

KATHMANDU UNIVERSITY  
End Semester Examination  
January/February 2024

Level : B.Tech.  
Year : III  
Time : 2 hrs. 30mins.

26 JAN 2024

Course : ENVE 301  
Semester : I  
F. M. : 55

SECTION "C"

[3Q. × 7 = 21 marks]

Attempt *THREE* questions.

1. Describe the role of engineering geology in the planning and design phases of civil engineering projects. Provide specific examples of how geological considerations can impact the construction and stability of structures.
2. Explore the impact of geological hazards, such as landslides, earthquakes, and volcanic activity, on infrastructure projects. How can engineering geologists contribute to risk assessment and mitigation strategies in these contexts?
3. Discuss the importance of site investigations in engineering geology. Outline the methods and techniques used for subsurface exploration, and explain how the data collected influence construction decisions.
4. Elaborate on the geological factors influencing the selection of construction materials. How does the geological composition of an area impact the durability and performance of materials used in infrastructure projects?

SECTION "D"

5. Write note on (*ANY FOUR*) [4 Q. × 4 = 16 marks]
  - a. Rock mass classification
  - b. Darcy's Law
  - c. Preliminary site investigations
  - d. Geological divisions of Nepal
  - e. Highway and Railroad Aggregates
6. Differentiate between (*ANY FOUR*) [4 Q. × 3 = 12 marks]
  - a. Sedimentary and metamorphic rock
  - b. Faults and Folds
  - c. Dip angle and Dip direction
  - d. Anticline and syncline
  - e. Confined and unconfined aquifer
7. Discuss in the following terms (*ANY THREE*) [3 Q. × 2 = 6 marks]
  - a. Safety during the construction
  - b. Braided channel
  - c. Erosion
  - d. Lateral accretion



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Registration No.:

Date :

SECTION "A"

[20Q.  $\times$  0.5 = 10 marks]

Choose and encircle the most appropriate answers from the given choices.

1. What is the primary purpose of engineering geology?  
a. Environmental conservation      b. Geological research  
c. Mineral exploration                d. Solving construction-related issues
2. \_\_\_\_\_ is measured in ohms meter squared per meter of the depth ( $\Omega\text{m}^2/\text{m}$ ) which amounts to ohm times meter, or ohm-meter.  
a. Gravity                                b. Seismic waves      c. Magnetic                                d. Resistivity
3. The study of soil behavior under load is known as:  
a. Soil mechanics      b. Soil dynamics      c. Soil lithology      d. Sedimentation
4. Which geological feature is most likely to cause foundation settlement issues in a building?  
a. Gravel-rich soil      b. Sand-rich soil      c. Clay-rich soil      d. Gravel sand-rich soil
5. An equation by which the discharge (rate of flow) of groundwater can be calculated  
a. Dormi's Law      b. Datsery's Law      c. Darcy's Law      d. Marcy's Law
6. What is the primary purpose of a geological site investigation in engineering projects?  
a. Identifying petroleum reserves      b. Locating minerals  
c. Assessing groundwater quantity      d. Evaluating subsurface conditions
7. Which rock type is often associated with karst topography and the formation of sinkholes?  
a. Granite                                b. Limestone                                c. Sandstone                                d. Shale
8. The angle of repose is the maximum angle at which loose material remains stable on a slope. It is an important factor in:  
a. Landslide prediction                                b. Groundwater flow  
c. Seismic activity                                        d. Soil classification
9. The drilling fluid used for stabilized the bore holes is a  
a. mixture of Bengonite                                b. mixture of Bintonite  
c. mixture of Bentonite                                d. mixture of Benzonite
10. What is the primary concern associated with expansive clay soils in construction projects?  
a. Landslides                                b. Settlement issues      c. Slope stability      d. Erosion



22. Rates of fast spreading plate motion is 100 cm/year. [ ]
23. Increased water content increases melting points of minerals. [ ]
24. Cementation means chemical precipitation of mineral material between grains ( $\text{SiO}_2$ ,  $\text{CaCO}_3$ ,  $\text{Fe}_2\text{O}_3$ ) binds sediment into hard rock. [ ]
25. The Modified Mercalli Intensity (MMI) scale measures the impact of ground shaking during an earthquake. [ ]
26. The angle of repose decreases with increasing grain size. [ ]
27. Rotational slides move along a surface of rupture that is curved and concave. [ ]
28. Capacity is a measure of the total volume of sediment stream can transport under a given set of flow conditions. [ ]
29. Regolith a layer of broken pieces of rock and slightly altered rock that underlies the bedrock. [ ]
30. Stability of rock mass is controlled by the strength of discontinuities. [ ]
31. Bumpy roads resulting from uniform settlement, volume change, junction of cut and fill. [ ]
32. The term "Seismic vibrations" refers to the shaking of the ground during a volcano activities. [ ]
33. Sounding means investigation by penetration of sound in drilling holes. [ ]
34. The process of retrofitting involves reinforcing buildings to withstand the impact of earthquakes. [ ]
35. Hand auger rig is used up to 200 m. [ ]
36. Wave velocities on unsaturated strata 15000 to 30000 ft/sec. [ ]
37. The process of water infiltrating the ground and becoming groundwater is known as recharge. [ ]
38. The focus is the location where an earthquake on the surface of Earth. [ ]
39. The lithosphere is the region of the Earth's interior beneath the asthenosphere, where rock is in a state of partial melting. [ ]
40. Artificial aggregates are materials such as air-cooled blast-furnace slag or fused loess. [ ]

