



ગુજરાત જાહેર સેવા આયોગ

ઇ-૩ સર્કલ પાસે, ઇ રોડ, સેક્ટર-૧૦/એ, ગાંધીનગર-૩૮૨૦૧૦

ખ.ક.૦૭/૨૦૨૩-૨૪

જગ્યાનું નામ: ભૂસ્તરશાસ્ત્રી, વર્ગ-૧

(નર્મદા, જળસંપત્તિ, પાણી પુરવઠા અને કલ્પસર વિભાગ)

ભાગ-૧ અને ભાગ-૨ ના ૧૮૦ મિનિટના સંયુક્ત પ્રશ્નપત્રના પ્રાથમિક કસોટીનો અભ્યાસક્રમ

પ્રાથમિક કસોટીનો અભ્યાસક્રમ ભાગ-૧	
માધ્યમ: ગુજરાતી	કુલ ગુણ : ૧૦૦
૧	ભારતની ભૂગોળ- ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને સ્થાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે
૩	ભારતનો ઇતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન
૫	ભારતીય રાજનીતિ અને ભારતનું બંધારણ: (૧) આમુખ (૨) મૂળભૂત અધિકારો અને હુરખે (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસૂચિત જાતિ, અનુસૂચિત જનજાતિ અને સમાજના પછાત વર્ગો માટેની જોગવાઈઓ (૯) એટર્ની જનરલ (૧૦) નીતિ આયોગ (૧૧) પંચાયતી રાજ (૧૨) નાણા પંચ (૧૩) બંધારણીય તથા વૈધનિક સંસ્થાઓ- ભારતનું સૂટણી પંચ, સંઘ લોક સેવા આયોગ, રાજ્ય લોક સેવા આયોગ, કોમ્પ્ટ્રોલર એન્ડ ઓડિટર જનરલ; કેન્દ્રીયસતર્કતા આયોગ, લોકપાલ તથા લોકાયુક્ત અને કેન્દ્રીય માહિતી આયોગ
૬	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી
૭	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી
૮	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો

**Syllabus of Preliminary Test
Part-1**

Medium: Gujarati

Total Marks-100

1	Geography of India-Physical, Economic, Social, Natural Resources and population related topics- with special reference to Gujarat
2	Cultural heritage of India-Literature, Art, Religion and Architecture-with special reference to Gujarat
3	History of India with special reference to Gujarat
4	Indian Economy and Planning
5	<u>Indian Polity and the Constitution of India:</u> 1. Preamble 2. Fundamental Rights and Fundamental Duties 3. Directive Principles of State Policy 4. Composition of Parliament 5. Powers of the President of India 6. Powers of Governor 7. Judiciary 8. Provisions for Scheduled Castes, Scheduled Tribes and backward classes of the society 9. Attorney General 10. NITIAayog 11. Panchayati Raj Institutions 12. Finance Commission 13. Constitutional and Statutory Bodies: Election Commission of India, Union Public Service Commission, State Public Service Commission, Comptroller and Auditor General; Central Vigilance Commission, Lokpal and Lokayukta, Central Information Commission
6	General Mental Ability
7	General Science, Environment and Information & Communication Technology
8	Daily events of Regional, National and International Importance including Sports

Part-2

Syllabus for the preliminary test for the recruitment on the post of Geologist, Class-I under Narmada, Water Resources, Water Supply and Kalpsar Department

Marks – 200

Questions – 200

Medium - English

1. Physical geology and remote sensing

Evolution of Earth; Earth's internal structure; earthquakes and volcanoes; principles of geodesy, isostasy; weathering- processes and products; geomorphic landforms formed by action of rivers, wind, glaciers, waves and groundwater; features of ocean floor; continental shelf, slope and rise; concepts of landscape evolution; major geomorphic features of India-coastal, peninsular and extra peninsular. Electromagnetic spectrum; electromagnetic bands in remote sensing; spectral signatures of soil, rock, water and vegetation; thermal, near infra-red and microwave remote sensing; digital image processing; LANDSAT, IRS and SPOT- characteristics and use; aerial photos- types, scale, parallax, relief displacement; elements of image interpretation.

