

**10. Physical Geology, Structural Geology,
Crystallography & Mineralogy (Geo. 311), 2066**

Time : 3 hour

Full Marks : 100

Attempt NINE questions, selecting THREE from each Group.

Group "A"

1. What is volcano ? Describe various types of volcanic products.
2. (a) Define weathering . Describe chemical weathering.
(b) Discuss the hydrologic cycle. Define aquifer, water table and vadose water.
3. (a) Describe the landforms produced by river deposition.
(b) Describe the erosion landforms produced by glaciers.
4. (a) What is an earthquake ? Discuss the mechanism of earthquake generation.
(b) Write short notes on any TWO:
i) Wave refraction, beaches and head land
ii) Isostasy
iii) Sand dunes

Group "B"

5. (a) Describe the procedures of finding the intersection of two planes by using stereographic projection.
(b) Define a fold. With neat sketches distinguish between (i) Overturned fold and recumbent fold (ii) Antiform and synform.
6. (a) What do you understand by fault ? Describe the criteria to recognize the fault in the field.
(b) Define an unconformity. With neat sketches describe briefly the different types of unconformity.
7. (a) What is topographic map ? Describe the roles to use the topographic map for geological studies .
(b) What is joint Discuss the geometrical and genetic classifications of joint.

8. (a) What are primary sedimentary structures ? Illustrate your answer with neat sketches.
 (b) Write short notes on any TWO :
 i) Foliation ii) Lincation iii) Sill and dyke
- Group "C"**
9. (a) Define a crystal . Describe briefly about crystal growth.
 (b) Explain twin, twin plane and twin axis of a crystal.
10. (a) Define a mineral . Give some examples of metallic and non-metallic minerals of Nepal.
 (b) Describe briefly the crystal habit of mineral.
11. (a) Describe briefly the construction of Nicols prism with diagram.
 (b) Give physical and optical properties, occurrences, chemical composition and important uses of biotite, pyroxene and kyanite.
12. (a) What is an optical indicatrix ? Explain briefly its types.
 (b) Write short notes on any TWO:
 i) Polymorphism ii) Plechroism iii) Extinction angle

Physical Geology, Structural Geology, Crystallography & Mineralogy (Geo. 311), 2067

Bachelor Level /Sc. & Tech/I Year

Full Marks: 100

Time: 3 hrs.

Attempt NINE questions, selecting THREE from each Group.

GROUP "A"

1. What is an earthquake? Discuss the mechanism of earthquake generation. Describe various types of seismic waves.
2. (a) Discuss briefly the theory of isostasy.
 (b) What is volcano? Describe various types of volcanic cones.
3. (a) Describe the landforms produced by wind erosion
 (b) Write notes on: (i) Mid oceanic ridge (ii) Continental slope
4. (a) Define weathering and describe physical weathering.
 (b) Write notes on any TWO:
 a. Alluvial fan
 b. Terminal moraine
 c. Atolls

GROUP "B"

5. (a) What are normal stress and shear stress? Describe briefly the Mohr diagram in two dimensional stress state.
 (b) What are the methods of plotting geological data on the topographic map and preparation of cross section?
6. (a) Define a fault. With neat sketches distinguish between (i) Normal fault and thrust fault (ii) Horst and graben.
 (b) What do you understand by unconformity? Describe the criteria to recognize the unconformity in the field.

7. (a) With neat sketches distinguish between (i) Cylindrical fold and non-cylindrical fold (ii) Salt domes and diapirs.
- (b) What is joint? Discuss the geometrical and genetic classifications of joint.
8. (a) What are primary sedimentary structures? Illustrate your answer with neat sketches.
- (b) Write short notes on any TWO:
 - (i) Deformation (ii) Kinematic analysis (iii) Geological compass

GROUP "C"

9. (a) Define a crystal. Describe briefly about crystal growth.
- (b) Describe 14 Bravais Lattice in brief.
10. (a) Define a mineral. Give some examples of rock minerals and ore forming minerals.
- (b) Describe briefly the crystal habit of mineral.
11. (a) Describe briefly about the construction and use of petrological microscope with a sketch.
- (b) Give physical and optical properties, occurrences, chemical composition and important uses of hornblende, calcite and andalusite.
12. (a) Discuss briefly the silica group of minerals.
- (b) Write short notes on any TWO:
 - a. Birefringence
 - b. Pleochroism
 - c. Isotropic and anisotropic media

Physical Geology, Structural Geology, Crystallography & Mineralogy (Geo. 311), 2068

Bachelor Level /Sc. & Tech/I Year

Full Marks: 100

Time: 3 hrs.

