Geoinformatics in Earth Science, Tectonic Hazard and Infrastructure Management

Test No 1

Time: 2 **Full Marks: 32**

Name: **Course:** **SID:**

Answer all short type of questions

1. List down four main branches of Earth Science and briefly discuss each.

1. geology (study of the Earth's solid materials),
2. meteorology (study of the atmosphere and weather),
3. oceanography (study of the oceans and marine environments),
4. astronomy (study of celestial bodies beyond Earth).

(7 marks)

2. In your own words differentiate between Environmental Science and Earth Science

Earth Science

- Earth science, also known as geoscience, is the study of the Earth's physical components and processes.
- It examines the Earth's structure, materials, and the dynamic processes that shape its surface and interior.

Environmental Science

- Environmental science is primarily concerned with the study of the;
- interactions between living organisms (including humans) and their environment,
- Study of Ecosystem and Biodiversity
- Human Health

(4 marks)

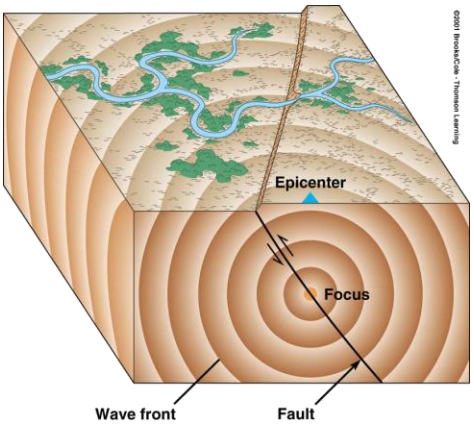
3. Discuss in few sentence how natural phenomena like earthquake or landslide seen to be hazardous event and to be a disastrous event.

✓ Any **physical event,** such as a volcanic eruption, that does not affect human beings is a **natural phenomenon** but not a natural hazard.
✓ A natural phenomenon that occurs in a populated area is a **hazardous event.**
✓ A hazardous event that causes unacceptably large numbers of fatalities and/or overwhelming property damage is a **natural disaster.**

(3 marks)

4. Discuss and differentiate with clear diagram the focus and the epicenter of the earthquake.

The focus or hypocenter of the earthquake is the place where energy is release.
The focus is underground measured as earthquake depth
The point directly above the focus on the surface is the epicenter



(4 marks)

5. Once the earthquake strikes, it releases energy in the form of seismic waves. The seismic waves propagates through site soil-geology.

With respect to degree of damage the particular earthquake can cause, briefly discuss in your own understanding with diagram the relationship between the seismic waves and site–soil geology.

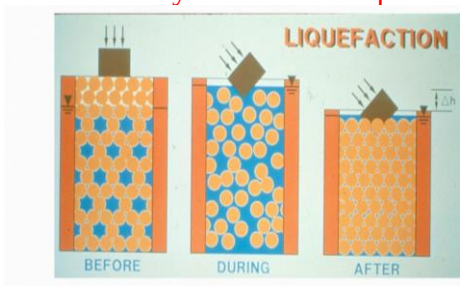
Once the earthquake strikes, the energy is release. The waves propagates through site-soil / geology and towards surface. Once the seismic waves come across non-consolidated site soil / geology the wave amplifies giving more changes for severe destruction to occur. However when waves propagates through consolidated site soil/geology the wave amplification reduces giving changes for minor to no damage to the infrastructures or environmental around.

(6 marks)

6. Discuss in your own words with the help of diagram what is liquefaction and how liquefaction occurs during Earthquake.

Liquefaction is more likely to occur in loose to moderately saturated granular soils with <u>poor drainage</u>, such as silty sands or sands and gravels that are capped or contain seams of impermeable sediments

- **Liquefaction occurs** in saturated soils, that is, soil in which the space between individual particles is completely filled with water.
- The water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together.
- Water Pressure was low at First.
- Earthquake shaking cause the water pressure to increase to the point where the soil particles can readily move with respect to other.



(5 marks)

7. Discuss any two (2) types of task that can be done with the help of GIS to assist communities during disaster Relief planning.

- Rapid identification of potential shelter/housing locations (schools, libraries, churches, public buildings) appropriate for supporting affected populations.
- Determine how many tents will be needed based on the location of populations affected by the disaster.
- Analyze areas where large numbers of refugees can establish camps out of harm's way that are accessible for supply delivery and have access to water and other resources necessary to support large numbers of people.

(3 marks)