Ref. No.: Ex/CE/5/Geo/T/103/2023

B. E. CIVIL ENGG. (EVENING) 1st YEAR 1st SEM. Examination, 2023

Subject: ENGINEERING GEOLOGY. **Time: 3 Hours.** **Full Marks: 100**

Answer Question No. 1 and any Five (5) from the rest: **{20+ (5 x 16)} = 100**

1. **Write "True" or "False" :** **1 x 20 = 20**

i) Granite is a metamorphic rock.
ii) R-wave can only pass through the Interior of Earth.
iii) Anti-form is the fold which closes downward.
iv) Topaz is harder than Calcite.
v) 8-Fold axis of symmetry exists in nature.
vi) Net-slip is measured along Dip direction in oblique-slip fault.
vii) The crust-mantle boundary is demarcated by "Moho-discontinuity".
viii) Petrology deals with study of Petroleum.
ix) "m" symmetry is equivalent to 2-Fold roto-inversion-symmetry.
x) Crest is highest point of any folded layer.
xi) Dip is the angle between inclined and horizontal planes.
xii) Trigonal System consists of three crystallographic axes.
xiii) Joint and fracture planes are equivalent in mineral.
xiv) Aquifers are porous and non-permeable medium.
xv) "Ground Water Table" must be saturated with surface water.
xvi) S-waves propagate along the outer surface of earth.
xvii) Calcite naturally shows three sets of perfect cleavage.
xviii) In monoclinic system, $a = b = c$ and $\alpha \neq \beta \neq \gamma$.
xix) Effluent rivers recharge the ground water.
xx) Streak is colour of powder of any mineral.

2. a) Discuss about the Structure of the Earth's Interior, with neat sketch using Depth vs. Velocity diagram of seismic waves. 10

b) Describe the behaviours of different seismic waves. 6

3. a) Discuss the different physical properties by which you can identify minerals in nature. 10

b) Define crystal symmetry. Discuss the Hexagonal System on the basis of their axial ratios and inter-axial angle with suitable sketch. 6

4. a) Attempt a Classification of Fold on the Basis of Dip isogons. Draw neat sketches of these folds. What is neutral fold? 8

b) Define Normal Fault. How do you identify a faulted structure in vertical rock section? Draw neat sketches of strike - slip fault. 8

5. a) What are Dam and Reservoir? What are the Geological factors that should be taken care of during construction of a safe and stable dam? Explain with diagrams. 8

   b) Discuss with neat sketches about the orientation of basement rocks for a safe and stable Dam. 8

6. a) Define igneous rock. What are the different types of rock found in crust? How the sedimentary rocks are formed in nature? 10

   b) What is sandstone? What is the basic difference between Shale and Slate? Define Metamorphic Rock with example. 6

7. a) Describe the problem of construction of a Tunnel across any folded and sheared sub-surface zone. Explain with suitable diagram. 8

   b) What are geological controls that should be taken care of during construction of a Bridge across any river channel? Explain with suitable diagram. 8

8. a) Describe the Engineering problem for construction of a Road along Hill-slope. How will you protect the Hill-cut Road which is constructed on a faulted or sheared zone? 10

   b) What is Ground Water Table? How will you protect saline water intrusion in coastal zone? 8

9. **Write short notes: (any four)** 4 x 4 = 16

   a) Isometric System,

   b) Perched Aquifer,

   c) Cleavage and fracture of mineral,

   d) Rayleigh and love Waves,

   e) Moh's Scale of Hardness,

   f) Centre of Symmetry.