R0998	Sub. Code
	464201

M.Sc. DEGREE EXAMINATION, APRIL – 2024

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 type questions by choosing the correct option.

1. Igneous rocks with high concentrations of Mg and Fe are likely to formed from magma originally derived from (CO1, K1)

   (a) SIAL (b) SIMA

   (c) Mantle (d) Outer Core

2. Basaltic lava can flow to a greater distances because of (CO2, K2)

   (a) High viscosity (b) Low viscosity

   (c) High temperature (d) Low temperature

3. Stock, bosses, and roof-pendants are related to (CO2, K2)

   (a) Dyke (b) Sill

   (c) Batholiths (d) Lopolith

4. What are the most prominent textural features of regional metamorphic rocks? (CO1, K1)

(a) Foliation (b) Bedding

(c) Cataclasis (d) Ripples

5. The term quartzite is associated with which type of sandstone? (CO2, K2)

(a) Siliceous sandstone

(b) Calcareous sandstone

(c) Argillaceous sandstone

(d) Ferruginous sandstone

6. The temperature range for the Bowen reaction series has been determined. (CO1, K1)

(a) 1200°C to 635°C (b) 1100°C to 450°C

(c) 1100°C to 573°C (d) 900°C to 573°C

7. The graphic texture indicates (CO2, K2)

(a) Eutectic crystallization

(b) Crystal settling

(c) Fractional crystallization

(d) Magma mixing

8. The plutonic igneous rock consisting only of plagioclase, pyroxene, and hornblende is known as (CO1, K1)

(a) Dunite (b) Lherzolite

(c) Granite (d) Diorite

9. The diagnostic amphibole in a blue schist facies metabasalt is (CO1, K1)

(a) Hornblende (b) Anthophyllite

(c) Glaucophane (d) Actinolite

10. Characteristic rocks of contact metamorphism is (CO2, K2)

(a) Hornfels (b) Blue schist

(c) Eclogite (d) Granulite

Part B (5 × 5 = 25)

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

11. (a) Classify the intrusive and extrusive bodies of magma. (CO3, K3)

Or

(b) Describe the solubility of volatiles in silicate melts. (CO3, K4)

12. (a) Discuss some igneous primary textures. (CO3, K3)

Or

(b) Explain the IUGS classification of plutonic igneous rocks. (CO3, K3)

13. (a) Distinguish the features of Deccan traps. (CO2, K2)

Or

(b) Distinguish the features of the Columbia River basalt. (CO3, K3)

14. (a) Categorise the agents and the types of Metamorphism. (CO3, K2)

Or

(b) List out the common minerals in metamorphic rocks. (CO3, K3)

15. (a) Write in short notes on the AFM and AKF diagrams. (CO2, K2)

Or

(b) Clarify the charnockitisation process and formation. (CO3, K4)

Part C (5 × 8 = 40)

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

16. (a) Write in detail about the binary eutectic systems of Albite and Anorthite. (CO3, K3)

Or

(b) Describe in detail on liquid immiscibility and assimilation. (CO3, K4)

17. (a) Give detail on the forms and structures of intrusive and extrusive igneous rock with their petrogenetic significance. (CO3, K4)

Or

(b) Narrate on the binary and ternary magmatic systems with an example. (CO3, K3)

18. (a) Classify the textures and structures of metamorphic rocks with neat sketches. (CO2, K2)

Or

(b) Elucidate the metamorphic facies and concepts from the view point of Eskola. (CO3, K4)

19. (a) Distinguish between the Gibbs phase rule and Goldschmidt mineralogical phase rule. (CO3, K3)

Or

(b) Give the detail about thermal and cataclastic metamorphism. (CO3, K3)

20. (a) Write an essay on the origin of Eclogite. (CO3, K3)

Or

(b) Examine how stable isotopes are used in metamorphic geochemistry. (CO3, K4)

R0999	Sub. Code
	464202

M.Sc. DEGREE EXAMINATION, APRIL – 2024

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. Identify the particle size of sand (CO1, K1)

