

R4529

Sub. Code

25MAG2C1

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Applied Geology

IGNEOUS & METAMORPHIC PETROLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The Bowen's Reaction Series explains the (CO1, K1)
 - (a) Weathering of rocks
 - (b) Crystallization of magma
 - (c) Metamorphic facies
 - (d) Sedimentary cycles

2. CIPW norm is mainly used for (CO1, K2)
 - (a) Rock dating
 - (b) Textural classification
 - (c) Chemical classification of igneous rocks
 - (d) Field identification

3. Phase rule was proposed by (CO2, K1)
- (a) Gold Schmidt
 - (b) Bowen
 - (c) Gibbs
 - (d) Eskola
4. A binary magma system consists of (CO2, K1)
- (a) One component
 - (b) Two components
 - (c) Three components
 - (d) Four components
5. The main agents of metamorphism include (CO3, K1)
- (a) Wind and water
 - (b) Pressure, temperature and fluids
 - (c) Gravity alone
 - (d) Solar radiation
6. Index minerals are useful in determining (CO3, K2)
- (a) Rock age
 - (b) Rock texture
 - (c) Metamorphic grade
 - (d) Chemical composition
7. Metamorphic facies concept was proposed by (CO4, K1)
- (a) Winkler
 - (b) Turner
 - (c) Eskola
 - (d) Bowen

8. ACF and AKF diagrams are used to represent (CO4, K2)
- (a) Igneous textures
 - (b) Sedimentary structures
 - (c) Metamorphic mineral assemblages
 - (d) Magma viscosity
9. Migmatites are formed due to (CO5, K1)
- (a) Weathering
 - (b) Partial melting
 - (c) Sedimentation
 - (d) Erosion
10. Eclogite facies is characterized by the presence of (CO5, K2)
- (a) Quartz and feldspar
 - (b) Garnet and omphacite
 - (c) Biotite and muscovite
 - (d) Chlorite and talc

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Apply Bowen's Reaction Series to explain the crystallization sequence of basaltic magma. (CO1, K3)

Or

- (b) Analyze the role of viscosity, temperature and pressure in magma evolution. (CO1, K4)

12. (a) Analyze the significance of phase rule in understanding silicate equilibrium systems. (CO2, K4)

Or

- (b) Evaluate binary and ternary magma systems with suitable diagrams. (CO2, K5)

13. (a) Classify the agents and types of metamorphism with suitable examples. (CO3, K4)

Or

- (b) Evaluate the concept of metamorphic grades and zones. (CO3, K5)

14. (a) Justify Eskola's metamorphic facies concept and its geological significance. (CO4, K5)

Or

- (b) Illustrate the ACF, AKF and AFM diagrams in metamorphic petrology. (CO4, K4)

15. (a) Integrate a genetic model for migmatization and anatexis. (CO5, K6)

Or

- (b) Compare the role of trace elements and REE in metamorphic processes. (CO5, K5)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Classify the igneous rocks using CIPW, IUGS and Niggli methods. (CO1, K4)

Or

- (b) Evaluate magmatic differentiation processes including assimilation and liquid immiscibility. (CO1, K5)

17. (a) Analyze petrogenetic provinces with reference to Deccan Traps and Columbia River basalts. (CO2, K4)

Or

- (b) Create a comprehensive explanation for layered intrusions like Skaergaard complex. (CO2, K6)

18. (a) Classify texture and structures of metamorphic rocks and their geological significance. (CO3, K4)

Or

- (b) Justify paired metamorphic belts and depth zone concept. (CO3, K5)

19. (a) Evaluate regional, thermal and cataclastic metamorphism and their effects on different rock types. (CO4, K5)

Or

- (b) Formulate a P-T-t path model for regional metamorphic terrains. (CO4, K6)

20. (a) Describe the origin of eclogite and amphibolite in relation to plate tectonics. (CO5, K5)

Or

- (b) Create an integrated model explaining the relationship between magmatism and metamorphism. (CO5, K6)
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R4530

Sub. Code

25MAG2C2

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Applied Geology

SEDIMENTARY GEOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. Weathering that involves chemical alteration of minerals is known as (CO1, K1)
 - (a) Physical weathering
 - (b) Chemical weathering
 - (c) Biological weathering
 - (d) Mechanical erosion
2. Reynolds number is mainly used to distinguish between (CO1, K2)
 - (a) Sediment size
 - (b) Laminar and turbulent flow
 - (c) Chemical reactions
 - (d) Rock textures

