

**M.Sc. APPLIED GEOLOGY – COGNATE SUBJECT STUDENTS  
ENTRANCE TEST SYLLABUS- A**

1. **Geodynamics and Remote Sensing:** Origin of the Earth, age of the earth, earth's interior. Composition of the earth. Earth's geological process. Exogenous Processes and Endogenous processes. Weathering and Mass-wasting. Geological action of rivers, glaciers, wind, waves and currents, and ground water. Earth Quakes, Volcanoes. Landforms of various origin. Aerial Photographs. Principles of Remote Sensing. Elements of aerial photo- interpretation. Remote sensing platforms, sensors, multispectral scanners and microwave remote sensing. Indian Satellite Missions.
2. **Crystallography:** Morphological Properties of crystals. Classification of crystal systems, Axial Ratio, Axial Angle, Twinning in crystals, Miller indices and symmetry elements, type minerals of various crystal systems.
3. **Mineralogy :** Basics of mineralogy- physical properties, characters depending upon elasticity, cohesion, light, electricity, magnetism. Chemical Bonding – Ionic, covalent, metallic, vander walls. Classification of minerals based on chemical composition and structure. Rock forming minerals. Ore minerals. Oxides, carbonates, phosphates, sulphates, sulphides, and hydrocarbon. Silicates-quartz, feldspar, olivine, garnet, pyroxene, amphibole.
4. **Petrology :** Classification of Rocks, Igneous, sedimentary and metamorphic rocks. Forms, Structures and textures of Igneous Rocks. Lithification and diagenesis. Structures of sedimentary rocks. Classification of sedimentary rocks based on grain size, and mode of formation. Agents and structures of metamorphic rocks. Grades and facies of metamorphism. Petrographic properties of all kinds of rocks.
5. **Palaeontology :** Introduction to palaeontology, scope and subdivision, classification, definition of fossil, types of fossils, nature and mode of preservation of fossils, uses of fossils, evolution of life, life through ages. General characters, morphology, classification, geological history and evolution of phylum mollusca, class, palecypoda, gastropoda, cephalopoda, Phylum-Protozoa, morphology, geological history and stratigraphic importance or order foraminifera, class anthozoa, plant fossils, Phylum-hemicordita, sub-phylum, graptolithina Phylum-brachiopoda, Phylum-arthropoda.
6. **Principles of Stratigraphy and Indian Stratigraphy:** Principles of stratigraphy. Law of order of superposition, law of uniformitarianism, law of faunal and floral succession, unconformities and its types, stratigraphic concept of correlation, standard stratigraphic scale, elements of lithostratigraphic, biostratigraphic, chronostratigraphic classification and their units. Physiographic division of India, Archaeans of Karnataka- Sargur group, Dharwar super group, (Sargur, Holenarasipura, Nuggehalli, Chitradurga, Shimoga, younger granite. Proterozoic era – An introduction of Purana basin, Kaladgi, Badami, Bhima, life of proterozoic, volcanic episode in Karnataka, western ghats, St.Mary's island, infra & intertrappeans, laterites and soils,
7. **Structural Geology and geotectonics: Geotectonics:** Introduction, Branches of Geotectonics, Methods of Geotectonics, Importance of Geotectonics, Plate tectonics, continental margins, plate boundaries, causes and movement of the plates, palaeomagnetism. Primary structural forms and secondary structural forms of sedimentary, igneous rocks. Concept of deformation. Forces of deformation. Folds- Parts of folds, types of folds and classification. Joints – Geometric and genetic classification. Faults-Geometric and genetic classification. Criteria for recognition of faults in the field. Unconformities.
8. **Mineral Exploration and Economic Geology:** Ore geology in relation to industry, Economic minerals. Principles and processes of ore formation; magmatic and hydrothermal processes, migration, deposition and replacement of ore deposits, metallogenic epochs and provinces with respect to India, and Karnataka. Methods of prospecting and exploration of ore deposits, guides and criterias for mineral exploration, geophysical exploration gravity, magnetic methods of exploration. Ore minerals, gangue minerals, processes of ore information : magmatic processes, contact metasomatism, hydrothermal processes, weathering processes, sedimentation (Fe & Mn cycles) oxidation and supergene enrichment, metamorphism and classification of ore deposits.
9. **Hydrogeology and Engineering Geology:** Global water distribution, Hydrological cycle, origin of water. Vertical distribution of water. Occurrences, movement and storage of water. Aquifers and types of aquifers. Hydrological properties of aquifers. Darcy's law, Water table fluctuation. Ground water quality, Artificial recharge of ground water. Salt water intrusion in coastal aquifers, hydrogeomorphic units, radio isotopes in hydrogeological studies. Hydrostratigraphic units. The role of geology in civil engineering, Engineering properties of rocks, construction materials, stones and rocks, physical, chemical and classifications of rocks, soil and stones. Geological investigation for damsite selection, laying tunnels, bridges and roads on ghats.
10. **Environmental Geology: Ecosystems and their components. Kinds of ecosystems. Earth's natural resources and their distribution. Energy Resources and crisis.** Natural Hazards, Earthquakes, floods, landslides and avalanches, drought anthropogenic activities. Soil, water, air pollution, causes and effects of mining on environment. Noise pollution. Global warming, climate change and acid rain. Impacts of global warming. Solid wastes. Municipal Effluents. Radioactive wastes.

