Karnataka Board Class 12, 2026 Geology Question Paper with Solutions

Time Allowed :3 Hours	Maximum Marks :80	Total questions :38

General Instructions

Read the following instructions very carefully and strictly follow them:

1. The paper is divided into Section A and Section B.
2. Section A includes objective-type questions.
3. All questions in Section A are compulsory.
4. Section B includes short answer, and long answer type questions.
5. Answers must be written legibly within the word limit.
6. Use of unfair means or electronic devices is prohibited.
7. Follow the correct format and instructions for each section.

Section - A

1. What kind of structure is characterized by an essentially granular and equidimensional mineral grain arrangement?

(A) Schistose structure

(B) Gneissose structure

(C) Granulose structure

(D) Cataclastic structure

Correct Answer: (C) Granulose structure

Solution:

Step 1: Understanding the term ”granulose structure.”

Granulose structure is characterized by granular, equidimensional mineral grains that are typically found in some types of igneous rocks. The grains are of nearly equal size and shape, distinguishing it from other structures with non-equidimensional mineral arrangements.

Step 2: Evaluating the options.

- **(A) Schistose structure:** Incorrect. Schistose structure refers to a foliated texture, where mineral grains are aligned in a parallel arrangement, not granular.
- **(B) Gneissose structure:** Incorrect. Gneissose structure also involves foliation, with alternating layers of light and dark minerals, not granular grains.
- **(C) Granulose structure:** Correct. This is the structure with equidimensional and granular mineral grains.
- **(D) Cataclastic structure:** Incorrect. Cataclastic structure is formed due to deformation, where minerals are broken and crushed, not granular.

Step 3: Conclusion.

The correct answer is (C) Granulose structure, which is characterized by granular, equidimensional grains.

Final Answer: Granulose structure.

Quick Tip

Granulose structure refers to a granular texture where mineral grains are nearly equal in size and shape, typical in some igneous rocks.

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2. The presence of angular grains in a sedimentary rock like breccia suggests:

(A) Long transport distance

(B) Short transport distance

(C) Chemical precipitation

(D) High temperature formation

Correct Answer: (B) Short transport distance

Solution:

Step 1: Understanding angular grains in breccia.

Breccia is a type of sedimentary rock that contains angular grains. The presence of angular grains suggests that the rock has not been transported over a long distance because long transport distances usually result in rounded grains due to abrasion during transport.

Step 2: Evaluating the options.

- **(A) Long transport distance:** Incorrect. Long transport would typically result in rounded grains, not angular ones.
- **(B) Short transport distance:** Correct. Short transport distance allows the grains to remain angular without much abrasion.
- **(C) Chemical precipitation:** Incorrect. Chemical precipitation forms sedimentary rocks through evaporation and not related to angular grains.
- **(D) High temperature formation:** Incorrect. High temperature formation is related to metamorphic processes, not angular grains in sedimentary rocks.

Step 3: Conclusion.

The correct answer is (B) Short transport distance, as angular grains are typically found in rocks that have not traveled far.

Final Answer: Short transport distance.

Quick Tip

Angular grains in sedimentary rocks like breccia indicate that the grains have undergone little transportation, preserving their sharp edges.

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3. The mesozone is characterized by which of the following conditions?

(A) Low temperature and high shear stress

(B) Moderate temperature and mixed pressure types

(C) High temperature and hydrostatic pressure

(D) Low pressure and low temperature

Correct Answer: (B) Moderate temperature and mixed pressure types

Solution:

Step 1: Understanding the problem.

The mesozone is typically characterized by moderate temperature and mixed pressure types, which is the most suitable condition among the given options.

Step 2: Explanation of the options.

- **(A) Low temperature and high shear stress:** Incorrect. This does not accurately describe the mesozone.
- **(B) Moderate temperature and mixed pressure types:** Correct. The mesozone is characterized by moderate temperatures and a mixture of pressure types.
- **(C) High temperature and hydrostatic pressure:** Incorrect. This does not reflect the conditions of the mesozone.
- **(D) Low pressure and low temperature:** Incorrect. This is not a characteristic of the mesozone.

Step 3: Conclusion.

The correct answer is (B) moderate temperature and mixed pressure types.

Final Answer: Moderate temperature and mixed pressure types.

Quick Tip

The mesozone is typically found with moderate conditions, both in temperature and pressure.

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4. The main orogeny that created the Alps and Carpathians took place during which era?

