

The vibrations detected by Seismo gram are commonly recorded on a photographic paper as a series of zigzag lines. These records are called Seismo gram.

(b) Explain the classification of earthquake according to their mode of origin?

Ans Classification of earthquake
 Earthquake may be classified according to their mode of origin as follows.

(i) Earthquakes due to surface causes:

Earthquake may be generated by landslips and collapse of the roof of underground caverns.

(ii) Earthquake due to volcanic cause :-

Volcanic eruptions may also produce earthquakes but such earthquakes are generally very

Feeble.

(ii) Earthquakes due to Tectonic causes :-

Tectonic earthquakes are the most ~~are~~ numerous and usually the most disastrous. They are caused by shocks which originate in the earth due to sudden movements along faults. On the basis of the depth of focus earthquakes are divided into following groups.

1. Shallow Earthquakes:-

When the focus lies up to the depth of 60 Km.

2. Intermediate Earthquake:-

When the focus lies between the depth of 60 to 200 Km.

3. Deep Earthquake:-

When the focus lies below the depth of 300 Km. The deepest focus ever recorded was 650 Km.

(C) Differentiate between

(1) S-wave or Secondary waves:

These are transverse in nature and their velocity is less than P-waves. The S-waves do not pass through the fluids.

* Shear waves - move material perpendicular to wave movement.

* travel through solids only.

(2) P-waves or Primary waves.

These are longitudinal in nature and travel with very velocity. The P-waves can be transmitted through solids as well as fluids.

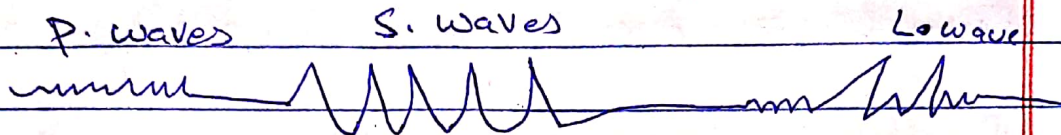
* Fastest waves.

* Compressional wave, material movement is in the same direction as wave movement.

(3) L-waves or Long waves:

These travel along the earth's surface and cause earthquakes. They are transverse in nature and their velocity is much

less than the P and S waves - The L waves are believed to be produced by reflection and refraction of P and S waves at the earth's surface



Q No (02)

a) Explain modified mercalli scale?

Ans Modified mercalli scale:

Intensity	Acceleration Produced (cm/sec/sec)	Effects.
Instrumental	less than 1cm	Recorded by instruments only.
Very feeble	over 1 cm	Noted only by a few people at rest.
Feeble	over 2.5cm	Felt by people at rest.
Moderate	over 5cm	Felt by people in motion.
Fairly strong	over 10cm	wakes persons breaks dishes, rings bells.

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Strong	over 25 cm	slight damage to buildings.
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very strong	over 50 cm	Produce cracks in the walls.
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Destructive	over 100 cm	chimneys fall
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Ruinous	over 250 cm	Damage well designed buildings pipes break.
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Disastrous	over 500 cm	Many building destroyed
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very Disastrous	over 750 cm	Few structures left standing.
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Catastrophic	over 950 cm	Total destruction.
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(b) Define volcano, volcanic cones and Explain the type of volcano?

Ans Volcano:

A volcano is a vent or fissure in the earth's crust through which hot lava and volcanic gases are thrown out. The volcanic eruptions may be either explosive or quiet.

Volcanic Cones:

Due to accumulation of volcanic materials around a volcanic pipe, conical hill like masses are formed which are called "volcanic cones" which are three types of volcanic cones.

(*) Cinder cones:

These are steep sided volcanic cones which are built of loose fragmentary materials mostly cinder. Cinder cones are usually very symmetrical and have circular craters.

* Lava cones:

Lava cones are flatter than cinder cones

They are composed of solidified lava flows. Volcanoes having such type of cones are called "Shielded volcanoes".

★ Composite cones:

These cones are composed of partly of Pyroclastic material and partly of solidified lava. Volcanoes which possess such well marked stratification are called strato-volcanoes.

Types of Volcano:

A volcano may be either active, dormant or extinct.

1 Active volcano:

It erupts very often.

(2) Dormant volcano:

It shows eruptions with the lapse of considerable period.

(3) Extinct volcano:

An extinct volcano is that which has not shown any volcanic activity since a very long time in the geological history.

