R2771	Sub. Code
	464201

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Applied Geology

IGNEOUS AND METAMORPHIC PETROLOGY

(CBCS – 2022 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 most abundant volatile that is present within magmatic liquid is termed as (CO1, K1)

   (a) Water Vapour (b) Carbon dioxide

   (c) Nitrogen (d) Sulphur dioxide

2. The texture formed as a result of epitaxial mineral growth is (CO2, K2)

   (a) Rapakivi texture (b) Cumulate texture

   (c) Trachytic texture (d) Poikilitic texture

3. The rock containing equal proportions of plagioclase, pyroxene and olivine is called as: (CO1, K1)

   (a) Anorthosite (b) Dunite

   (c) Lherzolite (d) Norite

4. Gabbro contains much more alumina than peridotite because it is richer in: (CO1, K1)

   (a) Ortho pyroxene (b) Ortho amphibole

   (c) Olivine (d) Plagioclase

5. A pair of mantle rocks commonly exploited for diamond deposits is (CO2, K2)

(a) Carbonatite and Kimberlite

(b) Kimberlite and Lamproite

(c) Eclogite and Lamprophyre

(d) Kimberlite and Pyroxenite

6. What type of metamorphism is produced by high temperatures and high pressure imposed on a large volume of crust? (CO3, K2)

(a) Burial (b) Contact

(c) Regional (d) Cataclastic

7. Marble is a metamorphic rock that forms from a _____ parent rock. (CO3, K2)

(a) Granite (b) Limestone

(c) Sandstone (d) Shale

8. In metabasic rocks, plagioclase is not stable in the following (CO2, K1)

(a) Granulite Facies

(b) Epidote amphibolite facies

(c) Amphibolite Facies

(d) Eclogite Facies

9. The mineral coesite is expected to be stable in the following metamorphic facies (CO2, K2)

(a) Greenschist (b) Blueschist

(c) Eclogite (d) Granulite

10. Enderbite and Charnockite are rocks of the _____ facies. (CO2, K2)

(a) Amphibolite (b) Greenschist

(c) Granulite (d) Eclogite

Part B (5 × 5 = 25)

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

11. (a) Explain the magmatic differentiation process. (CO1, K3)

Or

(b) Write a short note on Bowen's reaction series and its application to petrogenesis. (CO1, K4)

12. (a) Classify the features of the Bushveld igneous complex. (CO2, K3)

Or

(b) Distinguish the features of the Stillwater complex in South Africa. (CO2, K3)

13. (a) Elaborate on the limits and physiochemical controls of metamorphism. (CO3, K2)

Or

(b) Classify the petrographic properties of common metamorphic rocks. (CO3, K3)

14. (a) Explain the contact metamorphic zones. (CO4, K2)

Or

(b) What is metasomatism? Explain, in detail. (CO4, K3)

15. (a) What are the grades of metamorphism? (CO5, K2)

Or

(b) Simplify the migmatisation process. (CO5, K4)

Part C (5 × 8 = 40)

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

16. (a) Explain in detail of the viscosity, temperature and pressure relationship of magma? (CO1, K3)

Or

(b) What is the difference between phaneritic, aphanitic and porphyritic textures? (CO1, K3)

17. (a) What is magmatic differentiation? Explain the formation of several different igneous rocks from a single magma? (CO2, K4)

Or

(b) Write in detail about the binary eutectic system of Diopside and Anorthite. (CO2, K3)

18. (a) Write an essay on metamorphic grades and the zone concept. (CO3, K2)

Or

(b) Explain the significance of paired metamorphic belts in reference to plate tectonics? (CO3, K4)

19. (a) Distinguish the graphical representation of metamorphic facies diagrams of the ACF, AKF and AFM. (CO4, K3)

Or

(b) Describe in detail the regional metamorphic effects on carbonates, argillaceous, and arenaceous rocks. (CO4, K3)

20. (a) Explain the applications of trace elements and REEs in metamorphic rocks. (CO5, K3)

Or

(b) Explain the relationship between metamorphism and evolution of plate tectonics. (CO5, K4)

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R2772	Sub. Code
	464202

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Applied Geology

SEDIMENTARY PETROLOGY

(CBCS – 2022 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. Which of the following sedimentary environments has sand deposits that are mostly poorly sorted? (CO1, K1)
   (a) Alluvial (b) Beach
   (c) Desert (d) Glacial

