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Bihar Public

Service Commission

(BPSC Mains)

Optional Subject - Geology

GEOLOGY

SECTION- I

(General Geology, Geomorphology, Structural Geology, Palaeontology and Stratigraphy)

(i) General Geology: Energy in relation to Geo-dynamic activities. Origin and interior of the Earth. Dating of rocks by various methods and age of the Earth. Volcanoes-causes and products; volcanic belts. Earthquakes-causes, geological effect and distribution. Geosynclines and their classification, Island areas, deep sea trenches and mid-ocean ridges, sea-floor spreading and plate tectonics. Isostrasy, Mountains types and origin. Brief ideas about continental drift, Origin of continents and oceans. Radioactivity and its application to geological problems.

(ii) Geomorphology: Basic concepts and significance. Geomorphic processes and parameters. Geomorphic cycles and their interpretation. Relief features; Topography and its relation to structures and lithology. Major landforms. Drainage patterns. Geomorphic features of Indian subcontinent and Chotanagpur plateau.

(iii) Structural Geology: Stress and strain ellipsoid, and rock deformation. Mechanics of folding and faulting. Linear and planar structures and their genetic significance. Petrofabric analysis, its graphic representation and application to geological problems. Tectonic framework of India.

(iv) Palaeontology: Micro and Macro-fossils. Modes of preservation and utility of fossils, General idea about classification and nomenclature. Organic evolution and the bearing of palaeontological studies on it. Morphology, classification and geological history including evolutionary trends of brachiopods, bivalves, gastropods, ammonoids, trilobites, echinoids and corals. Principal groups of vertebrates and their main morphological characters. Vertebrates life through ages; dinosaurs: siwalik vertebrates. Evolution of horses, elephants and man, Gondwana flora and its importance. Types of micro fossils and their significance with special reference to petroleum exploration.

(v) Stratigraphy: Principles of Stratigraphy Stratigraphic classification and nomenclature. Standard stratigraphic scale. Detailed study of various geological systems of Indian subcontinent. Boundary Problems in Indian stratigraphy. An outline of the stratigraphy of various geological systems in their type-areas. Brief study of climates and igneous activities in Indian symmetry during geological post Palaeogeographic reconstructions.

Section – II

(Crystallography Mineralogy. Petrology and Economic Geology)

(i) Crystallography:- crystalline and non crystalline substances. Space groups. Lattice symmetry. Classification of crystals into 32 classes of symmetry. International system of crystallographic notation. Use of stereographic projections to represent crystal symmetry. Twinning and twin laws Crystal irregularities. Application of X-Rays for crystal studies.

(ii) Optical Mineralogy:- General principles of optics Isotropism and anisotropism, Concepts of optical indicatrix, pleochroism, interference colours and extinction. Optic orientation in crystals. Dispersion. Optical accessories.

(iii) Mineralogy: Elements of crystal chemistry-types of bondings Ionic radii, coordination number, isomorphism, polymorphism and pseudomorphism. Structural classification of silicates. Detailed study of rock-forming minerals-their physical, chemical and optical properties and uses, if any, study of the alteration products of these minerals.

(iv) Petrology:- Magma, its generation, nature and composition. Simple phase diagrams of binary and ternary systems, and their significance, Bowen's Reaction Principle. Magmatic differentiation; assimilation, Textures and structures, and their petrogenetic significance. Classification of igneous rocks. Petrography and petrogenesis of important rocktypes of India Genesis of granites; charnockites; anorthosites; and alkaline rocks. Processes of formation of sedimentary rocks. Diagenesis and lithification. Textures and structures of sedimentary rock and their significance. Classifications of sedimentary rocks elastic and non-elastic. Heavy minerals and their significance. Elementary concept of depositional environments. sedimentary facies and provenance. Petrography of common sedimentary rock types. Agents of metamorphism. Types of metamorphism. Metamorphic grades, zones and facies. ACF, AKF and AFM diagrams. Textures, structures and nomenclature of metamorphic rocks. Petrography and petrogenesis of important metamorphic rock types.

(v) Economic Geology: Concept of ore, ore mineral and gangue, tenor of ores. Processes of formation of mineral deposits. Common forms and structures of ore deposits. Classification of ore deposits. Control of ore deposition Metallogenetic epochs. Study of important metallic and non-metallic deposits oil and natural gas

fields and coalfields of India. Mineral wealth of Bihar, Mineral economics, National Mineral policy Conservation and utilization of minerals.

(vi) Applied Geology: Essentials of prospecting and exploration techniques. Principal methods of mining sampling dressing and beneficiation. Application of geology in Engineering works.

Elements of soil and groundwater geology. Groundwater Provinces of Bihar. Use of Air related Diagrams in Geological Exploration.