Q No (03)

(a) Explain occurrence of ground water in detail. ?

Ans Below the earth's surface the ground water occurs in three zones.

- (1) Zone of aeration
- (2) Capillary Belt
- (3) Zone of saturation

(1) Zone of Aeration:

The zone of aeration extends from the ground surface down upto the capillary belt. In this zone the opening of the rock contain both air and water. The rain water moving vertically downwards to the zone of ~~the~~ saturation, losses through this zone. All

The water which exists in the zone of aeration is called suspended water or vadose water.

(2) Capillary Belt:

The position of the capillary belt is in between the zone of aeration and the zone of saturation.

The water in this belt is connected with the zone of saturation and is raised above it by capillary forces.

In coarse grained soils the capillary belt only a few centimeters above the water table, but in fine grained soils or clays it may reach a height of 10 to 15 meters.

(3) Zone of Saturation:

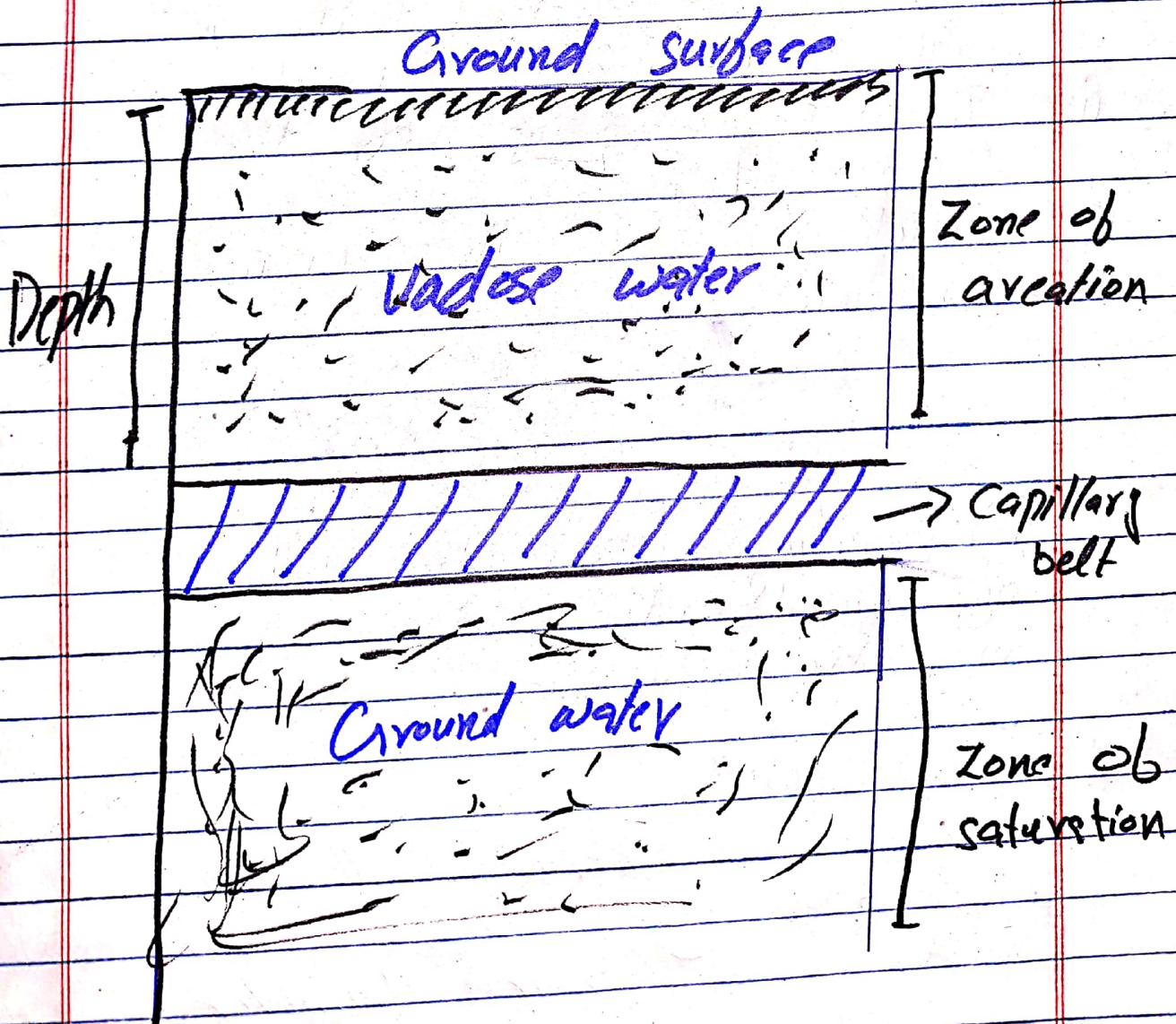
This zone extends from the water table downward.

