

# **RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER**

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

### **PAPER-II**

#### **Unit-I: Stratigraphy-**

Geological Time-scale and its equivalence with the Indian stratigraphic units. International code of stratigraphic nomenclature. Principles and methods of stratigraphic correlation.

Geochronology and Chronostratigraphy, Lithostratigraphy, Biostratigraphy, Quantitative stratigraphy, Magnetostratigraphy, Cyclostratigraphy, Pedostratigraphy, Seismic stratigraphy and Sequence stratigraphy.

Distribution, classification, lithology, structure and economic importance of Dharwar, Bastar, Singhbhum, Aravalli – Bundelkhand and Shillong cratons with special emphasis on Aravalli, Delhi, Dharwar, Vindhyan and Cuddapah Supergroups; Sausar – Sakoli Belt and Malani Igneous Suite.

Phanerozoic stratigraphy of India with special reference to Palaeozoic rocks of Kashmir, Mesozoic rocks of Spiti, Kachchh, western Rajasthan, central and southern India. Gondwana Supergroup and its significance. Tertiary rocks of western India and Himalayan region including Siwalik Super group.

Deccan Volcanic Province; its evolutions, extent, stratigraphy and age.

Quaternary geology of India, origin and evolution of Indo-Gangetic plains and Thar Desert.

#### **Unit-II: Paleontology-**

Origin of life and Organic Evolution, concept of palaeoecology. Marine and terrestrial ecosystems. Mass extinctions.

Morphology, classification, palaeoecology and evolutionary trends of Corals, Echinoids, Lamellibranchs, Cephalopods, Gastropods, Brachiopods; Trilobites and Graptoloids.

Morphology, classification and palaeoecology of Foraminifers, Ostracods. Conodonts and Nanoplanktons. Application micropaleontology in oil exploration. Vertebrates of Siwalik Supergroup. Evolutionary histories of Man, Elephant and Horse. Gondwana flora and its significance. Palynology and its applications.

#### **Unit-III: Mineral and Energy Resources-**

Classification of ore forming processes. Characteristics of Hydrothermal, Metasomatic Replacement and magmatic processes of ore genesis.

Economic mineral deposits of sedimentary association with emphasis on iron, manganese and evaporate deposits. Residual and mechanical concentration process of ore deposits.

Fluvial, Alluvial, Aeolian and Beach placer deposits. Oxidation and Supergene Sulphide deposits. Economic deposits of Biogenic origin. Concept of Black Smokers and Sea-bed mining.

Geological setting and genesis of metallic (iron, manganese, chromium, lead, zinc, copper and aluminum), industrial (mica, feldspar, quartz, soapstone, clay, gypsum, limestone, calcite, wollastonite and abrasive minerals), rock phosphate and potash deposits of India with special reference to Rajasthan.

Coal: its classification and origin. Coal-bed methane and fundamentals of its exploration. Geological and geographical distribution of coal deposits in India. Lignite deposits of India: their geological setting, characteristics and origin. Oil and gas deposits: their origin and nature. Primary and secondary migration of oil and gas. Characteristics of reservoir rocks and traps.

Geological characteristics of Indian oil fields: Cambay Basin, Barmer–Jaisalmer Basin, Bombay High, Assam and Krishna–Godavari.

Mode of occurrence, geological setting and genesis of U and Th deposits of India. Geological, geochemical and geophysical exploration methods for ferrous, nonferrous metals and petroleum and coal deposits.

#### **Unit-IV: Hydrogeology-**

Ground water: its occurrence and distribution; Water Table and its significance. Types of aquifer; and their properties: porosity, permeability, specific yield, specific retention, hydraulic conductivity, transmissivity, storage coefficient. Geological formations as aquifers. Steady, unsteady and radial flow conditions of water, Darcy's law and its application. Water Table contour maps. Pumping test and its significance. Physical and chemical properties of water; drinking water quality standards and suitability of water for industrial and agricultural use. Groundwater pollution (natural and anthropogenic), problems of nitrate, arsenic and fluoride in water and remedial measures. Impact of industrialization and urbanization on surface and ground water quality. Salt water intrusion in coastal aquifers and its prevention. Surface and subsurface geological and geophysical methods of groundwater exploration. Hydrogeomorphic mapping using various remote sensing techniques. Isotopes in hydrogeological studies. Groundwater provinces of India with special reference to Rajasthan. Water resource evaluation and management. Water logging problems; causes and remedies.

#### **Unit-V: Engineering Geology-**

Engineering properties of rocks. Physical characteristics of building stones and concrete aggregates. Geological investigations for dams and reservoir sites. Dam foundation investigations, dam failure and remedies. Classification of ground for tunneling purposes; types of tunnel support. Geotechnical considerations for tunnel construction and alignment. Mass movements with special emphasis on landslides. Hill slope instability and remedial measures.

## **Unit-VI: Environmental Geology-**

Concept of Environmental Geology. Elementary idea about climate change through Earth's history. Ozone layer and its depletion, Carbon di-oxide in the atmosphere and sea water. Records of palaeotemperatures in ice cores. Global warming and role of greenhouse gases. Eco-friendly mining and concept of sustainable development. Environmental impact of mining, EIA (Environmental Impact Assessment) and EMP (Environmental Management Plan).

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### **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.**