

# UPSC Mains Geography Optional Paper-I Syllabus

## **1. General Geology:**

The Solar System, meteorites, origin and interior of the earth and age of earth; Volcanoes-causes and products, Volcanic belts. Earthquakes causes, effects, seismic of zone of India; Island arcs, trenches and mid-ocean ridges; Continental drift; Seafloor spreading, plate tectonics. Isostasy.

## **2. Geomorphology and Remote Sensing:**

Basic concepts of geomorphology. Weathering and soil formations; Landforms, slopes and drainage. Geomorphic cycles and their interpretation. Morphology and its relation to structures and lithology; Coastal geomorphology; Applications of geomorphology in mineral prospecting, civil engineering; hydrology and environmental studies; Geomorphology of Indian sub-continent.

Aerial photographs and their interpretation-merits and limitations; The Electromagnetic spectrum. Orbiting Satellites and Sensor Systems. Indian Remote Sensing Satellites. Satellite data products; Applications of remote sensing in geology; The Geographic Information System (GIS) and Global Positioning System (GPS)—its applications.



## **3. Structural Geology:**

Principles of geologic mapping and map reading, projection diagrams, Stress and strain ellipsoid and stress- strain relationships of elastic, plastic and viscous materials; Strain markers in deformed rocks. Behaviour of minerals and rocks under deformation conditions. Folds and faults classification and mechanics; Structural analysis of folds, foliations, lineations, joints and faults, unconformities; Time-relationship between crystallization and deformation.

## **4. Paleontology:**

Species definition and nomenclature; Megafossils and Microfossils. Modes of preservation of fossils; Different kinds of microfossils; Application of microfossils in correlation, petroleum exploration, paleoclimatic and paleoceanographic studies; Evolutionary trend in Hominidae, Equidae and Proboscidae. Siwalik fauna.

Gondwana flora and fauna and its importance; Index fossils and their significance.

## **5. Indian Stratigraphy:**

Classification of stratigraphic sequences: lithostratigraphic, biostratigraphic, chrono-stratigraphic and magnetostratigraphic and their interrelationships; Distribution and classification of Precambrian rocks of India; Study of stratigraphic distribution and lithology of Phanerozoic rocks of India with reference to fauna, flora and economic importance. Major boundary problems-Cambrian/ Precambrian, Permian/Triassic, Cretaceous/Tertiary and Pliocene/Pleistocene; Study of climatic conditions, paleogeography and igneous activity in the Indian sub- continent in the geological past. Tectonic framework of India. Evolution of the Himalayas.

## **6. Hydrogeology and Engineering Geology:**

Hydrologic cycle and genetic classification of water; Movement of subsurface water; Springs; Porosity, permeability, hydraulic conductivity, transmissivity and storage coefficient, classification of aquifers; Water-bearing characteristics of rocks; Groundwater chemistry. Salt water intrusion. Types of wells. Drainage basin morphometry; Exploration for groundwater; Groundwater recharge; Problems and management of groundwater; Rainwater harvesting; Engineering properties of rocks; Geological investigations for dams, tunnels highways, railway and bridges; Rock as construction material; Landslides causes, prevention and rehabilitation; Earthquake-resistant structures.