(A) Mesozoic

(B) Cenozoic

(C) Paleozoic

(D) Precambrian

Correct Answer: (B) Cenozoic

Solution:

Step 1: Understanding orogeny and mountain formation.

Orogeny refers to the process of mountain formation. The Alps and Carpathians were primarily formed during the Cenozoic era.

Step 2: Explanation of the options.

- **(A) Mesozoic:** Incorrect. The Mesozoic era saw the formation of other mountain ranges, but the Alps and Carpathians were mainly formed in the Cenozoic era.
- **(B) Cenozoic:** Correct. The Alps and Carpathians are primarily the result of orogenic activity during the Cenozoic era.
- **(C) Paleozoic:** Incorrect. The Paleozoic era did witness some mountain-building, but not the formation of the Alps and Carpathians.
- **(D) Precambrian:** Incorrect. The Precambrian era predates the formation of most of the major mountain ranges seen today.

Step 3: Conclusion.

The correct answer is (B) Cenozoic, as the formation of the Alps and Carpathians took place during this era.

Final Answer: Cenozoic.

Quick Tip

Orogenic events that form major mountain ranges like the Alps and Carpathians occurred predominantly during the Cenozoic era.

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5. Inliers are areas of:

(A) Older rocks surrounded by younger rocks

(B) Younger rocks surrounded by older rocks

(C) Rocks formed by igneous activity

(D) Rocks altered by faulting

Correct Answer: (A) Older rocks surrounded by younger rocks

Solution:

Step 1: Understanding the term ”inliers.”

In geology, ”inliers” refer to areas of older rocks that are surrounded by younger rocks. These older rock formations are typically exposed at the surface in certain regions due to tectonic forces and geological processes.

Step 2: Evaluating the options.

- **(A) Older rocks surrounded by younger rocks:** Correct. This is the definition of inliers in geological terms.
- **(B) Younger rocks surrounded by older rocks:** Incorrect. This is not the definition of inliers; it would describe an ”outlier” instead.
- **(C) Rocks formed by igneous activity:** Incorrect. Inliers are not specifically related to igneous rock formation.
- **(D) Rocks altered by faulting:** Incorrect. Faulting does not necessarily define inliers; inliers refer to the age relationship of the rocks.

Step 3: Conclusion.

The correct answer is (A) Older rocks surrounded by younger rocks, as this accurately defines inliers in geology.

Final Answer: Older rocks surrounded by younger rocks.

Quick Tip

In geology, ”inliers” are regions where older rock formations are surrounded by younger rocks, often exposed due to erosion or tectonic activity.

Section - B

6. Discuss the morphology and geological range of brachiopods.

Solution:

Step 1: Morphology of brachiopods.

Brachiopods are marine invertebrates with hard, bivalve shells. They have a unique bilateral symmetry and a lophophore, a specialized feeding structure. The shells are made up of two valves, with the dorsal valve being larger than the ventral valve. Their body is divided into a pedicle (for attachment) and a crown (containing the lophophore).

Step 2: Geological range of brachiopods.

Brachiopods first appeared during the Cambrian period, around 500 million years ago. They were extremely abundant during the Paleozoic era, particularly in the Ordovician and Silurian periods. Today, brachiopods are found in much smaller numbers, mostly in deep-sea environments, with their geological range extending from the Cambrian to the present.

Step 3: Evolutionary significance.

Brachiopods are considered important for understanding the Paleozoic marine ecosystems and are used in paleontological studies to analyze the geological history of oceans and the biodiversity of ancient life.

Quick Tip

Brachiopods are often mistaken for bivalve mollusks, but their distinct symmetry and unique feeding structure (lophophore) set them apart.

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7. How do vesicular and amygdaloidal structures form? Explain their importance.

Solution:

Step 1: Define vesicular structures.

Vesicular structures are formed when gas bubbles are trapped in lava during volcanic eruptions. As the lava cools and solidifies, these gas bubbles leave behind cavities, creating vesicles or pores in the rock, typically found in basalt or pumice.

Step 2: Define amygdaloidal structures.

Amygdaloidal structures are similar to vesicular structures but involve the filling of the vesicles with secondary minerals, such as quartz, calcite, or zeolite, after the lava has solidified. This process occurs when water and minerals seep into the vesicles over time, filling them with various minerals.

Step 3: Importance of these structures.

Both vesicular and amygdaloidal structures provide valuable information about the volcanic history and cooling processes of igneous rocks. They also serve as reservoirs for water and other fluids in the Earth's crust, influencing the rock's porosity and permeability.