Attempt NINE questions, selecting THREE from each Group.

GROUP "A"

1. What is an earthquake? Discuss the mechanism of earthquake generation.
2. (a) Discuss briefly the evidences of sea floor spreading.
- (b) Describe briefly the theory of isostasy.
3. (a) Define weathering. Distinguish between physical and chemical weathering.
- (b) Define aquifer. Explain the geologic condition for an artesian system.
4. (a) Describe the landforms produced by river erosion.
- (b) Write short notes on any TWO:
 - (i) Moraine
 - (ii) Mid oceanic ridge
 - (iii) Metamorphic rocks

GROUP "B"

5. (a) What are normal stress and shear stress? Describe in brief the Mohr stress circle for two dimensional stress states.
- (b) Define an unconformity. Describe the criteria to recognize the

unconformity in the field.

6. (a) What do you understand by fault? How do you explain its importance in geological studies?
(b) Define a fold. Describe briefly the mechanism of folding.
7. (a) What is topographic map? How do you prepare geological map with the help of topographic map?
(b) What is joint? Discuss the geometrical and genetic classifications of joint.
8. (a) What are primary sedimentary structures? Illustrate your answer with importance of these structures in geological studies.
(b) Write short notes on any TWO:
(i) Horst and Gaben (ii) Cleavage (iii) Antiform and synform

GROUP "C"

9. (a) Define a crystal. Describe briefly about crystal growth.
(b) Describe 14 Bravais Lattice in brief.
10. (a) Define a mineral. Describe the physical properties of a mineral.
(b) Describe briefly the crystal habit of mineral.
11. (a) Describe briefly about the construction and uses of petrological microscope with a sketch.
(b) Give physical and optical properties, occurrences, chemical composition and important uses of muscovite, and garnet.
12. (a) What is an optical indicatrix? How many types are there? Give an example of any one.
(b) Write short notes on any TWO:
(i) Extinction angle
(ii) Metallic and non metallic minerals
(iii) Becke line

Physical Geology, Structural Geology, Crystallography & Mineralogy (Geo. 311), 2070

Bachelor Level /Sc. & Tech/I Year

Full Marks: 100

Time: 3 hrs.

Attempt NINE questions, selecting THREE from each Group.

GROUP "A"

1. Give an account of the internal structure of the earth.
2. (a) What is, an earthquake? Describe the mechanism of earthquake generation.
(b) Describe the evidences of continental drift and sea-floor spreading.
3. (a) Explain the theory of isostasy.
(b) What is mass wasting? Describe the types and causes of mass wasting.
4. (a) Describe the process of glacier erosion and transportation.
(b) Write short notes on any TWO:
(i) Moraine
(ii) Speleothems

(iii) Coral reefs

GROUP "B"

5. (a) What are the basic elements of geological map and cross-section? How are they prepared?
(b) Define stress and strain. Explain about Mohr circle and its use.
6. (a) What is an unconformity? Give their types and criteria for recognition in the field.
(b) What are the main features of intrusive contact? Describe with sketches.
7. (a) What is fold? Give classification of folds.
(b) What are primary sedimentary structures? What are their uses in geology? Explain.
8. (a) What is a joint? Discuss the genetic classification of joint.
(b) Write short notes on any TWO:
(i) Lamination (ii) Dynamic analysis (iii) Batholith

GROUP "C"

9. (a) What is a crystal? How is a crystal formed? Describe.
(b) What is meant by symmetry in crystal? Describe symmetry operations in crystals.
10. (a) Briefly explain about point group and space group.
(b) Define vector properties of minerals.
11. (a) Give physical, chemical and optical properties of olivine group of minerals.
(b) What is interference colour of mineral? How is it determined under microscope?
12. (a) What is an optical indicatrix? Explain a positive biaxial indicatrix.
(b) Write short notes on any TWO:
(i) Metallic minerals of Nepal
(ii) Becke line
(iii) Isometric system

OLD COURSE

Attempt NINE questions, selecting THREE from each Group.

