

**Syllabus**  
Ph.D. 2018-19 Entrance Test

Subject: Geology

**Section -B**

**Thrust Areas:-**

**1. Hydrogeology, Environmental Geology and Remote Sensing:**

- Ground water, origin, types, importance, occurrence, reservoir and movement.
- Hydraulic properties of aquifer and aquitard and their controlling factors, transmissivity, storativity and specific yield.
- Darcy's law and its validity.
- Evaluation of aquifer parameters using Theim, Theis and Walton equations.
- Structure and evolution of atmosphere, vertical structure, chemical evolution of atmosphere, thermal inversion.
- Global warming in present atmosphere due to indiscrete exploitation of fossil fuel, volcanic eruptions.
- Contamination of surface water and ground water quality due to industrialization and urbanization.
- Natural hazards: influences of neotectonics in seismic hazard assessment; distribution, magnitude, intensity and geological effect of earthquakes.
- Global and Indian remote sensing missions. IRS, Landsat, SPOT, series of satellites.
- Resolution of remotely sensed data – spatial, spectral, temporal, and radiometric.
- Types and geometry of aerial photographs and their utility in geosciences.
- Image interpretation – visual and digital analysis of remotely sensed data.
- Elements of image interpretation. Digital image processing techniques.
- GIS: Function, Data Formates, Data Generation and Applications in Geosciences.
- GPS: Function, Operation Principle, Data Generation and Applications.
- Scanning and Froming Systems. EMR Interaction with Atmosphere and Earth's Surface.

**2. Paleontology and Sedimentology:**

- Origin of life, origin of metazoans, Precambrian fossil record and major events in in the history of Phanerozoic life.
- Taphonomy and its significance in applications of fossils in Geology.

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- Microfossils and their advantages over megafossils, morphology and geological applications of major groups of microfossils with special reference to foraminifera.
- Origin and important landmarks in the evolution of vertebrates through geological time, evolution and extinction of dinosaurs, evolution of horse and man.
- Mineralogy and chemical composition of carbonate minerals.
- Sandstone classification.
- Diagenesis and fluid flow: diagenesis of mudstones, sandstones and carbonate rocks.
- Evaluation of sedimentary basins: tectonics and sedimentation, cration facies, geosyncline and related facies.

### **3. Igneous & Metamorphic Petrology and Geochemistry:**

- Mineralogy and chemistry of earth's mantle.
- Magma and its evolution.
- Criteria for classification of igneous rocks and IUGS classificaton.
- Magmatism and metamorphism in relation to plate tectonics.
- Nucleosynthesis, geochemical classification of elements, major elements, trace elements, compatible, incompatible, HFSE, LILE, low field strength elements, PGE.
- Partition coefficient: general principle and determination in natural and experimental systems.
- U, Th, Pb, K-Ar, Sm-Nd methods of dating.
- Isotopes as petrogenetic indicators.
- Application of geochemical studies in solving paetrological problems.

### **4. Economic Geology and Structural Geology:**

- Relationship of formation of mineral deposits with plate tectonics.
- Mineral exploration and mining methods.
- Renewable and non-renewable sources of energy.
- Mode of occurrence, genesis and distribution of important metal and non-metal deposits in India.
- Stress and Strain analyses.
- Geometry of folds and mechanics of follding.
- Fractures and jointed structures – their analysis.
- Classification and genesis of foliation and lineation.

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