Geoinformatics in Earth Science, Tectonic Hazard and Infrastructure Management

Test No 2

Time: 2 hrs **Full Marks: 30**

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

Answer all short type of questions

1. Briefly discuss the three (3) listed below;

    a. Weather

- **In essence, weather refers to the day-to-day variations in atmospheric conditions,**

- Short-term atmospheric conditions.
- Typically observed over a relatively short period (hours to days).
- Involves variables such as temperature, humidity, precipitation, wind speed, and atmospheric pressure.
- Can change rapidly and is subject to day-to-day fluctuations.
- Describes the current state of the atmosphere at a specific location and time.

    b. Climate

Climate represents the long-term average and trends in these conditions over a more extended period.

- Long-term patterns of weather over an extended period (typically 30 years or more).
- Represents the average of weather conditions over a specific region and time frame.
- Characterized by parameters like average temperature, annual rainfall, and seasonal variations.
- Changes in climate occur slowly over a longer time scale (decades to centuries).

    c. Climate Change

- Climate change can be seen as the changes in weather pattern /climate variance over a long period of time and is cause by either natural or human made processes and activities.

(6 marks)

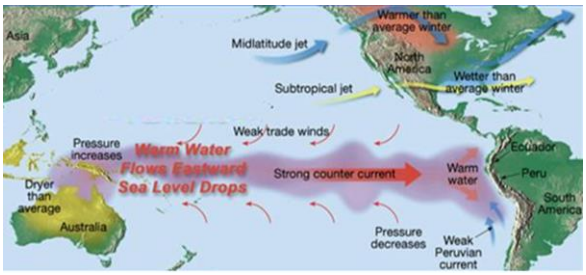
2. Discuss in your own words how you understand El-nino, La-nina weather patterns and how does it occur. Provide diagrams to assist your discussions.

- El Niño and La Niña events are a natural part of the global climate system.
- They occur when the Pacific Ocean and the atmosphere above it change from their neutral ('normal').
- El Niño events are associated with a warming of the central and eastern tropical Pacific, while La Niña events are the reverse, with a sustained cooling of these same areas.

Note: as the reversal happens, one side experiencing higher rainfall and flooding and the other side experience dry and drought

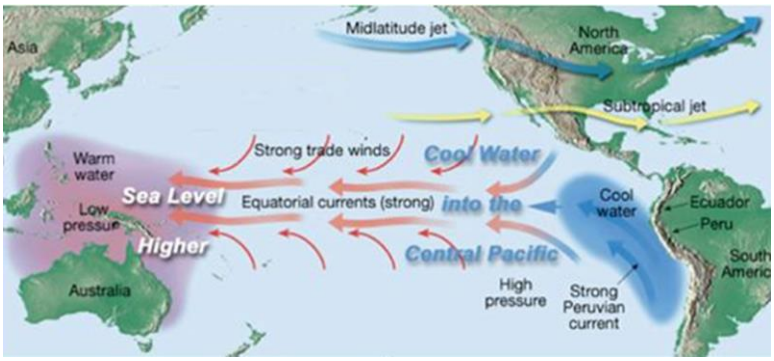
EL-nino

- Weak trade winds and weak upwelling cause warm water off the coast of S. America
- PNG/indonesia Experiencing Drought



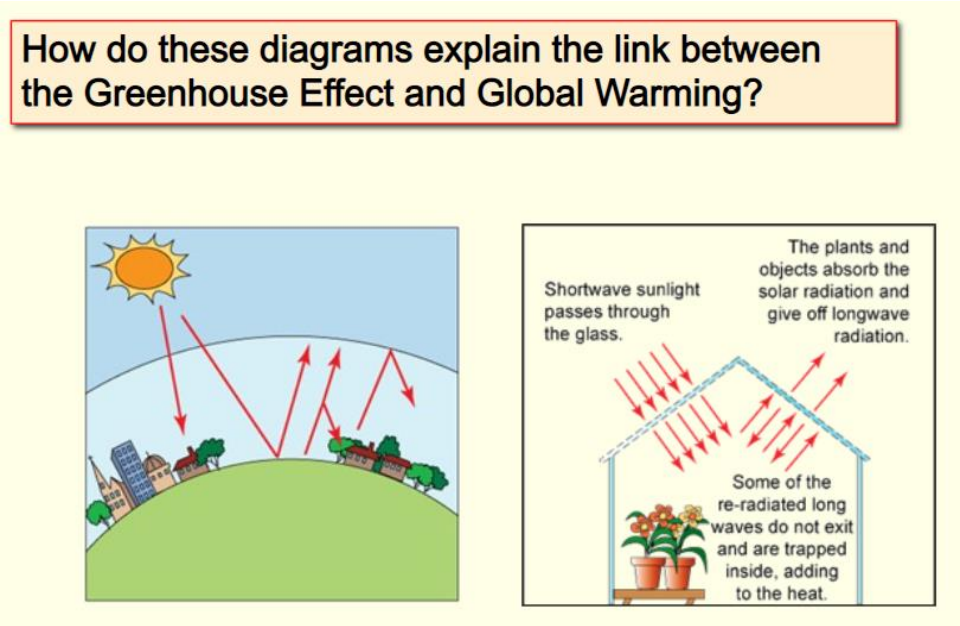
La Nino

- Strong trade winds blow surface water towards east, creating colder surface temperatures off South American coast.
- PNG/Indonesia Experience heavy and continuous rainfall