2. Which of the following is given in order of decreasing particle size? (CO2, K2)
   (a) Sandstone, siltstone, and conglomerate
   (b) Sandstone, conglomerate, and siltstone
   (c) Conglomerate, sandstone, and siltstone
   (d) Siltstone, sandstone, and conglomerate

3. What is the most abundant biochemical precipitate in the oceans? (CO1, K1)
   (a) Halite (b) Limestone
   (c) Chert (d) Coal

4. Which of the following sedimentary environments is characterized by sand, gravel and mud? (CO2, K2)
   (a) Active margin beach
   (b) Alluvial fans
   (c) Glacial
   (d) Deep marine

5. Siliceous environments, named after the silica-rich shells deposited in (CO2, K2)

(a) Evaporite environment

(b) Swamp environment

(c) Reef environment

(d) Deep-sea environment

6. What is the approximate temperature of sediment buried to a depth of 3 km? (CO1, K1)

(a) 0°C (b) 100°C

(c) 300°C (d) 1000°C

7. Sandstone with abundant rock fragments and clay minerals is termed as (CO2, K2)

(a) Arkose (b) Litharenite

(c) Quartz arenite (d) Shale

8. Coarse clastic material can be transported into a deep marine environment by (CO1, K1)

(a) Rivers (b) Wind

(c) Turbidity currents (d) All of these

9. Which of the following minerals has low solubility and is least susceptible to chemical weathering at the Earth's surface? (CO2, K2)

(a) Calcite (b) Plagioclase

(c) Quartz (d) Olivine

10. What is the porosity of newly deposited mud? (CO1, K1)

(a) less than 5%

(b) between 5% and 25%

(c) between 25% and 50%

(d) > 50%

Part B (5 × 5 = 25)

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

11. (a) Write an account of the classification of sedimentary rock. (CO1, K2)

Or

(b) Explain the major components of carbonate rocks. (CO1, K3)

12. (a) Discuss the primary sedimentary textures. (CO2, K3)

Or

(b) Discuss the mineralogy and chemical composition of siliceous and iron bearing rocks. (CO2, K3)

13. (a) Distinguish sedimentary features in transitional and marine environments. (CO3, K2)

Or

(b) Discuss the features of Aeolian deposits. (CO3, K2)

14. (a) Narrate the field and laboratory procedure adopted for grain size analysis. (CO4, K2)

Or

(b) Give an account on the origin of Petroleum and Gas. (CO4, K4)

15. (a) Enumerate on the sediment geochemistry. (CO5, K2)

Or

(b) Explain the mechanical and electromagnetic methods used for heavy mineral separation. (CO5, K4)

Part C (5 × 8 = 40)

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

16. (a) Describe the statistical parameters of sediment size, shape, sphericity and roundness. (CO1, K4)

Or

(b) Elaborate on sedimentary facies and their environments. (CO1, K4)

17. (a) Write an essay on the factors controlling the texture of sedimentary rocks. Add a note on clastic and non-clastic textures. (CO2, K4)

Or

(b) Describe Dunham's classification of limestone. (CO2, K3)

18. (a) Explain in detail the fluids and fluid flow in sedimentary basins. (CO3, K4)

Or

(b) Give a lucid account of the evolution of sedimentary basins. (CO3, K3)

19. (a) Describe the erosional and depositional features of glacial deposits with a neat sketch. (CO4, K3)

Or

(b) Write a brief note on the graphical representation of textural data. (CO4, K4)

20. (a) Describe the importance of heavy minerals in provenance studies. (CO5, K3)

Or

(b) Explain in detail how stable isotopes are used in sediment geochemistry. (CO5, K4)

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R2773

Sub. Code
464203

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Applied Geology

STRUCTURAL GEOLOGY AND GEOTECTONICS

(CBCS – 2022 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. What is the primary purpose of assessing geological principles in the field? (CO2, K2)

   (a) To confuse geologists

   (b) To enhance understanding and make accurate observations

   (c) To discourage exploration

   (d) To promote guesswork

2. Compare primary and secondary geological structures. Which of the following is a characteristic feature of primary structures? (CO2, K2)

   (a) Formed after secondary structures

   (b) Result of post-depositional processes

   (c) Original features formed during deposition

   (d) Always igneous in origin

3. Distinguish between Mohr cycle and Hooke's Law in rock mechanics. (CO1, K1)

(a) Mohr cycle describes deformation; Hooke's Law describes stress

(b) Mohr cycle describes stress; Hooke's Law describes deformation

(c) Both describe deformation

(d) Both describe stress

4. Interpret the role of foliation in rocks. What does foliation reveal about the deformation history of rocks? (CO1, K1)

