

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF ASSISTANT PROFESSOR IN GEOLOGY FOR COLLEGE EDUCATION DEPARTMENT

PAPER-I

Unit –I: Physical Geology and Tectonics-

Earth as a part of the Solar System. Origin, evolution, composition and structure of the Earth. Endogenic and Exogenic processes of the Earth and development of landforms.

Distribution of continents and oceans, basic idea about oceanic and continental crust. Ocean floor morphology.

Theory of Continental Drift. Concept of Sea floor spreading and evolution of Plate Tectonics theory. Mountain Building processes. Morpho-tectonic subdivisions of India. Theory of Isostasy. Structure, geological characteristics and distribution of Island Arcs, Mid Oceanic Ridges, Rift Valleys and Oceanic Trenches. Tectonics of Precambrian Orogenic Belts of India. Origin of the Alpine– Himalayan belt, the Appalachian- Caledonian belt, the Andes and the North American Cordillera. Seismicity, origin and classification of earthquakes, seismic waves, magnitude and intensity of earthquakes, world distribution of earthquakes and seismic zones of India. Seismicity and interior of the Earth. Volcanoes: their types, distribution and products, submarine volcanism. Seismicity and volcanism in relation to Plate Tectonics.

Unit – II: Structural Geology-

Rock deformation and concept of stress and strain. Two-dimensional strain and stress analyses. Types of strain ellipses and ellipsoids, their properties and geological significance. Strain markers in naturally deformed rocks. Folds; morphology and classification. Mechanism of folding and buckling. Faults; morphology and classification, causes and dynamics of strike-slip, normal and reverse faults, thrust and nappe. Shear zones, classification, genesis and significance of joints, cleavages and lineations. Unconformity: types and geological significance.

Unit – III: Remote sensing and Geoinformatics-

Principles of Remote Sensing; Indian satellites and their orbital parameters. General idea about electromagnetic spectrum, aerial photographs and their geometry, application of Photogrammetry. Satellite image characteristics and

image analysis. Identification of ground objects based on tone, texture and pattern; principles of terrain analysis, ground water potential, rock type identification; and interpretation of topographic and tectonic features. Concept of image processing. Concept of GIS and GPS and their application in geological investigations.

Unit – IV: Mineralogy and Geochemistry-

Crystals: their symmetry elements and classification. Concept of space lattice. Properties of light, Optical properties of minerals including Orthoscopic and Conoscopic. Silicate structures and classification of minerals. Concept of Isomorphism and Polymorphism. Mode of occurrence, chemical, physical, optical properties and genesis of Silica, Feldspar, Feldspathoid, Amphibole, Pyroxene, Mica and Olivine mineral groups.

Geochemical classification of elements. Abundance of elements in the Earth.

Trace and Rare Earth Elements: their significance in interpretation of geological processes. Use of geochemical data in tectonic discrimination and petrogenesis.

Stable isotopes and their geological significance. Radioactive dating based on U-Pb, Sm-Nd, Rb-Sr, Ar-Ar decay schemes and concept of ^{14}C dating.

Unit V: Igneous Petrology-

Origin of magma and its emplacement. Magma evolution and controlling factors. Mode of occurrence, texture and classification (mineralogical and chemical) of igneous rocks. Mineralogical Phase Rule and its application in binary (Albite-Anorthite, Diopside-Anorthite, Albite-Orthoclase, Forsterite-Silica and Leucite-Silica) and ternary (Diopside- Albite- Anorthite and Nepheline– Kaliophyllite– Silica) magmatic systems. Mode of occurrence, classification and petrogenesis of mafic-ultramafic, acidic and alkaline rocks.

Unit VI: Metamorphic Petrology-

Metamorphism: its types and factors. Texture, structure and classification of metamorphic rocks. Concept of metamorphic grade, zones and facies. Paired metamorphic belts, ocean floor and burial metamorphism.

Metamorphic reactions and pressure-temperature conditions of metamorphism. Metamorphic differentiation, anatexis and origin of migmatites. Petrogenesis of hornfelsic and cataclastic rocks, schist, gneiss, amphibolite, granulite and eclogite.

Unit VII: Sedimentary Petrology-

Sedimentary rocks; their classification, texture and structure. Concept of diagenesis and lithification. Petrology of sand, shale, carbonate, chemical and biochemical sedimentary rocks. Sedimentary environments and facies (continental: alluvial-fluvial, lacustrine, desert-aeolian, glacial, and marine). Palaeocurrent, palaeoenvironmental and basin analysis. Evolution of sedimentary basins, tectonics and sedimentation. Important sedimentary basins of India and their distribution and classification.

Note: -Pattern of Question Paper

- 1. Objective type paper**
- 2. Maximum Marks: 75**
- 3. Number of Questions: 150**
- 4. Duration of Paper: Three Hours**
- 5. All questions carry equal marks.**
- 6. There will be Negative Marking.**
- 7. Medium of Competitive Exam: Bilingual in English and Hindi**