Quick Tip

Vesicular and amygdaloidal structures offer insights into the cooling rates of volcanic rocks and play a crucial role in the study of igneous petrology.

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8. Explain with neat labelled diagram morphology of corals.

Solution:

Step 1: Define Corals.

Corals are marine invertebrates that belong to the phylum Cnidaria. They form coral reefs and exist in two main forms: solitary and colonial. They are known for their hard exoskeleton, which is primarily composed of calcium carbonate.

Step 2: Describe the Morphology of Corals.

The morphology of corals involves various structures like the polyp, tentacles, and calyx. The polyp is the living part of the coral, and it secretes the hard skeleton that forms the coral reef.

Step 3: Explanation of the Diagram.

The diagram of a coral's morphology includes the following parts:

- **Calyx:** The cup-like structure in which the polyp sits.
- **Tentacles:** The arms that extend from the polyp and contain stinging cells used to capture food.

- **Coelenteron:** The central body cavity where digestion occurs.

Morphology of Corals

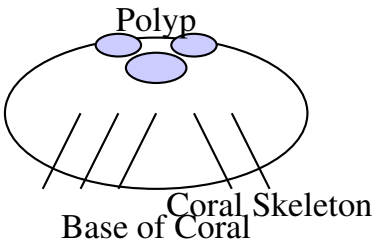

Figure 1: Morphology of Corals

Quick Tip

Corals play a crucial role in the marine ecosystem by forming coral reefs, which are important habitats for marine life.

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9. Describe the significance of the Glossopteris fossil in understanding the geological history of Gondwana.

Solution:

Step 1: Define Glossopteris.

Glossopteris is an extinct genus of seed ferns that played a crucial role in the understanding of the past vegetation and climate of the Gondwana landmass. The fossil remains of Glossopteris are found across Southern continents like Africa, South America, India, and Australia.

Step 2: Explain its significance.

The significance of the Glossopteris fossil lies in its contribution to the theory of continental drift. The widespread distribution of these fossils across multiple continents that are now separated provides evidence of the existence of the supercontinent Gondwana.

Step 3: Highlight the geological impact.

The discovery of Glossopteris fossils across different continents suggests that these landmasses were once part of a single, larger landmass (Gondwana). This evidence helped validate the idea of continental drift and played a key role in developing the theory of plate tectonics.

Quick Tip

The study of fossils like Glossopteris is instrumental in understanding the historical movement of continents and the changes in the Earth's geological structure over time.

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10. Discuss types of unconformity.

Solution:

Step 1: Define unconformity.

An unconformity is a surface of erosion or non-deposition that separates two layers of rock, indicating a gap in the geological record. Unconformities can form when there is a period of erosion, uplift, or lack of deposition.

Step 2: Types of unconformities.

(i) Angular Unconformity:

Angular unconformity occurs when horizontally parallel strata of sedimentary rocks are deposited on top of tilted or folded layers of older rock.

(ii) Disconformity:

A disconformity is a gap in the rock record between two parallel layers of sedimentary rocks, where there is an erosional surface separating them, but the layers remain parallel.

(iii) Nonconformity:

Nonconformity occurs when sedimentary rocks are deposited on top of older, eroded crystalline rocks such as granite or metamorphic rocks.

Quick Tip

Unconformities reveal gaps in the geological record, helping geologists understand the history of Earth's surface.

11. Explain the properties of Pumice and Basalt.

Solution:

Step 1: Properties of Pumice.

Pumice is a light, porous volcanic rock that is formed from rapidly cooling lava that is full of gas bubbles. It is highly abrasive and is often used in cleaning and polishing products. Pumice is light in weight and floats on water due to its low density.

Step 2: Properties of Basalt.

Basalt is a dense, dark-colored volcanic rock that forms from the solidification of lava. It is rich in iron and magnesium and is one of the most common igneous rocks found on Earth's crust. Basalt has a fine-grained texture, and it is the main component of oceanic crust.

Quick Tip

Pumice is known for its low density and porosity, while basalt is denser and commonly found in oceanic crust.

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12. Discuss the significance of structural geology in the exploration of groundwater.

Solution:

Step 1: Define structural geology.

Structural geology is the study of rock formations and their deformations, such as faults, folds, and fractures, which influence the flow of groundwater. It helps in understanding the behavior and movement of groundwater in various geological settings.

Step 2: Importance in groundwater exploration.

(i) Understanding aquifers:

Structural geology helps in identifying and mapping the aquifers (rock layers that contain groundwater). It provides information about the porosity and permeability of rock layers that affect water storage and movement.

