5. Minerals and Rocks

1. Multiple choice question

(i) Which one of the following are the two main constituents of granite?

(a) Iron and nickel

(b) Iron and silver

(c) Silica and aluminum

(d) Iron Oxide and potassium

Answer: (c) Silica and aluminum

(ii) Which one of the following is the salient feature of metamorphic rocks?

(a) Changeable
(b) Quite
(c) Crystalline
(d) Foliation

Answer: (d) Foliation

(iii) Which one of the following is not a single element mineral?

(a) Gold
(b) Silver
(c) Mica
(d) Graphite

Answer: (c) Mica

(iv) Which one of the following is the hardest mineral?

(a) Topaz
(b) Diamond
(c) Quartz
(d) Feldspar

Answer: (b) Diamond

(v) Which one of the following is not a sedimentary rock?

(a) Tillite
(b) Borax
(c) Breccia
(d) Marble

Answer: (d) Marble

2. Answer the following questions in about 30 wor

(i) What do you mean by rocks? Name the three major classes of rocks.

Answer: Rocks may simply be defined as all those materials, which form the crust of the earth, whether hard like granite or soft like clay, gravel, or sandstone. Igneous, sedimentary and metamorphic are three major classes of rocks. Petrology is science of rocks.

(ii) What is an igneous rock? Describe the method of formation and characteristics of igneous rock.

Answer: The rocks, which are formed through the solidification of molten materials, are called igneous rocks. Igneous rock is formed through the cooling and solidification of magma or lava. Igneous rocks are known as 'parent rocks' or primary rocks as all other rocks are derived from the igneous rocks.

(iii) What is meant by sedimentary rock? Describe the mode of formation of sedimentary rock.

Answer: Sedimentary rocks are formed from those materials, which are deposited at favourable sites by agents of denudation such as rivers, glaciers, wind, and ocean waves. The deposited material is known as sediment and the rocks thus formed are called sedimentary rocks.

(iv) What relationship explained by rock cycle between the major type of rock?

Answer: Rocks don’t remain in their original forms for long, but may undergo transformation. Igneous rocks are primary rocks, but sedimentary and metamorphic rocks are form from these primary rocks. Igneous rocks are exposed to the forces of weathering and denudation, and sedimentary rocks are formed. The igneous and the sedimentary rocks are transformed into metamorphic rocks under the influence of high temperature and pressure. The sedimentary rocks may again be buried so deep that they melt and resulting in the formation of igneous rocks. The change of one rock into another type under different conditions is known as rock cycle.

3. Answer the following questions in about 150 wor

(i) Define the term 'mineral' and name the major classes of minerals with their physical characteristics.

Answer: The mineral is a naturally occurring homogeneous solid that is an inorganic substance, having an orderly atomic structure and a definite chemical composition and physical properties. Some Major Minerals and their Characteristics are following:

Feldspar: It is one of the most widely spread minerals. Silicon and oxygen are common elements in all types of feldspar, and sodium, potassium, calcium, aluminum, etc., are found in specific feldspar variety. It is used for ceramics and gloss making.

Quartz: It consists of silica and forms one of the most important components of sand and granite. It is white or colorless and is used in radio and radar.

Pyroxene: It consists of calcium, aluminum, magnesium, iron and silica. It is of green or black colour.

Amphibole: It forms about 7 per cent of the earth's crust and consists mainly of aluminum, calcium, silica, iron, magnesium, etc. It is used in asbestos industry.

Mica: It consists of potassium, aluminum, magnesium, iron, silica, etc., and forms 4 % of the earth's crust. It is generally found in igneous and metamorphic rocks and is mainly used in electrical instruments.

Olivine: The main elements of olivine are magnesium, iron and silica. It is normally a greenish crystal.

Other minerals like chlorite, calcite, magnetite, hematite, bauxite, barite, etc., are also present in rocks.

(ii) Describe the nature and mode of origin of the chief types of rock at the earth's crust. How will you distinguish them?

Answer: Igneous, sedimentary, and metamorphic are three chief types of rocks. Igneous rocks are formed when magma cools and solidifies. The word igneous is derived from a Latin word ignis, which means fire. Thus, the source of all igneous- rocks is molten materials at very high temperature. Sedimentary rocks are the result of deposition of fragments of rocks by exogenous processes. The word 'sedimentary' is derived from the Latin word sediment, which means setting. Different rocks of the earth's surface are exposed to denudation agents and are broken into fragments. Such fragments are transported and deposited at suitable sites and are turned into sedimentary rocks.

Metamorphic rocks are formed out of existing rocks undergoing recrystallisation. The word metamorphic means ‘change of form’. Thus, metamorphic rocks are formed when the original character of the igneous and sedimentary rocks like their colour, hardness, texture, and mineral composition, etc., is partly or wholly changed due to heat and pressure of the earth.

(iii) What are metamorphic rocks? Describe the types of metamorphic rock and how are they formed?

Answer: Metamorphic rocks are formed out of existing rocks undergoing recrystallisation. The word metamorphic has been derived from two Greek words

'Meta' that means 'change' and 'Orphic' meaning 'form'.

Thus, metamorphic rocks are formed when the original character of the igneous and sedimentary rocks—their colour, hardness, texture, and mineral composition is partly, or wholly changed.

Metamorphic rocks are classified into two broad groups- cataclysmic rocks and recrystallised rocks.

Cataclysmic Metamorphic Rock's: These rocks are formed by mechanical disruption of the original minerals. As a result of high pressure, granite is converted into gneiss; clay and shale are transformed into schist at great depths of the earth's crust.

Recrystallised rocks: These rocks are formed by recrystallisation of the original minerals. Minerals with different chemical formulae and crystal lattices ore produced due to recrystallisation. There are two types of thermal metamorphism—contact metamorphism and regional metamorphism.

Types of metamorphic rocks depend upon original rocks that were subjected to metamorphism. Metamorphic rocks are classified into two major groups — foliated rocks and non-foliated rocks. Gneissoid, granite, syenite, slate, schist, marble, quartzite, etc., are some examples of metamorphic rocks.