University of the State of New York

33 Academic Examination

GEOLOGY

Friday, March 8. 1889 – Time. 1:30 to 4 P.M. only.

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40 credits, necessary to pass, 50.

1. Define dike, concretion, synclinal strata, strike, formation, outcrop.

Dikes are tabular or sheet-like bodies of magma that cut through and across the layering of adjacent rocks. They form when magma rises into an existing fracture, or creates a new crack by forcing its way through existing rock, and then solidifies.

Concretion is a mass or nodule of mineral matter, usually oval or nearly spherical in shape, and occurring in sedimentary rock. It is formed by the accumulation of mineral matter in the pore spaces of the sediment, usually around a fossil or fossil fragment acting as a nucleus.

Layers of rock which are inclined downward from opposite directions, so as to meet in a common point or line.

Strike is the course or bearing of a structural surface, such as an inclined bed, as it intersects a horizontal plane.

Formation is a geological feature of the earth

Outcrop is the part of a rock formation that appears above the surface of the surrounding land.

2. Distinguish between igneous and metamorphic rocks and mention and example of each

Igneous rocks are formed when molten rock (magma) cools and solidifies, with or without crystallization, either below the surface as intrusive (plutonic) rocks or on the surface as extrusive (volcanic) rocks. This magma can be derived from either the Earth's mantle or pre-existing rocks made molten by extreme temperature and pressure changes. Over 700 types of igneous rocks have been described, most of them formed beneath the surface of the Earth's crust. Granite, Pumice, Basalt and Diorite are examples.

Metamorphic rock is the result of the transformation of a pre-existing rock type, in a process called metamorphism, which means "change in form". The rock is subjected to extreme heat (>150 degrees Celsius) and pressure causing profound physical and/or chemical change. The initial rock may be sedimentary rock, igneous rock or another older metamorphic rock. Examples are Slate, Gneiss, Quartzite and Marble.

3. To which group of minerals does each of the following belong: diamond, calcite, common salt, coal?

4. Mention three kinds of iron ore

The major rock types mined for the production of metallic iron are: massive haematite, pisolitic goethite/limonite, which provide a "high-grade" ore, and banded metasedimentary ironstone, magnetite-rich metasomatite, to a much lesser degree, rocks rich in siderite, rocks rich in chamosite which provide a "low-grade" ore.

5. Describe a geological effect which you have observed in your own neighborhood produced by water, the wind, alternate freezing and thawing

Water: flooding

Wind: erosion of beach dunes

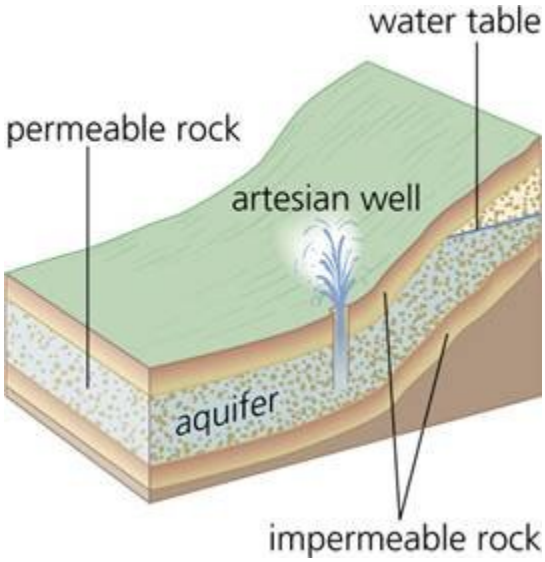
Freezing and Thawing: potholes in the road

6. What are fossils mud-cracks and how were they formed?

Mud-cracks form when muddy sediment is exposed to the atmosphere and dries up. They have a characteristic polygonal shape when viewed from above. When viewed from the side, the cracks are “V”-shaped, with the wider part of the “V” toward the surface. Thus, mud-cracks, when preserved in the rock record, indicate that the sediment formed in an environment that was alternately wet and dry, like a tidal flat or the flood plain of a river. The distinct "V" shape of the crack in cross-sectional view can indicate which way is up.

7. Describe the principle of the artesian well and illustrate by a drawing.

In an artesian well, water rises from an underground water-containing rock layer under its own pressure. Rain falls at one end of the water-bearing layer, or aquifer, and percolates through the layer. The layer fills with water up to the level of the water table. Water will flow from a well under its own pressure if the well head is below the level of the water table.



8. Upon an outline map of North America indicate the position of the Archean continent

9. In what part of New York are Devonian rocks found?

The New York border between Pennsylvania and New Jersey is where it begins. It continues upward to just south of Albany and Syracuse. It encompasses Buffalo, Jamestown, Elmira, Binghamton and Ithaca. For a better visual, see pg. 3 of your ESRT.

10. To what age do the Silurian rocks belong? Where are they found in New York State?

Range from 418-443 millions of years old.

Silurian rocks are found around Niagara Falls and Syracuse. For a better visual, see pg. 3 of your ESRT.

11. Mention the formation of coal and name the principal varieties.

Coal Formation starts with accumulation of organic matter (bits of dead plants) in a low oxygen setting such as a peat bog. The organic matter accumulates and forms a bed of peat. The peat bed gets buried by other sediments and under heat and pressure begins to transform to a low grade coal - a Lignite. More heat and pressure further metamorphose the lignite into Bituminous coal. Even more heat and pressure metamorphose the bituminous coal into a nice hard shiny Anthracite.

11. Mention three kinds of characteristics of the Reptilian age

The great event of this period was the evolution and decline of the dinosaurs. Land-animal life reached its greatest development, in point of size, and had virtually perished from the face of the earth by the end of this age. The dinosaurs evolved in all sizes from a species less than two feet long up to the huge non-carnivorous dinosaurs, seventy-five feet long, that have never since been equaled in bulk by any living creature.