   (a) 0.05 – 2.0 mm (b) 2 mm – 256 mm

   (c) 0.002 – 0.05 mm (d) > 2.0 mm

2. The term quartzite is associated with which type of sandstone? (CO1, K1)

   (a) Siliceous sandstone

   (b) Calcareous sandstone

   (c) Argillaceous sandstone

   (d) Ferruginous sandstone

3. Most shells of marine organisms are composed of (CO2, K2)

   (a) Silicates (b) Carbonates

   (c) Phosphates (d) Sulphates

4. Which of the following sedimentary environments is controlled by wave and tidal currents? (CO2, K2)

(a) Glacial (b) Alluvial fans

(c) Deltaic (d) Deep marine

5. Which of the following processes occurs during lithification? (CO1, K1)

(a) Recrystallization (b) Compaction

(c) Cementation (d) All of these

6. Which of the following types of sediments are most abundant? (CO2, K2)

(a) Coarse clastics (b) Fine clastics

(c) Chemical (d) Biochemical

7. Tendency for variations in current velocity to segregate sediments on the basis of particle size is called _____. (CO2, K2)

(a) Lithification (b) Compaction

(c) Metamorphism (d) Sorting

8. In which of the following climatic condition chemical weathering be most rapid? (CO1, K1)

(a) Hot and dry (b) Hot and humid

(c) Cold and dry (d) Cold and humid

9. Which of these is least likely to form a clay mineral during weathering? (CO2, K2)

(a) Feldspar (b) Quartz

(c) Amphibole (d) Olivine

10. Which of the following processes is not an important cause of subsidence during the development of a sedimentary basin? (CO2, K2)

(a) cooling and contraction of the crust

(b) deposition of sediments

(c) erosion of sediments

(d) tectonic down faulting

Part B (5 × 5 = 25)

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

11. (a) Explain the chemical sedimentary structures. (CO2, K3)

Or

(b) Describe the litho facies and bio facies. (CO3, K3)

12. (a) What are biogenic sediments and sedimentary rocks? (CO2, K3)

Or

(b) State the difference between bedding, lamination, and cross bedding. (CO3, K3)

13. (a) Write a short note on metals formed in sedimentary environments. (CO2, K2)

Or

(b) Mention the geophysical models used to identify the subsurface structures in a sedimentary basin. (CO3, K3)

14. (a) Give an account of transitional and non-marine mineral deposits. (CO3, K2)

Or

(b) Distinguish the features of glacial process. (CO3, K3)

15. (a) Enumerate the process of Scanning Electron Microscope (SEM), in sediment analysis. (CO3, K3)

Or

(b) Write a short note on the depositional environment and provenance. (CO3, K3)

Part C (5 × 8 = 40)

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

16. (a) Give an outline of the physical and chemical weathering processes in different sedimentary environments. (CO3, K3)

Or

(b) Write an essay on classification based on texture and composition. (CO3, K3)

17. (a) Describe the Folk's classification of limestone. (CO3, K3)

Or

(b) Give a detailed account of the microporosity types in carbonate rocks. (CO3, K3)

18. (a) Enumerate the lithification, and diagenesis process of limestone. (CO2, K2)

Or

(b) Briefly explain the tectonic theory of sedimentation. (CO3, K4)

19. (a) Elucidate the erosional and depositional features of aeolians with a neat sketch. (CO3, K3)

Or

(b) Describe the histogram, frequency, and cumulative curve in grain size analysis. (CO3, K3)

20. (a) Discuss the geochemical classification of sedimentary rocks. (CO3, K3)

Or

(b) Write an essay on the formation of heavy minerals and methods adopted for heavy mineral studies. (CO3, K4)

R1000

Sub. Code
464203

M.Sc. DEGREE EXAMINATION, APRIL – 2024

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 questions by choosing the correct option.

1. Explain the relationship between true dip and apparent dip. Why might apparent dip differ from true dip? (CO2, K2)

   (a) Due to geological confusion

   (b) Because of magnetic interference

   (c) Changes in topography

   (d) They are always the same

2. Justify the importance of measuring true thickness in geological studies. What does an accurate measurements of true thickness provide? (CO2, K2)