(5 marks)

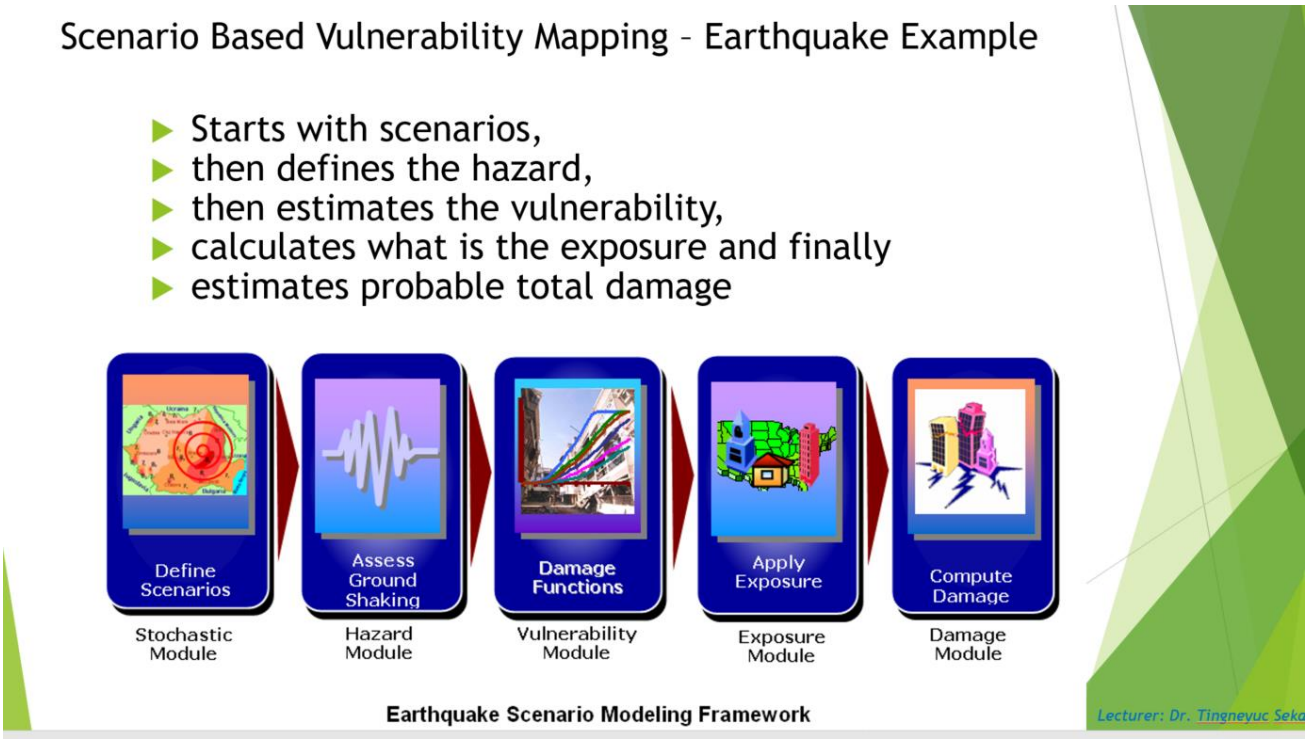
3. In your own understanding, fully discuss with diagram how global warming occurs that leads to climate change and its impact.



Human beings continually emit more greenhouse gases into the atmosphere, exacerbating the existing levels and contributing to the warming of the Earth's surface. Adequate warming of the Earth is beneficial for all living organisms, as it supports growth and survival. However, the increased production and release of greenhouse gases such as methane, carbon dioxide, nitrous oxide, and chlorofluorocarbons lead to the retention of more solar radiation in the atmosphere. Solar radiation reaches the Earth's surface, only approximately 20-30% manages to escape, while rest are captive and send back to earth, resulting in a maximum warming effect. This phenomenon ultimately leads to climate change, characterized by rising temperatures, alterations in rainfall patterns, the formation of cyclones, and an increase in sea levels

(5 marks)

4. Discuss with diagram the scenario based vulnerability mapping in relation to earthquake.



(5 marks)

5. Define Landslide and how does it occur. Provide diagrams to assist your discussions

Landslide is defined as the movement of a mass of rock, debris
or earth down the slope, when the shear stress exceeds the
shear strength of the material conjunction with Slope Morphology and geotechnical parameters

The occurrence of landslides is the consequence of a complex field of forces (stress is a force per unit area) which is active on a mass of rock or soil on the slope. Basically, the two main.

determinative parameters are:

· An increase of shear stress
· A decrease of material strength

(5 marks)

6. For the planning for road constructions, the least cost path analysis technique can be use. From least cost path analysis, what is cost raster and how is it utilized or integrated to create least cost part?

To identify a least cost path for a new road link, the cost weighted distance function is used. To calculate the least accumulative cost the source and a cost raster is needed by cost distance weight function.

The cost Raster identifies cost of travel to every cell. Weight values assigned to each class level. Higher the weight value, more the cost. Example, steep slope of class 54 degree to 83 degree slope will be assigned higher weightage since it will incur more cost of construction towards steep slope.

(4 marks)