2. Structural geology

Principles of geological mapping; kinematic and dynamic analysis of deformation; stress-strain relationships for elastic, plastic and viscous materials; measurement of strain in deformed rocks; structural analysis of fold, cleavage, boudin, lineation, joint, and fault; stereographic projection of linear and planar structures; superposed deformation; deformation at microscale- dynamic and static recrystallisation, controls of strain rate and temperature on development of microfabrics; brittle and ductile shear zones; time relationship between crystallisation and deformation, calculation of paleostress.

3. Sedimentology

Classification of sedimentary rocks; sedimentary textures-grain size, roundness, sphericity, shape and fabric; quantitative grain size analysis; sediment transport and deposition- fluid and sediment

gravity flows, laminar and turbulent flows, Reynold's number, Froude number, grain entrainment, Hjulstrom diagram, bed load and suspension load transport; primary sedimentary structures; penecontemporaneous deformation structure; biogenic structures; principles and application of paleocurrent analysis; composition and significance of different types of sandstone, limestone, banded iron formation, mudstone, conglomerate; carbonate diagenesis and dolomitisation; sedimentary environments and facies-facies models for fluvial, glacial, deltaic, siliciclastic shallow and deep marine environments; carbonate platforms- types and facies models; sedimentation in major tectonic settings; principles of sequence stratigraphy-concepts, and factors controlling base level changes, parasequence, clinoform, systems tract, unconformity and sequence boundary.

4. Paleontology

Fossil record and geological time scale; modes of preservation of fossils and concept of taphonomy; body- and ichno-fossils, species concept, organic evolution, Ediacara Fauna; morphology and time range of Graptolites, Trilobites, Brachiopods, Lamellibranchs, Gastropods, Cephalopods, Echinoids and Corals; evolutionary trends in Trilobites, Lamellibranchs, Gastropods and Cephalopods; micropaleontology- methods of preparation of microfossils, morphology of microfossil groups (Foraminifera, Ostracoda), fossil spores, pollen and dinoflagellates; Gondwana plant fossils and their significance; vertebrate life through ages, evolution in Proboscidea, Equidae and Hominidae; applications of paleontological data in stratigraphy, paleoecology, and paleoclimatology; mass extinctions.

5. Stratigraphy

Principles of stratigraphy-code of stratigraphic nomenclature of India; lithostratigraphy, biostratigraphy, chronostratigraphy and magnetostratigraphy; principles of stratigraphic correlation; characteristics of Archean granite-greenstone belts; Indian stratigraphy- geological evolution of Archean nuclei (Dharwar, Bastar, Singhbhum, Aravalli and Bundelkhand); Proterozoic mobile belts-

Eastern Ghats Mobile Belt, Southern Granulite Terrain, Central Indian Tectonic Zone, Aravalli-Delhi Belt, North Singhbhum Mobile Belt; Proterozoic sedimentary basins (Cuddapah and Vindhyan); Phanerozoic stratigraphy- Paleozoic (Spiti, Kashmir and Kumaon), Mesozoic (Spiti, Kutch, Narmada Valley and Trichinopoly), Gondwana Supergroup, Cenozoic (Assam, Bengal basins, Garhwal-Shimla Himalayas); Siwaliks; boundary problems in Indian stratigraphy.

6. Igneous petrology

Viscosity, temperature and pressure relationships in magmas; IUGS classification of plutonic and volcanic rocks; nucleation and growth of minerals in magmatic rocks, development of igneous textures; magmatic evolution (differentiation, assimilation, mixing and mingling); types of mantle melting (batch, fractional and dynamic); binary (albite-anorthite, forsterite-silica and diopside-anorthite) and ternary (diopside-forsterite-silica, diopside-forsterite-anorthite and nepheline-kalsilite-silica) phase diagrams and relevance to magmatic crystallization; petrogenesis of granites, basalts, ophiolite suite, komatiites, syenites, boninites, anorthosites and layered complexes, and alkaline rocks (carbonatite, kimberlite, lamproite, lamprophyre); mantle metasomatism, hotspot magmatism and large igneous provinces of India.