   (a) Misleading information

   (b) Vertical thickness only

   (c) Accurate representation of subsurface structures

   (d) Irrelevant data

3. Classify the mechanical properties of rocks into two main categories (CO1, K1)

(a) Brittle and ductile

(b) Sedimentary and metamorphic

(c) Igneous and sedimentary

(d) Elastic and plastic

4. Generate an explanation for the term "strain ellipsoid" in rock mechanics (CO1, K1)

(a) A type of igneous rock

(b) A geometric representation of strain in rocks

(c) A measure of rock hardness

(d) A unit of stress measurement

5. Which category do recumbent folds belong to? (CO2, K3)

(a) Anticline (b) Syncline

(c) Overturned fold (d) Isoclinal fold

6. Generate a definition for salt domes in geological terms (CO2, K3)

(a) Igneous intrusions

(b) Folded rock layers

(c) Accumulation of salt deposits

(d) Meteorite impact sites

7. Distinguish between joints and faults based on their characteristics. (CO1, K1)

(a) Joints involve displacement; faults do not

(b) Faults are always vertical; joints can be horizontal

(c) Joints are associated with compressional forces; fault with tensional forces

(d) Faults are wider than joints

8. Simplify the process of recognizing faults in the field by identifying key visual markers. (CO1, K1)

(a) Presence of mineral veins

(b) Offset geological layers

(c) Absence of fractures

(d) Symmetrical beddings

9. Generate a list of geological features associated with plate boundaries (CO2, K2)

(a) Midocean ridges (b) Subduction zones

(c) Transform faults (d) Rift Valleys

10. Classify evidence of continental drift into geological and geophysical categories (CO1, K1)

(a) Fossil records

(b) Seafloor spreading

(c) Earthquake distribution

(d) Magnetic anomalies

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

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

11. (a) Explore how basic geological principles form the foundation for understanding Earth's structure and processes. How do these principles contribute to the core knowledge of geology? (CO2, K2)

Or

(b) Define key geological terms and analyze how precise definitions enhance communication in the field. How does a shared terminology improve comprehension among geologists and facilitate effective collaboration? (CO3, K3)

12. (a) Examine how the mechanical properties of rocks shape their behavior under varying geological conditions. How do these properties influence the response of rocks to external forces? (CO3, K4)

Or

(b) Investigate the concepts of stress, strain, and deformation in rocks through kinematic and dynamic analyses. (CO5, K5)

13. (a) Examine the geometry of folds and explore how their shapes and structures contribute to our understanding of geological processes. How do folds form and impact the Earths crust? (CO6, K6)

Or

(b) Distinguish and classify the terminology used to describe folds, including various schemes for their classification. (CO5, K5)

14. (a) Explore the mechanisms that lead to the formation of joints in rocks. (CO4, K4)

Or

(b) Classify faults into different categories and analyze the implications of each category on geological structures. How does the categorization of faults aid in understanding tectonic processes? (CO4, K4)

15. (a) Examine the fundamental principles of plate tectonics. How does the movement of tectonic plates contribute to the dynamic Earth processes, such as earthquakes and volcanic activity? (CO2, K3)

Or

(b) Explore the evidence supporting the theories of oceanic and continental drift. What geological and geophysical phenomena provide insights into the movement of continents and oceanic plates? (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Contrast primary and secondary geological structures, emphasizing their unique features. How do these structures manifest in outcrop trends, and what valuable insights can be gleaned from studying these geological formations? (CO3, K3)

Or

(b) Explain the relationship between true dip and apparent dip in geology. How does understanding this relationship aid geologists in decoding subsurface structures and unraveling the geological history of an area? (CO5, K5)

17. (a) Interpret the significance of stress and strain ellipsoids in rock mechanics. Explore the applications of the Mohr cycle in deciphering the stress and strain history of rocks. (CO4, K4)

Or

(b) Evaluate the physical properties of rocks, emphasizing deformation, brittleness, plasticity, and elasticity. How do these properties collectively contribute to the overall behavior of rocks in response to external forces? (CO4, K4)

18. (a) Investigate the mechanisms behind the formation of folds. How do tectonic forces and other geological processes contribute to the creation of fold structures in the Earth's crust? (CO5, K5)

Or

(b) Explore the methods and techniques used for recognizing folds in field geology. How can geologists identify and interpret fold structures while conducting fieldwork? (CO3, K3)

19. (a) Discuss methods for recognizing and identifying faults in the field. What geological features and indicators help geologists identify and differentiate between various types of faults? (CO3, K3)

Or

(b) Compare and contrast the characteristics of joints and faults in geological formations. How do these structural features differ in terms of formation, impact on landscapes, and geological significance? (CO3, K3)

20. (a) Discuss the geological and geophysical evidence that supports the theory of plate tectonics. (CO3, K3)

