



Department of Minerals and Energy  
Mine Health and Safety  
The Mine Surveyor's Certificate of Competency examinations

**GEOLOGY SYLLABUS**

Framed in accordance with Regulation 28.6 in force in terms of  
Schedule 4 of the Mine Health and Safety Act (Act 29 of 1996) as amended

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**1. MINERALOGY**

1.1 Classification of minerals according to the following chemical grouping:

Native elements, Sulphides and Arsenides, Haloids, Oxides, Carbonates, Sulphates and Phosphates, Silicates (Felspars, Micas, Amphiboles, Pyroxenes, Olivine's and Garnets).

**Note: The chemical composition of individual minerals are not required for examination purposes.**

1.2 A description based on the physical properties i.e. tenacity, hardness, density, colour, lustre, feasibility and chemical grouping of the following minerals:

1.2.1 Diamond, graphite, gold, pyrite, chalcocopyrite, bornite, chalcocite, galena, stibnite, cinnabar, sperrylite, fluorite, halite, quartz, corundum, hematite, magnetite, limonite, cassiterite, pyrolusite, cuprite, calcite, magnesite, dolomite, malachite, gypsum, barytes, apatite, garnet, beryl, topaz, andalusite and nepheline.

1.2.2 Rock forming minerals: orthoclase, microcline, plagioclase, muscovite, biotite, hornblende, augite and olivine.

1.3 Mode of occurrence and use of the above-mentioned minerals.

## **2. PETROLOGY**

2.1 The general physical characters, composition, structure, texture and mode of origin of igneous, sedimentary and metamorphic rocks.

2.2 The commoner rock types:

2.2.1 Igneous-granite, syenite, diorite, andesite, gabbro, pyroxenite, peridotite, dolerite, norite, basalt, anorthosite.

2.2.2 Sedimentary-conglomerates, breccias, clays, tillite, quartzite, grit, the various types of sandstone, mudstone, shale, slate, volcanic agglomerate, volcanic breccia, volcanic tuff, peat lignite, coal, anthracite, limestone, chert, flint, travertine.

2.2.3 Metamorphic- hornfels, gneiss, quartzite, marble, schist, phyllite.

## **3. PHYSICAL GEOLOGY**

The geological action of the atmosphere, rain, rivers, glaciers, ocean, underground water, lake, ice, animals and plants with more particular reference to South African examples.

Underground water: Water-table, springs, caves and landslips.

Volcanic activity, earthquakes, elevation and subsidence of land and their results.

Influence of geological structure on topography of a country with special reference to South African examples.

## **4. STRUCTURAL GEOLOGY**

The origin and constitution of the earth. The more common rock structures. The influence of geological structure on topography of a country with special reference to South African examples.

Common forms assumed by Igneous Rocks- Dyke, sill, boss, batholith, laccolith, lopolith, phacolith, cone, pipe, lava flows.

Structures due to deposition: stratification, primary or initial dip, false or current bedding.

Faults: tensional, compressional, normal, reverse, strike, dip, oblique, thrust, step, trough, horst and block faults.

Structures due to erosion: unconformity, inlier and outlier.

## **5. HISTORICAL GEOLOGY**

Stratigraphic subdivisions in South Africa. The significance of fossils in the identification of strata in South African Geology.

## **6. ECONOMIC GEOLOGY**

Character and origin of the principal types of ore deposits in South Africa.

A knowledge of mineral resources of South Africa with special reference to the following:

Gold, diamond, platinum, silver, copper, chromium, iron, lead, manganese, mercury, tin, tungsten, asbestos, salt, corundum, flourspar, graphite, limestone, mica and vermiculite, coal, clays and slates.

## **7. PROSPECTING METHODS**

A general knowledge of prospecting methods. Geological surveys assisted by aerial photography, geophysical surveys and boreholes.

## **8. GEOLOGICAL MAPS**

General study of geological maps with deductions regarding economic potentialities.

Drawing of sections across geological maps. Effect of topography on outcrops. Determination of dip and strike from outcrops. True and apparent dips. Graphical determination of dip and strike.

Graphical solution of three-borehole problems.

The candidate should be especially familiar with the graphical solution of all types of faults, multiple fault problems and problems affecting the relation of one or more stratum planes with each other and with other geological occurrences.