7. Metamorphic petrology

Limits and physico-chemical controls (pressure, temperature, fluids and bulk rock composition) of metamorphism; concept of zones, facies, isograds and facies series, geothermal gradients and tectonics of orogenic belts; structures, micro-structures and textures of regional and contact metamorphic rocks; representation of metamorphic assemblages (ACF, AKF and AFM diagrams); equilibrium concept in thermodynamics; laws of thermodynamics, enthalpy, entropy, Gibb's free energy, chemical potential, fugacity and activity; tracing the chemical reactions in P-T space, phase rule and mineralogical phase rule in multi-component system; Clausius-Clapeyron equation and slopes of metamorphic reactions; heat flow, diffusion and mass transfer; Fourier's law of heat conduction; geothermobarometry; mass

and energy change during fluid-rock interactions; charnockite problem, formation of skarns, progressive and retrogressive metamorphism of pelitic, calcareous and basic rocks; P-T-t path and tectonic setting.

8. Geodynamics

Phase transitions and seismic discontinuities in the Earth; seismic waves and relation between V_p , V_s and density; seismic and petrological Moho; rheology of rocks and fluids (Newtonian and non-Newtonian liquids); rock magnetism and its origin; polarity reversals, polar wandering and supercontinent cycles; continental drift, sea floor spreading; gravity and magnetic anomalies of ocean floors and their significance; mantle plumes and their origin; plate tectonics- types of plate boundaries and their inter-relationship; heat flow and heat production of the crust.

9. Economic geology

Ore minerals and industrial minerals; physical and optical properties of ore minerals; ore textures and paragenesis; characteristics of mineral deposits- spatial and temporal distribution, rock-ore association; syngenetic and epigenetic deposits, forms of ore bodies, stratiform and strata-bound deposits; ore forming processes- source and migration of ore constituents and ore fluid, mechanism of ore deposition; magmatic and pegmatitic deposits (chromite, Ti-magnetite, diamond, Cu-Ni sulphide, PGE, REE, muscovite, rare metals); hydrothermal deposits (porphyry Cu-Mo, greisen Sn- W, skarn, VMS and SEDEX type sulphide deposits, orogenic gold); sedimentary deposits (Fe, Mn, phosphorite, placer); supergene deposits (Cu, Al, Ni and Fe); metamorphic and metamorphosed deposits (Mn, graphite); fluid inclusions in ore mineral assemblage- physical and chemical properties, microthermometry; stable isotope (S, C, O, H) in ore genesis- geothermometry, source of ore constituents; global tectonics and mineralisation.

10. Engineering geology

characteristics of source and reservoir rocks; structural, stratigraphic and mixed traps; geological, geochemical and geophysical methods of hydrocarbon exploration; petroliferous basins of India; geological characteristics and genesis of major types of U deposits and their distribution in India. Engineering properties of rocks; geological investigations in construction of dams, reservoirs, tunnels, bridges, highways and coastal protection structures; geologic considerations of construction materials.

11. Environmental geology and Natural hazards

Stefan-Boltzmann equation and planetary temperature; cause and effects of global climate change; Earth's radiation budget; greenhouse gases and effect; examples of positive and negative feedback mechanisms; biogeochemical cycle of carbon; geological investigations of nuclear waste disposal sites; marginal marine environments-estuaries, mangroves and lagoons; ozone hole depletion, ocean acidification, coral bleaching, Milankovitch cycle, sea level rise, eutrophication and acid rain; environmental impacts of urbanization, mining and hydropower projects; water pollution, water logging and soil erosion; Himalayan glaciers; causes and consequences of earthquakes, volcanoes, tsunamis, floods, landslides, coastal erosion, droughts and desertification; application of remote sensing and geographic information systems (GIS) in environmental management.

12. Hydrogeology

Occurrence and distribution of groundwater : Origin of water on Earth; global water cycle and budget; residence time concept, geologic formations as aquifers; confined and unconfined aquifers; groundwater table mapping and piezometric nests; porosity, void ratio, effective porosity and representative porosity range; primary and secondary porosities; groundwater zonation; specific retention, specific yield; groundwater basins; springs.

Groundwater movement and well hydraulics: Groundwater flow concepts; Darcy's Law in isotropic and anisotropic media and validity;

water flow rates, direction and water volume in aquifers; permeability and hydraulic conductivity and ranges in representative rocks; Bernoulli equation; determination of hydraulic conductivity in field and laboratory; concept of groundwater flow through dispersion and diffusion; transmissivity and aquifer thickness.

