The World of Rocks

Que 1: 'Surface features in sediments formed during the sedimentation process may be preserved and exhibited in the resulting sedimentary rocks as sedimentary structures'. Analyse the statement and give a short note on the major structures commonly found in sedimentary rocks. ***Marks :(4)***

Ans: Brief description of stratification-and bedding- lamination-cross bedding-graded bedding-ripple marks- mud cracks-raindrop marks.

Que 2: What do you mean by the term 'texture of an igneous rock'? What are the important textures of igneous rocks? ***Marks :(4)***

Ans: The texture of an igneous rock describes the degree of crystallisation, size, shape, and arrangement of the mineral grains or crystals that make up the rock.

Size of the mineral grains -Coarse-medium-fine

Crystallinity- holocrystalline- microcrystalline- holohyaline

Granularity- phaneritic-aphanitic- porphyritic

Que 3: a). Clastic sedimentary rocks are formed from ---------

(i) minerals dissolved in sea water

(ii) remains of marine organisms

iii) accumulation and cementation of fragments of pre-existing rocks

iv) residual product left behind at the site of weathering

b) Mention the various stages involved in the process of formation of clastic sedimentary rocks. ***Marks :(3)***

Ans: a) iii) accumulation and cementation of fragments of pre-existing rocks

b) Weathering, erosion, transportation, deposition, diagenesis and lithification.

Que 4: a) There are several factors/agents involved in the transformation of a protolith into a metamorphic rock. Mention any three agents that contribute to the process of metamorphism. ***Marks :(4)***

b) In what manner does the pressure factor help in metamorphic process?

Ans: a) Heat, pressure and chemically active fluids.

b) Pressure affects the texture of rocks, grains become flattened and re-orient along preferred direction, foliation develops resulting from overall orientation of flattened minerals**.**

Que 5: Give examples to the following ***Marks :(4)***

i) Igneous rock having aphanitic texture

ii) Volcanic rock with glassy texture

iii) Sedimentary rock composed entirely of coarse-grained quartz particles

iv) Metamorphic rock having a gneissic structure

Ans: i) Basalt/Rhyolite

ii) Obsidian

iii) Sandstone

iv) Biotite Gneiss

Que 6: Differentiate between the following

i) Magma and lava

ii) Conglomerate and breccia ***Marks :(4)***

Ans: i) Magma - molten rock materials beneath the earth:

Lava - magma erupted at the surface.

ii) Conglomerate - sedimentary rock composed of cemented together well-rounded clasts and pebbles.

Breccia - sedimentary rock composed of angular pieces of various sizes cemented together.

Que 7: Rocks can be broadly classified into igneous, sedimentary and metamorphic types. But the rocks of the earth do not remain the same forever. Describe the geologic process by which a rock is transformed from one type to another over millions of years. Illustrate with the help of a neat diagram showing the concept of rock cycle. ***Marks :(4)***

Ans: Diagram of rock cycle

Processes of recycling of rocks over millions of years-melting, crystallisation, formation of igneous rocks, sedimentation, diagenesis and lithification leading to the formation of sedimentary rocks, changing conditions of heat and pressure, metamorphism, formation of metamorphic rocks and ultimate complete melting during extreme condition and generation of a new magma.

Que 8: a) Dykes are tabular plutons that cut across country rocks, while -------- are plutons with their upper and lower contacts parallel to the layering of country rocks.

b) Give a diagrammatic representation of a dyke, a sill and a batholith. ***Marks :(4)***

Ans: a): Sills

b): Labelled diagram of dykes, sills and batholiths

Que 9: a) Which one of the following is produced by the crystallisation of magma at great depth? ***Marks :(3)***

(Gabbro, Basalt, Rhyolite, Andesite)

b) Describe the texture of igneous rocks formed by the crystallisation of magma at depth?

Ans: a) Gabbro

b) They are coarse grained and phaneritic

Que 10: a) Igneous rocks containing a large proportion of feldspar and silica are termed ------

(Mafic, Felsic, Intermediate, Ultramafic)

b) What is the difference between mafic and ultramafic igneous rocks? *Marks :(3)*

Ans: a) Felsic

b) Mafic rocks are rich in minerals containing magnesium and iron; and their silica percentage ranges between 45- and 52; they are also dark in colour

Ultramafic rocks are much more rich in magnesium and iron; their silica percentage is below 45.

Que 11: Classify the given metamorphic rocks into foliated and non-foliated types.

(Schist, Quartzite, Gneiss, Marble, Slate, Hornfels) ***Marks :(3)***

Ans: Foliated – Schist, Gneiss, Slate

Non-foliated – Quartzite, Marble, Hornfelse

Que 12: State whether the following statements are true or false

i) Plutonic rocks cool relatively faster than volcanic rocks

ii) Volcanic rocks are fine grained in texture

iii) Hypabyssal rocks are formed from magma crystallized at very great depth

iv) Extrusive rocks are formed at the surface ***Marks :(3)***

Ans: i) False

ii) True

iii) False

iv) True

Que 13: a) Which one of the following statements is true about basalt?

(i). It is composed mostly of felsic minerals

(ii). It is a fine-grained volcanic rock

(iii). It is a fine-grained plutonic rock

(iv). It is a coarse-grained plutonic rock

b) What do you mean by the term granularity in the case of igneous rocks?

c) Mention the two principal mineral constituents of basalts. ***Marks :(4)***

Ans: a) (ii). It is a fine-grained volcanic rock.

b) The granularity of an igneous rock describes the size of the mineral grains or crystals that make up the rock. Igneous rocks can be divided into three types based on granularity - coarse grained, fine grained and medium grained igneous rocks.

c) Pyroxene and plagioclase feldspars

Que 14: a) Which one of the following is NOT a sedimentary rock?

(Shale, Slate, Laterite, Limestone)

b) Differentiate between clastic and non-clastic sedimentary rocks. ***Marks :(3)***

Ans: a: Slate

b) Clastic-sedimentary rocks are formed by lithification of broken fragments of rocks:

Non-clastic rocks are sedimentary rocks formed by chemical, biochemical or organic processes.