GROUP "A"

1. (a) Describe different types of seismic waves. Explain with a neat sketch how Mohorovicic discontinuity is recognized.
(b) Define a volcano. Describe different kinds of lava and their characters.
2. (a) Describe processes of transportation of sediment load by a river.
(b) Define porosity and permeability of a rock.
3. (a) Discuss various evidences for sea-floor spreading in brief.
(b) Discuss the coastal erosion process.
4. (a) Define a weathering. Distinguish between weathering and erosion.
(b) Write short notes on any TWO
(i) Coral reefs (ii) Isostasy (iii) Sand dunes

GROUP "B"

5. (a) What is stereographic projection? Describe the methods to project the planes and lines on a sphere.
(b) Describe different rock cleavages with neat sketches.
6. (a) Define a fault. With neat sketches distinguish between (i) normal fault and thrust fault (ii) horst and graben
(b) What do you understand by an unconformity? Describe the criteria to recognize the unconformity in the field.
7. (a) With neat sketches distinguish between (i) Antiform and synform (ii) sills and dykes.
(b) What is a joint? Discuss the geometrical classification of joint.
8. (a) What are primary sedimentary structures? Describe various types of sedimentary structures with neat sketches.
(b) Write short notes on any TWO:
(i) Dip and strike (ii) Foliation (iii) Geological compass

GROUP "C"

9. (a) What is a crystal? Describe briefly about the crystal growth.
(b) Explain twin, twin plane and twin axis of a crystal.
10. (a) Describe the symmetry elements and forms of the normal class of the isometric system.
(b) Define a mineral. Describe the physical properties of a mineral.
11. (a) Give physical and optical properties, occurrences, chemical composition and important uses of biotite and quartz.
(b) Describe briefly the polarization and interference of light with neat sketches.
12. (a) Describe the construction of a Nicol prism with a neat sketch.
(b) Write short notes on any TWO:
(i) Extinction angle (ii) Pleochroism (iii) Isomorphism

Physical Geology, Structural Geology, Crystallography & Mineralogy (Geo. 101), 2071 (New course)

Bachelor Level (4 Yrs.)/1st Year/Science & Tech.

Full Marks: 100

Time: 3 hrs.

GROUP "A"

Long Answer Questions

Attempt FOUR questions.

(4×10=40)

1. What is plate tectonics? Describe the characteristics of various types of plate boundaries with labelled diagrams.
2. Define earthquake. Explain the mechanism of an earthquake in terms of elastic rebound theory. Differentiate between the intensity and magnitude of an earthquake.
3. What is a cleavage in a mineral? Differentiate between the uniaxial and biaxial minerals with examples.

- Distinguish between open and close forms of crystals. Describe in brief about the symmetry and forms of tetragonal system with diagrams.
- What do you mean by index fossils? Describe the characteristics and uses of index fossils. Discuss the evolution and geological history of foraminifera.
- What are the bases of construction of geological time scale? Prepare a geological time scale showing the major epochs, periods and organic evolution.

GROUP "B"

Short Answer Questions

Attempt any Eight questions.

(8×5=40)

- Explain various types of landforms made by glaciers.
- What is groundwater? Differentiate between confined and unconfined aquifers with suitable sketches.
- What is a sand dune? Describe different types of sand dunes formed by the action of wind.
- What is a fault? Differentiate between normal fault and reverse fault with diagram.
- Give classification of rock forming minerals.
- What is a polarizing microscope? Explain the function of its principal parts with diagram.
- Define the terms habit, hardness, extinction relief and pleochroism in minerals.
- Describe in brief the theory of origin of life.
- Write a short history of human evolution on the Earth.
- Explain in short the geological history of Carboniferous Period.

GROUP "C"

Attempt any Eight questions.

(8×2.5=20)

- Differentiate between the weathering and erosion.
- Draw the interior of the earth and label it.
- What are the primary geological structures? List them.
- Give a brief introduction of coral reefs.
- What are the economic minerals of Nepal? Write their names.
- What do you mean by twinning in a crystal? Write different types of twins.
- Draw a cubic form of a crystal and show the symmetry elements.
- What do you mean by bio-stratigraphic correlation in geology?
- Write a short note on conodonts.
- What is the scope of micro-palaentology in the field of geology?

