KATHMANDU UNIVERSITY
End Semester Examination
July/August, 2024

Marks Scored:

Level : B.Sc.
Year : III

Course : ENVE 301
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 07 AUG 2024

SECTION "A"
[20 Q. × 0.5 = 10 marks]

Choose and encircle in the most appropriate option from each set of choices

1. The point or location in Earth where earthquake energy in first released.
   a. Focus b. Epicenter c. Center d. Metacentre

2. What is the primary concern associated with expansive clay soils in construction projects?
   a. Landslides b. Settlement issues c. Slope stability d. Erosion

3. Crust is a part of the _____
   a. asthenosphere b. lithosphere c. Troposphere d. cryosphere

4. Earthquakes less than _____ are not felt by people.
   a. M = 5 b. M = 2 c. M = 6 d. M = 4

5. Bend that develops in stratified rocks because of tectonic force
   a. Joint b. Fault c. Bedding plane d. Fold

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. The study of rocks is known as
   a. Petrology b. Geomorphology c. Hydrology d. Sedimentology

8. The study of soil behavior under load is known as:
   a. Soil mechanics b. Soil dynamics c. Soil lithology d. Sedimentation

9. Property of metamorphic rock characterized by parallel alignment of the platy or elongated mineral grains; environmentally important because it can affect the strength and hydrologic properties of rock.
   a. Schistosity b. Folding c. Foliation d. Bending

10. 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

11. Every feature of _____ investigation in more demanding than traditional foundation engineering projects.
    a. geographic b. geologic c. hydrologic d. seismologic

12. 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

13. Making _____ is for high length slopes to protect from direct impact of water and falling rock fragments.
a. berms b. burns c. booms d. bends

14. Which rock type is often associated with karst topography and the formation of sinkholes?
a. Granite b. Limestone c. Sandstone d. Shale

15. _____ has transversely divided the whole Himalaya Range into five major groups
a. Gansser (1964) b. Gansser (1965) c. Gansser (1966) d. Gansser (1967)

16. Rotary and Percussion Drilling are not generally used in _____ materials.
a. rocky b. sandy or clayey c. muddy and rocky d. bouldery

17. The geologic unit in between Main Boundary Thrust and Main Frontal Thrust is
a. Siwalik b. Midland c. Lesser Himalaya d. Terai

18. 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

19. Refers to unconsolidated, generally rounded fragments of rocks and minerals less than 2mm in diameter.
a. Agglomerate b. Gravel c. Sand d. Conglomerate

20. Which geological process is responsible for the formation of alluvial deposits in river valleys?
a. Erosion b. Deposition c. Weathering d. Compaction

SECTION "B"
[20 Q. × 0.5 = 10 marks]

Mark "T" for true and "F" for false

21. You must need at least four stations to determine the location of an epicenter. [ ]

22. Richter scale is the amount of energy received 100 km from the epicenter. [ ]

23. The outer portion of the Earth is made up of about 50 distinct "plates" (~ 100 km thick), which move relative to each other. [ ]

24. Hand auger rig is used up to 200 m. [ ]

25. The most common procedure of investigation is drill holes and sampling. [ ]

26. Sounding means investigation by penetration of loud sound in the ground. [ ]

27. Resistivity is measured in ohms meter squared per meter of the depth ($\Omega m^2/m$) which amounts to ohm times meter, or ohm-meter. [ ]

28. Sub- Himalaya consists of huge pile of strongly metamorphosed rocks. [ ]

29. Artificial aggregate materials are the air-cooled blast-furnace slag or fused loess. [ ]

30. A major difference between geologists and most other scientists is their concept of rocks. [ ]

31. The angle of repose decreases with increasing grain size. [ ]

32. Rotational slides move along a surface of rupture that is curved and concave. [ ]

33. Trellis drainage pattern represents flat-laying or homogeneous rocks. [ ]

34. Capacity is a measure of the total volume of sediment stream can transport under a given set of flow conditions. [ ]

35. Regolith a layer of broken pieces of rock and slightly altered rock that underlies the bedrock. [ ]

36. Stability of rock mass is controlled by the strength of discontinuities. [ ]

37. Bumpy roads resulting from uniform settlement, volume change, junction of cut and fill. [ ]

38. The term "Seismic vibrations" refers to the shaking of the ground during volcano activities. [ ]

39. Sounding means investigation by penetration of sound in drilling holes. [ ]

40. Richter scale is based on damage and human perception. [ ]

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SECTION "C"
[3 Q. × 7 = 21 marks]

Attempt ANY THREE questions.

1. What is engineering geology? In the context of Nepal, why is it so important in infrastructure projects? Please express your opinions precisely. [1+3+3]

2. What are folds and faults? Please describe their significance in engineering projects. [2+5]

3. If you had one highway construction project (50 km), how would you explore construction materials? Explain your steps and methods.

4. How do geological conditions impact the overall budget of the project? Express your ideas.

SECTION "D"
[34 marks]

5. Write note on (***ANY FOUR***) [4 Q. × 4 = 16 marks]
   a. Geology of Nepal
   b. Groundwater contamination
   c. Landslide hazards mitigation
   d. Seismic waves
   e. Types of aquifers

6. Differentiate between (***ANY FOUR***) [4 Q. × 3 = 12 marks]
   a. Debris avalanche and Debris slide
   b. Faults and Joints
   c. Chemical weathering and Physical weathering
   d. MFT and MBT
   e. Sedimentary rock and Metamorphic rock

7. Give precise meaning or definition (***ANY THREE***) [3 Q. × 2 = 6 marks]
   a. Angle of repose
   b. MCT
   c. Minerals
   d. Types of River Channel Patterns