(a) The mineral composition

(b) The orientation of minerals

(c) The age of the rocks

(d) The color of the rocks

5. What common geological processes contribute to these distinct structural features? (CO2, K3)

(a) Tectonic forces

(b) Volcanic activity

(c) Sedimentary deposition

(d) Glacial erosion

6. Which method involves analyzing the orientation of rock layers to identify fold structures? (CO2, K3)

(a) Petrographic analysis

(b) Radiometric dating

(c) Structural geology mapping

(d) Seismic tomography

7. Generate a list of fault types commonly found in tectonic settings. (CO1, K1)

(a) normal fault (b) reverse fault

(c) strikeslip fault (d) obliqueslip fault

8. Classify joints based on their origin and provide examples for each type. (CO1, K1)

(a) tension joints

(b) tension joints

(c) compression joints

(d) exfoliation joints

9. Distinguish between contour and topographical maps in geological mapping. (CO2, K2)

(a) Contour maps show elevation; topographical maps show vegetation

(b) Contour maps represent rock types; topographical maps show fault lines

(c) Contour maps display elevation lines; topographical maps depict surface features

(d) Contour maps emphasize human made structures; topographical maps focus on landforms

10. Simplify the process of determining the order of superposition in the field for relative dating. (CO1, K1)

(a) Younger rocks are always found above older rocks

(b) Fossils in lower layers are older than those in higher layers

(c) Sedimentary rocks are always younger than igneous rocks

(d) The Law Superposition does apply in the field

Part B (5 × 5 = 25)

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

11. (a) Determine the distinctions between true thickness and vertical thickness in geological stratigraphy. How do these measurements contribute to precision in geological mapping and interpretation of subsurface formations? (CO1, K2)

Or

(b) Interpret the mutual relationship between true thickness and vertical thickness in geological formations. Evaluate the practical implications of this understanding for geological modeling and the exploration of natural resources. (CO1, K3)

12. (a) Examine geological features like foliation, lineation, and cleavages in rocks. How do these features offer insights into the geological history and deformation processes of rocks? (CO2, K4)

Or

(b) Investigate the relationship between foliation orientation and the strain ellipsoid in rocks. How does the alignment of foliation within the strain ellipsoid enhance our understanding of deformation patterns? (CO2, K5)

13. (a) Explore the methods and techniques used for recognizing folds in field geology. How can geologists identify and interpret fold structures while conducting fieldwork? (CO3, K6)

Or

(b) Examine the geological phenomenon of salt intrusion and the formation of salt domes. How do salt domes contribute to the deformation of surrounding rock layers, and what geological implications do they carry? (CO3, K5)

14. (a) Explain the geometric characteristics of different types of joints in geological formations. (CO4, K4)

Or

(b) Provide an in depth classification of faults and discuss the different types of faults. How does the movement along faults contribute to the deformation of the Earth's crust? (CO4, K4)

15. (a) Discuss the role of contour and topographical maps in geological mapping. (CO5, K3)

Or

(b) Classify geological structures into different categories based on their origin and impact. (CO5, K4)

Part C ($5 \times 8 = 40$)

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

16. (a) Justify the importance of applying basic geological principles in fieldwork. Provide concrete examples of how field geologists rely on these principles to make accurate observations and interpretations, shaping our understanding of Earth's surface. (CO1, K3)

Or

(b) Evaluate techniques used in geological analysis, considering their strengths and limitations. How do these techniques collectively contribute to a comprehensive Understanding of geological structures and processes? (CO1, K5)

17. (a) Explore the temporal relationship between the crystallization of rocks and subsequent deformation. (CO2, K4)

Or

(b) Examine the methods and significance of calculating paleo stress in geological studies. How does this information contribute to our understanding of past geological events and provide insights into the stress history of rocks? (CO2, K4)

18. (a) Examine the geological phenomenon of salt intrusion and the formation of salt domes. How do salt domes contribute to the deformation of surrounding rock layers, and what geological implications do they carry? (CO3, K5)

Or

(b) Interpret the concept of unconformities in geological stratigraphy. Explore the various types of unconformities and their significance in understanding the geological history of a region. (CO3, K3)