In this zone all the openings present in the rocks are saturated with water. As the openings in the rocks decrease with depth, the lower limit of the zone

Zone of saturation is commonly found within a few hundred meter of the earth's surface.

Water table

The upper surface of the zone of saturation is called water table.



(b) Define wells and list down types of wells?

Ans Wells..

A well is a vertical hole or shaft which is excavated in the earth's surface for extracting ground water. The water that a well will yield depend on

- (i) The permeability of the aquifer.
- (ii) Thickness of the aquifer.
- (iii) Diameter of well.

types of wells

Depending upon the method of construction the wells may be classified as:

1 Dug wells..

These well are excavated by means of picks and their diameter is usually more than one meter. Dug wells exceed a depth of 20 meter.

(2) Driven wells:

The wells in the unconsolidated materials may be constructed by driving a pipe at the end of which there is a drive point. The diameter of such wells exceeds seven centimeters.

(3) Bored wells:

The bored wells are constructed in the unconsolidated materials by means of hand or power augers.

(4) Jetted wells:

These wells are excavated in the loose earth materials by the force of the jet of water which is produced by pumping water through hollows & drill rods.

(5) Drilled wells:

The water from consolidated aquifer is extracted by drilling deep wells. These wells may be constructed either by

hydraulic rotary drill methods. The drilled wells may attain a depth of 70 meter or more.

Q No 04

g) Explain terminology of ~~found~~ a dam along with figure?

Ans Heel of a Dam:

The portion of a dam that touches the ground on the ~~up~~^{up} stream side is called the Heel of a dam.

Toe of a Dam:

The portion of a dam that touches the ground on the downstream side is called the toe of a Dam.

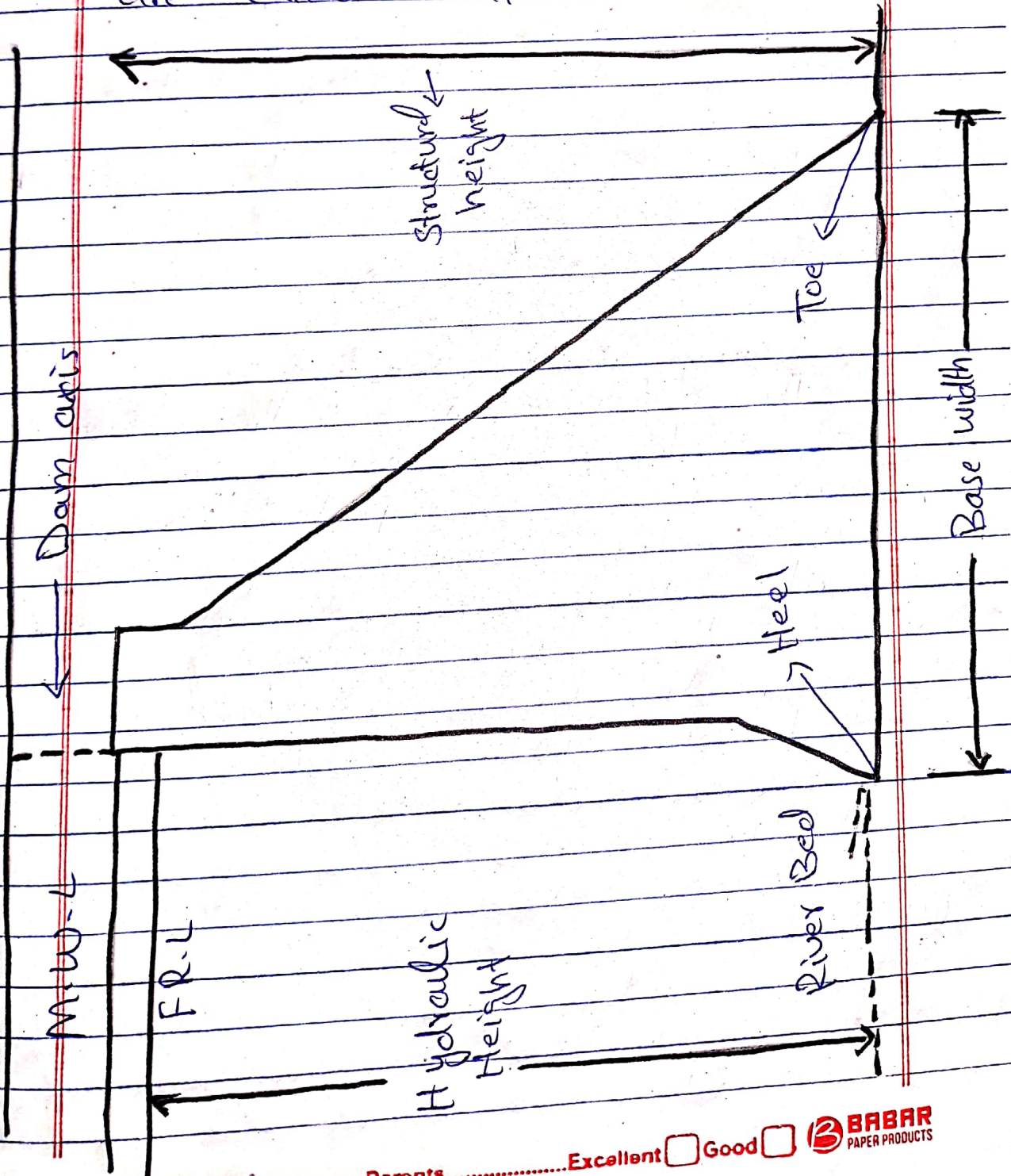
Axis of a Dam:

