

# GEOLOGY (GG)

**The Planet Earth:** Origin of the Solar System and the Earth; Geosphere and the composition of the Earth; Shape and size of the Earth; Earth-Moon system; Dating rocks and age of the Earth; Volcanism and volcanic landforms; Interior of the Earth; Earthquakes; Earth's magnetism and gravity, Isostasy; Basic elements of Plate Tectonics; Orogenic cycles.

**Geomorphology:** Weathering and erosion; Soil formation; Transportation and deposition by wind, ice, river, sea and resulting landforms.

**Structural Geology:** Orientation of planes and lines in space – concept of dip, strike, rake and plunge. Contour lines; Rule of 'V's and outcrop patterns; Interpretation of geological maps and cross-section construction; Classification and origin of folds, faults, joints, unconformities, foliations and lineations; Stereographic and equal-area projections of planes and lines; Numerical problems related to outcrop and bore-hole data.

**Paleontology:** Major steps in the evolution of life forms; Fossils, their mode of preservation and utility in age determination and paleoenvironmental interpretations; Morphology, major evolutionary trends and ages of important groups of animals – Brachiopoda, Mollusca, Trilobita, Graptolitoidea, Anthozoa, Echinodermata; Gondwana plant fossils; Elementary idea of vertebrate fossils in India.

**Stratigraphy:** Principles of stratigraphy; Litho-, Chrono- and biostratigraphic classification; Stratigraphic correlation techniques; Archaean cratons of Peninsular India (Dharwar, Singhbhum and Aravalli); Proterozoic mobile belts; Stratigraphy of Cuddapah and Vindhyan basins; Stratigraphy of Paleozoic – Mesozoic of Spiti and Kashmir, Gondwana Supergroup, Jurassic of Kutch, Cretaceous of Trichinopoly, Tertiary and Quaternary sequences of Assam, Bengal and Siwaliks.

**Mineralogy:** Symmetry and forms in common crystal classes; Physical properties of minerals; Isomorphism, polymorphism, solid solution and exsolution; Classification of minerals; Structure of silicates; Mineralogy of common rock-forming minerals; Elements of Optical Mineralogy, Optical properties of common rock-forming minerals.

**Petrology:** Definition and classification of rocks; Igneous rocks – forms of igneous bodies; Processes of evolution and diversification of magma; Classification, association, and genesis of common igneous rocks. Sedimentary rocks – classification, texture, and structure; Petrology of sandstone and limestone; Elements of sedimentary environments and facies. Metamorphic rocks – classification and texture; Types of metamorphism; Controls on metamorphism – pressure, temperature and fluids; Concept of projections – ACF, AKF and AFM diagrams; Phase Rule and its applications; Concepts of zones and facies, Characteristic mineral assemblages of pelites in the Barrovian zones and mafic rocks in common facies.

**Economic Geology:** Physical properties of common economic minerals; General processes of formation of mineral deposits; Mode of occurrence and distribution of metallic and non-metallic mineral deposits in India; Fundamentals of reserve calculation; Elements of coal and hydrocarbon geology, Coal and hydrocarbon occurrences in India.

**Applied Geology:** Groundwater and hydrological cycle, Types of aquifers, porosity and permeability; Principles of engineering geology; Geological considerations in construction of dams and tunnels.