B. Sc. Geological Sciences Examination, 2023

(3rd Year, 2nd Semester)

Engineering Geology and Solid Earth Physics

Paper – CORE/TH/14

Time : Two hours Full Marks : 40

(Use a separate Answer script for each Part)

PART – I (Marks: 20)

Attempt ***any five*** questions. 4×5

1. Derive the expression for normal (σ) and shear (τ) stress on an inclined plane making angle θ with the direction of minimum principal stress in two dimensions. Also represent the state of stress graphically on $\sigma - \tau$ space. 3+1

2. Write briefly the purposes of site characterization for an engineering project? Do you think that the frequency of landslide in hilly regions becomes extremely high in monsoon as compare to winter season? Justify your answer. 2+2

3. What are the differences between intensity and magnitude scales of an earthquake? How is the epicenter of an earthquake located? Justify your answer. 2+2

4. What are the major geological factors a geologist should consider in construction of a dam? 4

5. Do you think that the tunnel passing through the core of an antiform is more stable than through the core of a synform? Justify your answer. 4

6. Which parameters are considered in determining Rock Structure Rating (RSR) for an engineering geological project? 4

7. What are the special types of mass wasting in cold region? Write classification of landslide on the basis of water content and velocity. 2+2

PART – II (Marks: 20)

8. Answer ***any five*** questions : 5×4=20

   a) Discuss the behavior of natural remanent magnetizations (NRMs) of metamorphic rocks. 4

   b) Explain the magnetic cleaning processes to separate the vectors present in natural rock samples. 4

   c) How will you select the heating steps for different magnetic minerals during thermal demagnetization? What is PCA? 4

   d) Explain the internal structure of the Earth on the basis of velocity of seismic waves. 4

   e) Explain with a suitable diagram the presence of multiple magnetic vectors residing in a natural rock samples. 4

   f) Write Short Notes (***any two***) : 2×2=4

      i) Rayleigh Wave,

      ii) Hysteresis Study,

      iii) Euler Pole,

      iv) Moment Magnitude Scale.

   g) How do you identify both paramagnetic and ferromagnetic minerals by a specific rockmagnetic measurement? 4

   h) Explain the behavior of different seismic waves with suitable sketches. 4