Physical Geology, Structural Geology, Crystallography & Mineralogy (Geo. 101), 2072

Bachelor Level (4yrs. prog.) I Year/Scie. & Tech.

Full Marks: 100

Time: 3 hrs.

Attempt ALL the questions.

Group "A"

Long Answer Questions.

Attempt FOUR questions.

[4×10=40]

- Describe the application of geology in disaster mitigation.

2. What is an earthquake? Discuss elastic rebound theory.
3. Describe the characteristics of uniaxial optical indicatrices.
4. What is a crystal? Describe symmetries in crystals.
5. What is a fossil? Discuss the evolutionary trend of Hominidae.
6. Discuss the theory of origin of life.

Group "B"

Short Answer Questions.

Attempt any Eight questions.

[8×5 = 40]

7. Describe about the rock cycle.
8. Describe the geological work of glaciers.
9. Describe the types and causes of weathering.
10. List and describe primary sedimentary structures.
11. What is Bravi's Lattice? Describe.
12. Briefly describe about the Moho's scale of hardness.
13. describe Michael Levy chart and its use.
14. Give an account of the magnetostratigraphy.
15. Describe the microfossils and their importance.
16. Describe about the importance of fossils.

Group "C"

Attempt any Eight questions.

[8×2.5 = 20]

17. Define magnitude and intensity of earthquakes.
18. List the evidences of continental drift.
19. Write short note on ripple marks.
20. What is a lineation? Where is it formed?
21. What do you understand by Miller indices?
22. What is twinning? List twin types in minerals.
23. What is birefringence?
24. Write short note on Permian Period.
25. What is a trace fossil? Explain.
26. Differentiate between chronostratigraphy and lithostratigraphy.

11. Environmental Science (Env.311), 2066

Time : 3 hour

Full Marks : 100

Group "A"

1. Attempt any THREE Questions.

3×10=30

- 1.1. Define conservation . What are various methods of biodiversity conservation ? Discuss.
- 1.2. What is biogeochemical cycle ? Illustrate sulphur cycle and its significance in the environment.
- 1.3. What is humus ? Write down the processes in formation of humus in soil. Discuss its importance in soil environment.

- 1.4 What are actual wind, geostrophic wind, thermal wind and baroclinicity in the physical environment? Explain.

Group "B"

2. Describe briefly any TEN Questions : 10×5=50
- 2.1. Ecological pyramids of forest and grassland ecosystems.
 - 2.2. Significance of adaptation
 - 2.3. Ecological dominance
 - 2.4. Ecotone and edge effect
 - 2.5. Soil profile
 - 2.6. Causes of earthquakes
 - 2.7. Mining and its effects
 - 2.8. Causes of nitrogen oxides pollution
 - 2.9. Principles of conductometric titration
 - 2.10. Biological control of pests
 - 2.11. Significance of micrometeorology on vegetated surfaces and urban areas.
 - 2.12. Techniques used for the estimation of microbial population

Group "C"

3. Attempt ALL the Questions : 10×2=20
- Differentiate between :
- 3.1. Food chain and trophic level
 - 3.2. Primary succession and secondary succession
 - 3.3. Volumetric and colorimetric analysis
 - 3.4. Organic and inorganic water pollutants
 - 3.5. Soil erosion and landslide
 - 3.6. Micronutrients and macronutrients
 - 3.7. Radiation inversion and subsidence inversion
 - 3.8. Turbulence and diffusion
 - 3.9. Algae and fungi
 - 3.10. Gram positive and gram negative bacteria

Environmental Science (Env.311), 2067

Bachelor Level /Science & Tech. /1 Year

Full Marks: 100

Time: 3 hrs.

SECTION "A"

1. Attempt any THREE questions. 3×10=30
- 1.1. What do you understand by biotic community? Discuss the major biotic communities with examples.
 - 1.2. What is biogeochemical cycle? Describe phosphorus cycle and its significance in the environment.
 - 1.3. What are the geological agents of environmental changes? Discuss.
 - 1.4. What is atmospheric stability? Illustrate the adiabatic diagram of parcel method.