

**SYLLABUS FOR WRITTEN TEST FOR THE POSTS OF SURVEYOR- GEOLOGY
IN JKSPDC**

S. No	Examination Type	Subjects	No. of Questions	Marks	Duration
1	Multiple Choice Questions	Discipline oriented	100	100	2 hours

GEOLOGY- 100 Marks

1. General Geology

5 Marks

Origin of Earth: Kant-Laplace, Jeans and Jeffrey's, Big Bang Theories. Earthquakes: Earthquake belts of the world, seismic zones of India. Volcanoes: Classification of volcanoes, volcanic landforms and distribution of volcanoes.

Concept of continental drift and plate tectonics and their evidences. Continent – Continent Collision Tectonics; Himalaya Geometry and mechanism of plate motion tectonics of continental margins and continental shelves. Origin and distribution of Island Arcs, Mid-Oceanic Ridge and Trenches. Organic and epeirogenic phases and brief description of evolution of ocean and continents. Detailed idea of isostasy and its various theories. Origin of Himalayan mountain chain.

Weathering: Controlling factors of weathering, Types of weathering. Fluvial, glacial and aeolian processes. Glaciers: their types and glaciations through geological ages. Erosional and depositional features produced by river, glaciers and wind.

2. Mineralogy and crystallography

10 Marks

Minerals: classification of silicate minerals based on silicate structure. The significance of physical properties and their utility in identification of minerals, Mohs scale of hardness. Physical properties and chemical composition of Feldspar and Mica Groups. Physical properties and chemical composition of Amphibole and Pyroxene Groups. Physical properties and chemical composition of Garnet and Olivine Groups.

Crystal structure, morphology of crystals division of different crystals into normal crystal systems. Crystallographic axes and axial angles, notation of faces on parameters of Weiss and Miller indices. Crystal Symmetry and forms of Normal classes of Cubic, tetragonal and Hexagonal Systems. Crystal Symmetry and forms of Normal classes of Orthorhombic,

Monoclinic and Triclinic systems. Twinning: Twin crystals, Twin axis, twin planes, composition planes, Twin laws and different types of twinning

Petrological microscope: construction and working. Polarized light, Pleochroism, Birefringence, Interference colours. Extinction and its types, extinction angle, isotropism and anisotropism Reflection and refraction. Double refraction, Nicol prism and its construction and function. Refractive index: methods of its determination, critical angle.

3. Petrology

15 Marks

Igneous rocks-definition, classification, tabular and normative. Origin of igneous rocks, magmatic differentiation and assimilation. Magma – definition and its composition, Bowen's reaction series. Textures and structure of igneous rocks. Description of important igneous rocks, i.e Granite, Rhyolite, Basalt, Gabbro, Syenite, Trachyte, Pegmatite and Peridotite.

Felsic, femic, mafic and salic minerals, colour index and its significance. Chemical composition of minerals and elementary idea about phase rule. Use of phase rule in two and three component silicate systems, crystallization of albite-anorthite, plagioclase series, di-ab- an system. Mineralogical characteristics of acid and alkaline igneous rocks. Mineralogical characteristics of basic and ultramafic igneous rocks.

Sedimentary rocks- origin, transportation and deposition. Diagenesis: lithification, compaction, cementation, neomorphism. Classification of clastic rocks. Classification of non –clastic rocks. Primary and secondary structures in sedimentary rocks. Textures of sedimentary rocks. Structures of Sedimentary rocks. Concept of Sedimentary facies. Depositional environments of sedimentary rocks. Description of important sedimentary rocks i.e. sandstone, shale, limestone, conglomerate and breccias.

Metamorphism, agents and types. Textures and structures of metamorphic rocks. Concept of ACF & AKF diagrams. Metamorphic facies- greenstone, granulite and eclogite facies. Description of important metamorphic rocks : Slate, Phyllite, Schist, Gneiss, Quartzite and marble.

4. Earth's Resources

5 Marks

Concept of ore-Ore mineral, tenor and gangue. Factors controlling mineral availability. Classifications of ore deposits and types of ore forming processes: magmatism, sedimentation, metamorphism, hydrothermal, residual and placer. Distribution of mineral deposits in Time and Space. Supergene enrichment process of ore formation. Sedimentary ore deposits and their distribution in India.