(ii) Identifying fractures and faults:

Fractures, faults, and other geological structures act as pathways for groundwater flow. By studying these structures, geologists can locate potential sources of groundwater and estimate their yield.

(iii) Predicting groundwater contamination:

Structural geology helps predict areas where groundwater might be contaminated due to the movement of pollutants along faults or fractures. This is crucial for water conservation and protection.

Quick Tip

Structural geology is critical in groundwater exploration as it helps identify and understand aquifers, faults, and the flow paths of groundwater.

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13. What is the role of temperature in metamorphism?

Solution:

Step 1: Define metamorphism.

Metamorphism is the process by which pre-existing rocks (parent rocks) undergo changes in mineralogy, texture, and chemical composition due to changes in temperature, pressure, and chemical environment.

Step 2: Temperature's role in metamorphism.

Temperature is one of the primary factors that drive metamorphism. When rocks are exposed to high temperatures, their minerals become unstable and may recrystallize into more stable minerals. The increase in temperature accelerates the movement of ions within the rock, causing changes in mineral structure.

Step 3: Temperature range for metamorphism.

Metamorphism typically occurs at temperatures between 200°C and 700°C. Rocks subjected to higher temperatures may undergo partial melting, while lower temperatures lead to more mild forms of metamorphism.

Step 4: Effects of temperature on rocks.

Higher temperatures promote the growth of larger crystals and promote changes in the

mineral composition of the rock. Temperature also plays a significant role in determining the type of metamorphic rock that forms.

Quick Tip

Temperature affects the recrystallization of minerals in rocks, leading to changes in texture and mineral composition during metamorphism.

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14. What is pillow lava?

Solution:

Step 1: Define pillow lava.

Pillow lava is a type of lava that forms when basaltic lava erupts underwater or under ice. As the lava flows, it rapidly cools and solidifies upon contact with the water, forming distinctive, rounded, pillow-like shapes.

Step 2: Characteristics of pillow lava.

Pillow lava typically has a smooth, shiny surface with a distinct, rounded, pillow-shaped structure. These structures are usually hollow, and their interiors often contain vesicles (gas bubbles trapped during solidification).

Step 3: Formation process of pillow lava.

The rapid cooling of the lava when it comes into contact with cold water leads to the formation of a glassy outer layer. The inner portion of the lava continues to flow and solidifies more slowly, creating the pillow-like formations.

Step 4: Geological significance.

Pillow lavas are common in mid-ocean ridges and underwater volcanoes. They provide evidence of ancient underwater volcanic activity and offer insights into the processes occurring at divergent plate boundaries.

Quick Tip

Pillow lava is a key indicator of underwater volcanic activity, helping geologists understand the formation of oceanic crust.

15. Write the classification of igneous rocks.

Solution:

Step 1: Define Igneous Rocks.

Igneous rocks are formed by the solidification of molten material called magma. These rocks are classified based on their texture and mineral composition.

Step 2: Classification of Igneous Rocks.

Igneous rocks are mainly classified into two categories:

(1) Intrusive (Plutonic) Rocks:

These rocks are formed when magma cools slowly beneath the Earth's surface, allowing large crystals to form. An example is Granite.

(2) Extrusive (Volcanic) Rocks:

These rocks are formed when lava cools quickly on the Earth's surface, resulting in smaller crystals. An example is Basalt.

Quick Tip

Igneous rocks are key to understanding the Earth's internal processes and are the most abundant type of rock in the Earth's crust.

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16. Write a note on agents of metamorphism.

Solution:

Step 1: Define Metamorphism.

Metamorphism refers to the process in which existing rocks (either igneous, sedimentary, or other metamorphic rocks) undergo changes in mineral composition, texture, and structure due to changes in temperature, pressure, or chemically active fluids.

Step 2: Agents of Metamorphism.

There are three main agents responsible for metamorphism:

(1) Heat:

Heat increases the rate of chemical reactions and can cause the minerals in a rock to recrystallize, forming new minerals. Heat from the Earth's interior is the primary source.

(2) Pressure:

Pressure from tectonic forces can cause rocks to change their structure and form foliation, where minerals align under high pressure. This occurs in regions of mountain-building.

(3) Chemically Active Fluids:

Fluids like water carrying dissolved ions can facilitate the transfer of ions between minerals, resulting in the formation of new minerals and textures. These fluids are commonly involved in the process of hydrothermal metamorphism.

Quick Tip

Metamorphism helps in understanding the Earth's crustal processes and the transformation of rocks under various geological conditions.