3. Roundness of sediment grains mainly depends on (CO2, K1)
- (a) Composition
 - (b) Transport distance
 - (c) Cementation
 - (d) Burial depth
4. CM pattern is commonly used to interpret (CO2, K1)
- (a) Metamorphic grade
 - (b) Igneous textures
 - (c) Depositional environment
 - (d) Fossil assemblages
5. Diagenesis includes (CO3, K1)
- (a) Weathering and erosion
 - (b) Compaction and cementation
 - (c) Folding and faulting
 - (d) Melting and crystallization
6. Heavy mineral analysis is useful in determining (CO3, K2)
- (a) Metamorphic facies
 - (b) Provenance of sediments
 - (c) Absolute age
 - (d) Porosity

7. Aeolian deposits are typically characterized by (CO4, K1)
- (a) Poor sorting
 - (b) Angular grains
 - (c) Well-sorted and rounded grains
 - (d) High clay content
8. Breccia differs from conglomerate mainly in (CO4, K2)
- (a) Colour
 - (b) Mineralogy
 - (c) Grain size
 - (d) Clast angularity
9. Radiolarites are mainly composed of (CO5, K1)
- (a) Calcium carbonate
 - (b) Silica
 - (c) Iron oxide
 - (d) Phosphate
10. Phosphorite deposits commonly form in (CO5, K2)
- (a) Desert environments
 - (b) Deep marine upwelling zones
 - (c) Glacial regions
 - (d) Volcanic terrains

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Apply Hjulström diagram to explain sediment erosion, transportation and deposition. (CO1, K3)

Or

- (b) Analyze the processes of sediment transportation by fluid and gravity flows. (CO1, K4)

12. (a) Analyze sedimentary textures of clastic rocks using grain size and shape parameters. (CO2, K4)

Or

- (b) Evaluate the role of statistical methods in interpreting depositional environments. (CO2, K5)

13. (a) Analyze the processes of diagenesis and lithification in sedimentary basins. (CO3, K4)

Or

- (b) Evaluate the application of palaeocurrent and palaeoslope analysis in basin evolution. (CO3, K5)

14. (a) Evaluate the depositional processes of rudaceous rocks in glacial and aeolian environments (CO4, K5)

Or

- (b) Analyze structures and textures of conglomerates and breccias. (CO4, K4)

15. (a) Create a classification scheme for carbonate rocks based on texture and environment. (CO5, K6)

Or

- (b) Evaluate the economic importance of siliceous and phosphatic sediments. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Analyze sedimentary environments and facies models in continental and marine settings. (CO1, K4)

Or

- (b) Evaluate the role of weathering and sedimentation in the sedimentary cycle. (CO1, K5)

17. (a) Analyze sedimentary structures and their significance in environmental interpretation. (CO2, K4)

Or

- (b) Create an integrated model using textural data for depositional environment analysis. (CO2, K6)

18. (a) Evaluate sedimentary basin classification and tectonic controls on basin evolution. (CO3, K4)

Or

- (b) Create a provenance model using mineral composition and heavy mineral data. (CO3, K5)

19. (a) Analyze arenaceous and argillaceous rocks with respect to texture mineralogy and environment. (CO4, K5)

Or

- (b) Evaluate evaporite deposition and its geochemical significance. (CO4, K6)
20. (a) Evaluate carbonate, siliceous and iron-bearing sediments in different depositions environments. (CO5, K5)

Or

- (b) Create an integrated sedimentological model for phosphorite formation. (CO5, K6)
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R4531

Sub. Code

25MAG2C3

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Applied Geology

STRUCTURAL GEOLOGY AND GEOTECTONICS

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. True dip is measured in a direction (CO1, K1)
 - (a) Parallel to strike
 - (b) Perpendicular to strike
 - (c) Oblique to bedding
 - (d) Along apparent dip

2. Apparent dip is always (CO1, K2)
 - (a) Equal to true dip
 - (b) Greater than true dip
 - (c) Less than true dip
 - (d) Zero

3. Mohr circle represents the relationship between (CO2, K2)
- (a) Stress and time
 - (b) Stress and strain
 - (c) Stress components
 - (d) Strain components
4. Foliation develops mainly due to (CO2, K1)
- (a) Igneous intrusion
 - (b) Sedimentation
 - (c) Differential stress
 - (d) Weathering
5. Isoclinal folds are characterized by (CO3, K1)
- (a) Gentle limbs
 - (b) Parallel limbs
 - (c) Vertical axial plane
 - (d) Horizontal hinge
6. Salt domes are associated with (CO3, K2)
- (a) Compressional tectonics
 - (b) Evaporite sequences
 - (c) Igneous activity
 - (d) Metamorphism

7. Joints are fractures with (CO4, K1)
- (a) Displacement
 - (b) Crushing
 - (c) No displacement
 - (d) Rotation
8. Normal faults develop due to (CO4, K1)
- (a) Compression
 - (b) Tension
 - (c) Shearing
 - (d) Folding
9. Transform plate boundaries are dominated by (CO5, K2)
- (a) Thrust faults
 - (b) Normal faults
 - (c) Strike-slip faults
 - (d) Reverse faults
10. Neotectonics mainly deals with (CO5, K1)
- (a) Precambrian structures
 - (b) Fossil deformation
 - (c) Recent crustal movements
 - (d) Metamorphic fabrics