Water wells and groundwater levels: Unidirectional and radial flow to a well (steady and unsteady); well flow near aquifer boundaries; methods for constructing shallow wells, drilling wells, well completion; testing wells, pumping test, slug tests for confined and unconfined aquifers; fluctuations in groundwater levels; stream flow and groundwater flows; groundwater level fluctuations; land subsidence; impact of global climate change on groundwater.

Groundwater exploration: Surface investigation of groundwater-geologic, remote sensing, electrical resistivity, seismic, gravity and magnetic methods; sub-surface investigation of groundwater- test drilling, resistivity logging, spontaneous potential logging, radiation logging.

Groundwater quality and management : Groundwater composition, units of expression, mass-balance calculations; rock-water interaction (chemical equilibrium, free energy, redox reactions and cation/anion exchanges), graphic representation of chemical data; groundwater hardness, microorganisms in groundwater; water quality standards; sea-water intrusion; groundwater issues due to urbanization; solid and liquid waste disposal and plume migration models; application of isotopes (H, C, O) in groundwater; concepts of artificial recharge methods; managing groundwater resources; groundwater basin investigations and management practices.

13. Metamorphic Processes.

Concepts and Theory: Types of Metamorphism and their controlling factors; Common minerals of metamorphic rocks; Field observations, petrographic classification of common metamorphic rocks; Metamorphic facies and facies series. Effects of Metamorphism:

Phase diagrams and graphic representation of mineral assemblages; Prograde and retrograde metamorphism, Matasomatism; Deformation textures and textures related to recrystallization; Metamorphic reactions, elemental exchange and Pressure – Temperature conditions of Isograds; Mineral assemblages equilibrium/ reaction textures and geo-thermo barometry. Experimental and thermodynamic appraisal of metamorphic reactions; Role of fluids in metamorphic reactions. Metamorphism types and products: Regional and thermal metamorphism of pelitic rocks. Regional and thermal metamorphism of basic and ultrabasic rocks; Regional and thermal metamorphism of impure, silicious carbonate rocks; Metamorphism of Granitoides, Charnockites and Migmatites. Metamorphism in space and time: Plate tectonics and metamorphic processes; Paired metamorphic belts, Archaean and Proterozoic terrains; Extraterrestrial Metamorphism (Impact and Shock Metamorphism); polymetamorphism

14. Indian mineral deposits.

Occurrence and distribution in India of metalliferous deposits - base metals, iron, manganese, aluminum, chromium, nickel, gold, silver, molybdenum. Indian deposits of non-metals – Diamond, mica, asbestos, barytes, gypsum, graphite, apatite and beryl. Phosphorene deposits. Placer deposits, rare earth minerals. Strategic, critical and essential minerals. UNFC classification, National Mineral Policy. related to mineral deposits. Mineral Concession Rules. Marine mineral resources and Laws of Sea.

15. Mineral deposits of Gujarat.

Value addition, UNFC Classification and latest method of classification, Existing mineral policy of Gujarat State, Geology of Gujarat, Rules and regulations pertaining to prevention of illegal mining.

16. Earthquake and Engineering Seismology.

Seismology, earthquakes, focal depth, epicenter, great Indian earthquakes, Intensity and Magnitude scales, Energy of earthquakes,

foreshocks, aftershocks, Elastic rebound theory, Fault plane solutions, Seismicity and Seismotectonics of India, Frequency-Magnitude relation (b values), Velocity structure, V_p/V_s studies. Elastic waves, their propagation characteristics. Seismic ray theory for spherically and horizontally stratified earth, basic principles of Seismic Tomography and receiver function analysis, Seismic network and arrays, telemetry systems, Earthquake prediction; dilatancy theory, short-term, middle-term and long-term predictions, Seismic microzonation studies, application for engineering problems, Seismometry, Principle of electromagnetic seismograph, displacement meters, velocity meter, accelerometer, WWSSN stations, Strong motion seismograph, seismic arrays for detection of nuclear explosions, Broadband seismometry.

17. Current trends and recent advancements in the above fields.