Or

(b) Explain the methods used in determining the order of superposition in geological fields. How do geologists establish the relative ages of rock layers and fossils to reconstruct Earth's history? (CO4, K4)

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R1001

Sub. Code
464204

M.Sc. DEGREE EXAMINATION, APRIL – 2024

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. The formation temperature of different magmatic deposits varies from (CO2, K1)

   (a) 2000°C to 500°C

   (b) 1500°C to 300°C

   (c) 1000° C to 200°C

   (d) 800°C to 100°C

2. Diamonds in kimberlite and corundum in nepheline syenite are good examples of (CO2, K2)

   (a) Disseminated deposit

   (b) Segregated deposit

   (c) Injected deposit

   (d) Pegmatitic deposit

3. Ore shoots are the most characteristic of (CO1, K2)

(a) Fissure veins only

(b) Replacement loads only

(c) Fissure veins and replacement loads

(d) Breccia-filling deposits

4. When copper ores occupy sandstone pores, it is known as: (CO2, K1)

(a) Sandy ores

(b) Sandstone copper ores

(c) Pore ores

(d) Red beds ores

5. In general, tourmaline-rich rocks are products of (CO1, K1)

(a) Metamorphism

(b) Magmatic crystallisation

(c) Metasomatism

(d) Oxidation and supergene enrichment

6. The chemical formula of the barite mineral is (CO2, K2)

(a) $BaSO_4$

(b) $BaSO_3$

(c) $BaSO_2$

(d) $BaCaSO_4$

7. India is one of the chief producers of which of the following ores (CO2, K2)

(a) Gold

(b) Diamond

(c) Manganese

(d) Silver

8. Ore deposits formed by the mechanical concentration process are also called (CO1, K1)

(a) Placer deposits

(b) Sedimentary deposits

(c) Evaporation deposits

(d) All of the above

9. An exceptionally rich shoot or bunch of ore is called: (CO2, K2)

(a) Bonanza

(b) Chimneys

(c) Flake

(d) Pitch

10. The smallest amount of metal percentage, at which mining is profitable, is known as (CO2, K2)

(a) Average grade

(b) Cut-off grade

(c) Mill grade

(d) Economic grade

Part B (5 × 5 = 25)

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

11. (a) Write short notes on placer deposits. (CO3, K3)

Or

(b) Explain in detail the Geological thermometers. (CO3, K3)

12. (a) Write in detail about the metallogenic epochs and provinces. (CO2, K3)

Or

(b) Discuss metasomatic replacement deposits. (CO2, K3)

13. (a) Explain the mineralogy, mode of occurrence, and distribution of Iron ores. (CO2, K3)

Or

(b) Write short notes on the mineralogy, mode of occurrence, and distribution of Copper deposits. (CO2, K2)

14. (a) Write short notes on the coal deposits of India. (CO2, K2)

Or

(b) Classify the different types of mining methods. (CO3, K3)

15. (a) Discuss about the underground coal mining methods. (CO2, K2)

Or

(b) Elucidate the mining laws for minor and major minerals. (CO3, K4)

Part C (5 × 8 = 40)

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

16. (a) Describe in detail the minerals that are used for the manufacture of cement. (CO3, K3)

Or

(b) Write an essay on strategic, critical, and essential minerals. (CO3, K4)

17. (a) Discuss in detail the oxidation and supergene enrichment of mineral deposits with a neat sketch. (CO2, K3)

Or

(b) Describe gold mineralization under the control of ore localization. (CO2, K2)

18. (a) Write an essay on molybdenum deposits, their mineralogy, mode of occurrence, and distribution in India. (CO2, K2)

Or

(b) Write an essay on radioactive mineral deposits, their mineralogy, mode of occurrence, and distribution in India. (CO3, K4)

19. (a) Describe the machineries that are used in mining industry. (CO3, K4)

Or

(b) Describe the surface mining methods: open-pit mining, strip mining, and quarrying. (CO3, K4)

20. (a) Write an essay on reserve estimation by the United Nations Framework Classification (UNFC). (CO2, K3)

Or

(b) Define deep-sea mining. Describe the mining process and the environmental impact of deep-sea mining. (CO3, K4)

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R1002

Sub. Code
464502

M.Sc. DEGREE EXAMINATION, APRIL – 2024

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 type questions by choosing the correct option.