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Calculate the true thickness of a bed dipping at 30° if the apparent thickness is 10 m. (CO1, K2)

Or

- (b) Apply the relationship between true dip and apparent dip with a neat sketch. (CO1, K3)

12. (a) Analyze the stress—strain behavior of rocks under brittle and ductile conditions. (CO2, K5)

Or

- (b) Analyze the significance of Mohr circle in deformation studies. (CO2, K3)

13. (a) Evaluate the mechanisms of folding with suitable examples. (CO3, K4)

Or

- (b) Evaluate the geological importance of unconformities. (CO3, K4)

14. (a) Design a field-based method to recognize faults. (CO4, K6)

Or

- (b) Construct a classification scheme of joints based on geometry. (CO4, K5)

15. (a) Analyze tectonic features of compressional regimes.
(CO5, K5)

Or

- (b) Analyze the concept of supercontinent cycle.
(CO5, K4)

Part C (5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Analyze the relationship between true dip, apparent dip, and outcrop pattern.
(CO1, K4)

Or

- (b) Analyze methods for determining true thickness of inclined beds.
(CO1, K6)

17. (a) Evaluate the role of stress and strain ellipsoid in structural analysis.
(CO2, K4)

Or

- (b) Evaluate the significance of stereographic projection.
(CO3, K4)

18. (a) Create a classification chart of folds with field criteria.
(CO3, K5)

Or

- (b) Design a field approach to recognize fold styles.
(CO3, K6)

19. (a) Analyze fault classification and mechanics.
(CO4, K5)

Or

- (b) Analyze the geological significance of joints.
(CO4, K4)

20. (a) Evaluate neotectonic evidence in India. (CO5, K5)

Or

(b) Create a tectonic model for strike-slip terrains.
(CO5, K4)

R4532

Sub. Code

25MAG2C4

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Applied Geology

ECONOMIC GEOLOGY & MINING GEOLOGY

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective type questions by choosing the correct option.

1. The concentration of valuable minerals in an ore is called:
(CO1, K2)
(a) Tenor (b) Gangue
(c) Overburden (d) Tailings
2. Which of the following is a strategic mineral? (CO1, K2)
(a) Quartz (b) Iron
(c) Uranium (d) Limestone
3. The study of temperature of ore formation is known as:
(CO2, K1)
(a) Geochronology (b) Geologic thermometry
(c) Petrology (d) Stratigraphy
4. Fluid inclusions are mainly used to determine (CO2, K1)
(a) Ore grade
(b) Age of rocks
(c) Temperature and composition of ore fluids
(d) Mining method

5. Coal rank is primarily based on: (CO3, K1)
(a) Colour (b) Carbon content
(c) Ash content (d) Moisture only
6. Which metal is commonly associated with ultramafic rocks? (CO3, K2)
(a) Tin (b) Nickel
(c) Lead (d) Zinc
7. Long wall mining is mainly used for (CO4, K1)
(a) Granite (b) Coal
(c) Limestone (d) Gold
8. Reserve estimation primarily depends on: (CO4, K1)
(a) Colour of ore
(b) Sampling and drilling data
(c) Mine machinery
(d) Labour strength
9. EIA stands for: (CO5, K2)
(a) Environmental Inspection Act
(b) Environmental Impact Assessment
(c) Economic Investment Analysis
(d) Energy Industry Act
10. UNFC classification is related to: (CO5, K1)
(a) Mining hazards
(b) Mineral processing
(c) Reserve and resource estimation
(d) Metallurgy

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Explain the modes of mineral formation with suitable examples. (CO1, K2)

Or

- (b) Analyze the importance of strategic, critical and essential minerals in India. (CO1, K4)

12. (a) Analyze the role of magmatic differentiation in ore formation. (CO2, K4)

Or

- (b) Evaluate the significance of hydrothermal processes in mineral deposition. (CO2, K5)

13. (a) Analyze the geological settings of metallic mineral deposits. (CO3, K4)

Or

- (b) Evaluate the classification of coal based on rank and grade. (CO3, K5)

14. (a) Justify the suitability of different underground mining methods. (CO4, K5)

Or

- (b) Create a comparative account of surface and underground mining methods. (CO4, K6)

15. (a) Evaluate the major mining hazards and their control measures. (CO5, K3)

Or

- (b) Create a brief outline of mining laws and environmental regulations in India. (CO5, K2)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Analyze global and Indian mineral resources with reference to marine mineral resources and concession rules. (CO1, K4)