19. (a) Discuss the various classifications of joints in geology and their geological significances. How do different types of joints contribute to the overall behavior of rock masses? (CO4, K3)

Or

(b) Examine the mechanisms behind the formation of faults in geological settings. What geological processes lead to the creation and activation of faults, and how do they impact the Earth's crust? (CO4, K3)

20. (a) Analyze the importance of geological surveying in understanding Earth's structure and composition. (CO5, K3)

Or

(b) Compare the mapping techniques used for oceanic and continental geological studies. What are the specific challenges and advantages associated with mapping these diverse environments? (CO5, K4)

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R2774	Sub. Code
	464204

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Applied Geology

ECONOMIC AND MINING GEOLOGY

(CBCS – 2022 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. Native sulphur is generally found in and around (CO2, K2)

   (a) Volcanic crater (b) Hydrothermal deposit

   (c) Copper deposit (d) Supergene deposit

2. The temperature range for the formation of hypothermal deposits is (CO2, K2)

   (a) 300°C – 700°C (b) 300°C – 500°°C

   (c) 300°C – 450°°C (d) 300°C – 400°°C

3. Platinum occurs only in (CO1, K1)

   (a) Mafic rocks (b) Ultramafic rocks

   (c) Mafic to rocks (d) Mafic to ultrabasic rocks

4. An assemblage of high-temperature metamorphic gangue minerals in contact with metasomatic deposits are called as (CO2, K2)

(a) Skarn (b) Gondite

(c) Gossans (d) Bar deposits

5. Kaolin adsorbs copper from the solution to form (CO1, K1)

(a) Azurite (b) Chalcocite

(c) Chrysocolla (d) Atacamite

6. Which term refers to one who searches for ore deposits? (CO2, K2)

(a) Geologist (b) Prospector

(c) Miner (d) Mineral specialist

7. Which type of mine has a network of tunnels that start at the surface and extend deep into the ground, following the veins of the ore? (CO2, K2)

(a) Strip mine (b) Open pit mine

(c) Shaft mine (d) Vein mine

8. The long wall method is generally employed for (CO1, K1)

(a) Copper ore mining (b) Iron ore mining

(c) Coal mining (d) Gypsum mining

9. Horizontal access to the ore body is called (CO2, K2)

(a) Shaft (b) Incline

(c) Adit (d) Stope

10. High explosives chiefly consist of (CO2, K2)

(a) Nitro-glycerine

(b) Sodium nitrate

(c) Ammonium nitrate

(d) Charcoal sulphur

Part B (5 × 5 = 25)

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

11. (a) Explain the magmatic and contact metasomatic processes of the ore formation. (CO1, K3)

Or

(b) Discuss the controls of ore localization. (CO2, K3)

12. (a) Write a short note about the processes of sedimentary evaporation deposits. (CO2, K3)

Or

(b) Discuss oxidation and supergene enrichment deposits with a neat sketch. (CO3, K4)

13. (a) Give a detailed account of the formation and use of phosphatic nodule deposits. (CO2, K3)

Or

(b) Define a gemstone. Give the mode of occurrence of diamonds. (CO3, K3)

14. (a) Describe the physical and chemical controls of ore deposition. (CO2, K3)

Or

(b) Give a detailed account of the mineralogy and mode of occurrence of silver. (CO3, K2)

15. (a) Explain the alluvial mining methods. (CO4, K3)

Or

(b) Discuss the ore reserve estimation methods. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Write an essay on the mode of formation of minerals. (CO1, K3)

Or

(b) Briefly explain on marine mineral resources. (CO1, K3)

17. (a) Discuss in detail the residual and mechanical concentration of mineral deposits. (CO2, K2)

Or

(b) Compare Bateman and Lindgren classification of mineral deposits. (CO2, K2)

18. (a) Write an essay on gold deposits and their mineralogy, mode of occurrence, and distribution in India. (CO3, K3)

Or

(b) Write the classification of coal and explain the macroscopic and microscopic constituents of coal. (CO3, K3)

19. (a) Explain the geophysical ore prospecting techniques. (CO4, K4)

Or

(b) Explain the various techniques used in subsurface mining. (CO4, K3)

20. (a) Write an essay about mining hazards and its control measures. (CO5, K4)

Or

(b) Describe the environmental impact of onshore and offshore mining. (CO5, K4)