Fe, Cu, Pb & Zn ore deposits of India their geological setting, mode of occurrences and distribution. Coal, Petroleum and radioactive minerals: their composition, properties, origin, occurrences and their distribution in India. Cement industry minerals: Mode of occurrences and distribution in India. Mineral wealth of J&K: metallic, non-metallic, precious stones, building stones and coal.

5. Palaeontology and Stratigraphy

10 Marks

Fossil-definition, conditions and mode of preservation, types, their significance. Origin of life and life through ages. Morphological characteristics and geological distribution of Nautiloidea, Ammonoidea, Graptolites, Pelecypoda, Gastropoda, Brachiopoda, Echinodermata, and trilobite. Importance of Graptolites. Emergence and Importance of Ostracods. Brief evolutionary history of horse and elephant and a brief study of reptiles with special reference to dinosaurs.

Principles of Stratigraphy and the criteria for correlation of strata. Standard stratigraphic time scale. Concept of litho-bio-chronostratigraphy. Physical and structural subdivisions of Indian subcontinent and their characteristics. Brief description of Archean and Proterozoic successions of India: Dharwar, Aravallies, Cuddapha, Distribution and lithostratigraphic classification of Vindhyan, Salkhala, Dogra/Shimla Slates. Litho and biostratigraphic classification of Palaeozoic sequence of Kashmir and Spiti. Gondwana Stratigraphy: litho and biostratigraphic classification, climatic variations and economic importance. Important characteristics of Gondwana plants: Glossopteris, Gangmopteris, Vertebraria, Thinfeldia, Sigillaria, Nilsonia, Ptylophylum, Lepidodendron, Calamites, Schizoneura. Microflora: Introduction, Important forms of microflora. Stratigraphy of the Jurassic of Kutch and Cretaceous of Trichnopoly. Deccan lava flows-distribution and stratigraphic position. Litho and biostratigraphic classification of Siwalik sequence. Lithology and age of Karewas of Kashmir

6. Structural Geology

10 Marks

Folds and faults: Morphology and Classification. Mechanical aspects of folding. Mechanics of faulting. Vertical and horizontal tectonics: Origin of grabbens, horsts, window, klippe & nappes. Joints: Definitions; Genesis; Classification and Significance. Relationship between joints and folds. Foliation: Definition, origin and its relationship with major structures. Relationship between folds and foliations. Lineation: Definition; Types; Origin and its relationship with major structures. Unconformities: definition and types. Distinguishing features of faults from unconformities. Geological significances of unconformity and foliation. Response of rocks to stress change: elastic, plastic and brittle behaviour of the rocks. Plotting of structural data equal area and stereographic projections.

7. Applied Geology

5 Marks

Hydrological Cycle. Groundwater: definition; water table, piezometric surface; perched water. Vertical distribution of groundwater. Hydrological properties of rocks, permeability and porosity. Aquifers: confined and unconfined. Engineering Geology and its impact on natural environment. Geological conditions favouring location of dams & reservoirs and tunnels.

8. Surveying

40 Marks

Meaning and necessity of maps and plans. Scale: expression and statement. The representative fraction. Enlargement and reduction of maps. Representation of Direction: True North, Bearing and conversion of bearings. Concepts of units of measurement. Geoids datum, msl, latitude & longitude etc. Representation of relief: relief, contours, hachures and gradient. Spot heights. Bench Marks and Trigonometrical Stations. Conventional signs on survey maps. Marginal information. Map projections-cylindrical: simple and equal area; Mercator's, Conical, Polyconic. The Globular Projection. Zenithal Projection. Equidistant Polar Zenithal Projection.

Introduction to surveying. Key concepts and principles of Surveying. Designing surveys, processing of survey data, Process of Map Making, Data sources for mapping: remote sensing, field observations, GPS, maps and other ancillary data.

Modern survey methods: Modern surveying electronic equipments: digital levels, digital theodolites, EDMs, Total stations; Principles, working and applications; Lasers in surveying, GPS working principles and components.

Map Construction. Map drawing from field data. Topographic/Contour maps, geological: maps, cross and L-sections. Data presentation - Know how of application of different mapping soft-wares for generation of different maps/drawings. Methods of computer assisted data collection.

Remote Sensing and GIS based Surveys: Remote Sensing principles, components as a tool for data generation and mapping; Introduction to modern techniques – Air photographs and Satellite Imagery and their basic properties, concept of GIS and GPS and their components, Types, scales and ground coverage. Advantages of Aerial photographs over conventional on-the-ground observations.