it is an imaginary line that passes along the length of a dam through

its centre.

Abutments:

The sloping sides of a valley upon which the sides of a dam are keyed are called abutment.



(b) Describe the factors which are included in geotechnical investigation of reservoir?

Ans The geological investigation of a reservoir are includes mainly the following factors.

- (1) Study of ground water conditions
- (2) Study of permeability of rock
- (3) Study of rate of silting.

(i) Ground water conditions:

The determination of the depth of water table in a reservoir area is very important because it controls the leakage of water from the reservoir.

(i) If the water table is so near the ground surface, that the water level in the reservoir does not rise above it, no serious loss by leakage will be expected.

(ii) If the water table lies deep below the ground surface the water level in the reservoir will stand above it. As a

a result leakage will occur and its amount will depend on the permeability of rocks.

(ii) Permeability of Rocks :-

The investigation is carried out to locate the highly permeable rocks that are present in the reservoir area -

(i) The rocks which are highly fissured, jointed, faulted or have solution channels are likely to cause serious leakage from the reservoir.

(ii) Generally the leakage of water from the strata that have down stream dip, will be more than those which have upstream dip.

(iii) If a permeable rock on the valley slope in the reservoir, it may not only cause leakage but may also cause landslides. Such a landslide may produce an opening in the reservoir through which the stored water may escape.

Q No 5

a) Define landslides and explain how to prevent the land sliding ::?

Ans Landslides::

A landslide is the movement of rock, earth, or debris down a sloped section of land. Landslides are caused by rain, earthquakes, volcanoes, or other factor that make the slope unstable.

There are also various direct methods of preventing landslides:

these include modifying slope geometry, using chemical agent to reinforce slope material, installing structure such as piles and retaining walls grouting rocks joints and fissures, diverting debris pathways and rerouting surface and under water drainage.

(b) What is glaciers and movement of glaciers?

Ans Glaciers;

Glaciers are found chiefly in high latitudes as in the Arctic region or at high elevations as on the Himalayan mount, above the snow line. The snow line is the lower limit of accumulating snow. Below the snow line the snow melts in summers. In the Himalayas the snow line lies at altitudes varying between 4200 to 5700 meter.

* The glaciers are the rivers of ice which move over the ground under the influence of gravity. Most of glaciers move at the rate of a few meter per day.

Movement of Glaciers:

The glaciers move partly by plastic flow and partly by shear movements. In the high gradient valleys a

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a mountain glaciers flows down the slope much like stream of water under gravity, but in basin shaped, flat or upload areas where the ice can not move under gravity, the glaciers move as a result of differential pressure with in the ice mass. The first types of movement is called the gravity flow and the second extrusion flow. A mountain glaciers may have gravity flow in one part of its course, and extrusion flow in another, depending upon the irregularities present in the path.