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R2775

Sub. Code
464502

M.Sc. DEGREE EXAMINATION, APRIL – 2025

Second Semester

Applied Geology

Elective — ENGINEERING GEOLOGY AND ENVIRONMENTAL GEOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

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

1. What is the primary purpose of laboratory testing in assessing the engineering properties of rocks? (CO2, K2)

   (a) Generate (b) Compare

   (c) Operate (d) Classify

2. How do the properties of road materials impact the durability and performance of roads? (CO2, K2)

   (a) Examine (b) Interpret

   (c) Simplify (d) Distinguish

3. In bridge construction, what role does geological knowledge play in foundation design? (CO1, K1)

   (a) Simplify (b) Distinguish

   (c) Relate (d) Show

4. What is the primary purpose of site improvement based on geological considerations in civil engineering projects? (CO1, K1)

(a) Show (b) Operate

(c) Compare (d) Explain

5. How can health hazards associated with mining be addressed and prevented? (CO2, K3)

(a) Simplify

(b) Generate more waste

(c) Operate without safety measures

(d) Propose preventive measures

6. In the context of coal mining, what does the word 'distinguish' imply? (CO2, K3)

(a) Compare safety measures

(b) Examine environmental impacts

(c) Differentiate specific hazards

(d) Interpret combustion processes

7. How can health hazards associated with mining he addressed and prevented? (CO1, K1)

(a) Simplify regulations

(b) Generate more waste

(c) Operate without safety measures

(d) Propose preventive measures

8. In the context of coal mining, what does the word 'distinguish" imply? (CO1, K1)

(a) Compare safety measures

(b) Examine environmental impacts

(c) Differentiate specific hazards

(d) Interpret combustion processes

9. How can health impacts resulting from global warming be classified? (CO2, K2)

(a) Simplify and interpret

(b) Compare and generate

(c) Classify and categorize

(d) Operate and distinguish

10. In the context of ozone layer depletion, what does the word "operate" imply? (CO1, K1)

(a) Examine international agreements

(b) Compare natural causes

(c) Operate technological innovations

(d) Simplify chemical processes

Part B ($5 \times 5 = 25$)

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

11. (a) Discuss the engineering properties of rocks and highlight the significance of dimensional stone properties. (CO1, K2)

Or

(b) Examine the physical and engineering properties of soil, emphasizing their importance in civil engineering projects. (CO1, K3)

12. (a) Illustrate the role of engineering geology in tunnel construction. Highlight specific challenges and solutions related to geological considerations in tunneling. (CO2, K4)

Or

(b) Relate the importance of engineering geology in road cut projects. (CO2, K5)

13. (a) Discuss how engineers use bearing capacity data in the design process for safety and structural integrity. (CO3, K6)

Or

(b) Illustrate how settlement affects foundation performance. (CO3, K5)

14. (a) Compare the environmental impacts of various mining practices, such as open pit mining, underground mining, and placer mining. (CO4, K4)

Or

(b) Simplify the complexities of how urbanization affects hydrology. (CO4, K4)

15. (a) Explore the distinctions between natural and human induced causes of ozone layer depletion. (CO5, K3)

Or

(b) Discuss strategies for adaptation, emission reduction, and international collaboration to address this global challenge. (CO5, K4)

Part C (5 × 8 = 40)

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

16. (a) Evaluate the role of road materials in construction and elaborate on their properties. (CO1, K3)

Or

(b) Explore the methods and tests involved in selecting rock sites for construction purposes. (CO1, K5)

17. (a) Explore the contributions of engineering geology in the construction of roads and highways. (CO2, K4)

Or

(b) Discuss how geological assessments influence the foundation design and overall structural integrity of bridges. (CO2, K4)

18. (a) Provide a simplified explanation of pile foundations, breaking down key concepts. Discuss scenarios where pile foundations are preferred and their advantages. (CO3, K5)

Or

(b) Categorize bridge foundations by design and discuss how geological conditions influence foundation selection. (CO3, K3)

19. (a) Categorize and discuss different strategies for mitigating acid mine drainage. Explore the chemical processes involved and evaluate the effectiveness of various treatment methods. (CO4, K3)

Or

(b) Classify and analyze the hydrologic effects stemming from urbanization. (CO4, K3)

20. (a) Explore the direct and indirect effects on human health, including heat related illnesses, vector borne diseases, and food security concerns. (CO5, K3)

Or

(b) Discuss international agreements, policy measures, and technological innovations aimed at preserving the ozone layer. (CO5, K4)

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