Or

- (b) Evaluate mineral recycling and reuse in sustainable mineral resources management. (CO1, K6)

17. (a) Analyze metallogenetic epochs and provinces with suitable examples. (CO2, K4)

Or

- (b) Create an integrated exploration model using geological and geophysical methods. (CO3, K4)

18. (a) Analyze the origin and distribution of major metallic mineral deposits of India. (CO3, K5)

Or

- (b) Evaluate the economic importance of uranium and thorium deposits. (CO3, K6)

19. (a) Analyze ore prospecting methods and reserve estimation techniques. (CO4, K5)

Or

- (b) Create a mine layout plan highlighting machinery and screening principles. (CO4, K4)

20. (a) Evaluate the role of UNFC classification in mineral resource reporting. (CO5, K5)

Or

- (b) Create a comprehensive environmental management plan for a mining project. (CO5, K4)

R4533

Sub. Code

25MAG2E2

M.Sc. DEGREE EXAMINATION, APRIL – 2026

Second Semester

Applied Geology

**Elective – MARINE GEOLOGY & PALAEO
OCCEANOGRAPHY**

(CBCS – 2025 onwards)

Time : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. The continental slope is characterized by (CO1, K2)
 - (a) Gentle gradient
 - (b) Steep gradient
 - (c) Flat surface
 - (d) Volcanic origin

2. Mid-ocean ridges are primarily associated with (CO1, K2)
 - (a) Compressional tectonics
 - (b) Transform faulting
 - (c) Divergent plate boundaries
 - (d) Subduction zones

3. Fringing reefs are directly attached to (CO2, K1)
 - (a) Continental shelf
 - (b) Volcanic islands
 - (c) Ocean trenches
 - (d) Abyssal plains

4. Submarine fans are mainly formed by (CO2, K1)
(a) Wave action (b) Tidal currents
(c) Turbidity currents (d) Longshore drift
5. The age of oceanic crust increases (CO3, K1)
(a) Towards mid-ocean ridges
(b) Towards continental margins
(c) Uniformly everywhere
(d) Randomly
6. The Atlantic Ocean is an example of (CO3, K1)
(a) Juvenile ocean (b) Mature ocean
(c) Declining ocean (d) Closing ocean
7. Salinity of seawater is commonly expressed in (CO4, K1)
(a) Percentage (b) Parts per thousand (%)
(c) ppm (d) mg/L
8. Deep ocean currents are mainly controlled by (CO4, K1)
(a) Wind stress
(b) Earth's rotation
(c) Density differences
(d) Tidal forces
9. Marine phosphorites are commonly formed in (CO5, K2)
(a) Deep ocean basins (b) Upwelling zones
(c) Ocean trenches (d) Coral reefs
10. The continental shelf of India is best developed along the (CO5, K1)
(a) Eastern coast (b) Western coast
(c) Southern coast (d) Northern coast

Part B

(5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) Apply the principles of marine geomorphology to explain the origin of continental margins. (CO1, K3)

Or

- (b) Explain the classification and significance of ocean floor relief features. (CO1, K4)

12. (a) Analyze the formation and distribution of coral reefs in relation to sea-level changes. (CO2, K4)

Or

- (b) Examine the sedimentary processes operating in deep-sea environments. (CO2, K3)

13. (a) Evaluate the evidence supporting seafloor spreading. (CO3, K5)

Or

- (b) Assess the tectonic evolution of the Indian Ocean. (CO3, K2)

14. (a) Construct a model illustrating global ocean circulation. (CO4, K3)

Or

- (b) Design a schematic representation of thermohaline circulation. (CO4, K2)

15. (a) Analyze the origin and distribution of polymetallic nodules. (CO5, K4)

Or

- (b) Examine the environmental impacts of marine mineral exploration. (CO5, K2)

Part C

(5 × 8 = 40)

Answer **all** questions not more than 1000 words each.

16. (a) Analyze the major morphological features of the ocean floor with suitable diagrams. (CO1, K4)

Or

- (b) Evaluate the role of plate tectonics in shaping ocean basins. (CO1, K6)

17. (a) Analyze the development and global distribution of coral reefs. (CO2, K4)

Or

- (b) Create a conceptual model explaining reef evolution through geological time. (CO3, K4)

18. (a) Evaluate the opening and closing stages of ocean basins. (CO3, K5)

Or

- (b) Design a method to estimate seafloor spreading rates using magnetic data. (CO3, K6)

19. (a) Analyze the temperature and salinity structure of the world oceans. (CO4, K5)

Or

- (b) Evaluate the significance of hydrothermal circulation at mid-ocean ridges. (CO4, K4)

20. (a) Evaluate the distribution of marine mineral resources of the Indian Ocean. (CO5, K5)

Or

- (b) Propose sustainable strategies for marine resource management. (CO5, K4)