1. Which type of foundation is most suitable for expansive soils? (CO2, K2)
   (a) Shallow Foundation
   (b) Deep Foundation
   (c) Pile Foundation
   (d) Raft Foundation

2. In civil engineering, what criteria are considered during the selection of rock sites for construction? (CO2, K2)
   (a) Simplify (b) Compare
   (c) Distinguish (d) Examine

3. What term is used to describe the process of categorizing geological information for its relevance in civil engineering projects? (CO1, K1)
   (a) Classify (b) Show
   (c) Explain (d) Simplify

4. How does engineering geology contribute to the safety and stability of dams? (CO1, K1)

(a) Explain (b) Compare

(c) Illustrate (d) Operate

5. Which term is used to describe the process of determining the characteristics and suitability of rocks for construction purposes? (CO2, K3)

(a) Operate (b) Classify

(c) Generate (d) Interpret

6. What is the primary purpose of a site investigation in foundation engineering? (CO2, K3)

(a) Estimating construction costs

(b) Assessing environmental impact

(c) Understanding geological conditions

(d) Calculating structural loads

7. Which word best describes the process of categorizing acid mine drainage mitigation strategies? (CO1, K1)

(a) Examine (b) Classify

(c) Generate (d) Simplify

8. What is the primary focus of the essay on marine oil pollution? (CO1, K1)

(a) Comparing prevention methods

(b) Classifying pollution sources

(c) Analyzing health hazards

(d) Examining cleanup efforts

9. What is the primary objective of the essay on acid rain? (CO2, K2)

(a) Compare its sources

(b) Simplify its formation

(c) Examine its effects

(d) Generate adaptation strategies

10. Which word best describes the process of proposing solutions to mitigate climatic change? (CO1, K1)

(a) Generate (b) Distinguish

(c) Operate (d) Compare

Part B (5 × 5 = 25)

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

11. (a) Analyze the laboratory, field, and instrument testing techniques used for evaluating the engineering properties of rocks. (CO2, K2)

Or

(b) Interpret the challenges and benefits associated with utilizing dimensional stones in construction. (CO3, K3)

12. (a) Explain the role of engineering geology in civil engineering projects, focusing on its significance in dam construction. (CO3, K4)

Or

(b) Discuss the application of engineering geology in the construction of reservoirs. (CO5, K5)

13. (a) Explain various foundation types, highlighting their features and applications. (CO6, K6)

Or

(b) Compare settlement methods for foundations, discussing pros and cons, considering cost, time, and effectiveness. (CO5, K5)

14. (a) Propose and evaluate potential solutions to mitigate health hazards associated with mining activities. (CO4, K4)

Or

(b) Interpret the specific hazards linked to coal mining. Examine the health, environmental, and safety aspects associated with coal extraction, transportation and combustion. (CO4, K4)

15. (a) Investigate and analyse the factors contributing to climatic change. Explore natural and anthropogenic causes, assessing their individual and cumulative impacts on the Earths climate. (CO2, K3)

Or

(b) Discuss how changing climatic conditions influence the spread of diseases, impact public health, and pose challenges to healthcare systems. (CO4, K4)

Part C (5 × 8 = 40)

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

16. (a) Compare and contrast the physical and engineering properties of rocks and soils. (CO3, K3)

Or

(b) Discuss the importance of testing and quality control in ensuring the suitability of road materials for construction. (CO5, K5)

17. (a) Distinguish the role of engineering geology in site improvement for engineering constructions. (CO4, K4)

Or

(b) Compare the challenges and considerations of engineering geology in different civil engineering projects, such as dams, tunnels, road cuts, and bridges. (CO4, K4)

18. (a) Explore differences between shallow and deep foundations, considering factors like soil composition and building requirements. (CO5, K5)

Or

(b) Interpret the significance of geological conditions in site investigations for foundations. (CO3, K3)

19. (a) Investigate the environmental consequences of mineral extraction and processing. (CO3, K3)

Or

(b) Differentiate between sources of marine oil pollution, exploring the impact on marine ecosystems. (CO3, K3)

20. (a) Compare the impacts of global warming on different ecosystems. (CO3, K3)

Or

(b) Discuss the sources of acid rain, the chemical processes involved, and its environmental repercussions on soil, water bodies and vegetation. (CO4, K4)

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