## M.Sc APPLIED GEOLOGY – FOR PCM STUDENTS

### ENTRANCE TEST SYLLABUS- B

1. Inorganic Chemistry: Atomic structure, periodic properties- atomic radii, ionic sizes of atoms, ionization energy, electron affinity, electro-negativity, chemical bonding, types of bonds, hybridization, bond characters, molecular orbital theory, compounds of s-block elements, d-,f-, p-block elements, noble gas compounds, inter-halogen compounds, pseudo-halogens. Solvents, indicators. Polymers, fuels, abrasives, refractories, explosives, paints, ceramics, glass.
2. Organic Chemistry: Classification and nomenclature of alkenes and alkyl halides. Mechanism of organic reactions. Types of organic reactions. Reaction intermediates. Electronic displacement in organic compounds, alcohols-classification, phenols, amines, carbonyl compounds, active methylene compounds, cycloalkanes, aromatic hydrocarbons, heterocyclic compounds, dyes, oils, fats, waxes, soaps, detergents, drugs, vitamins, stereochemistry, carbohydrates, amino acids, alkaloids, terpenes, steroids.
3. Physical Chemistry: gases- molecular velocities, liquefaction, adsorption, catalysis, liquid mixtures-classification, laws of thermodynamics, colligative properties, phase equilibrium, chemical kinetics, crystals- structures, buffer solutions, corrosion. Energy sources- cells. Colloids.
4. Quantitative and Analytical Chemistry: Photochemistry, spectroscopy, electrochemistry, chromatography, gravimetry, colorimetry, chemicals and glassware used in labs, EDTA, hardness of water, distillation, crystallization, sublimation, salt mixtures, acid and basic radicals, density, specific gravity, decomposition, saponification, hydrolysis.
5. Algebra, Analytical Geometry and Calculus: Theory of numbers, theory of equations, matrices, vectors, bases and frames. Sequences, infinite series, Parametric representation of lines, equations of planes, lines and planes, projections, angles and normals, differential calculus- limit of a function, types of functions, linear approximation, quadrics, techniques of integration, partial derivatives, asymptotes, envelopes, surface areas and length of arcs. Boolean algebra and group theory. Rings and fields.
6. Differential equations(DE), Linear Algebra and Applied Mathematics: Differential equations of first order, Linear differential equations, DEs of other types, Partial Differential Equations(PDE), solution to PDEs. Vector spaces. Linear transforms. Fourier series, Laplace transforms, Simultaneous linear equations- functions. Fundamentals of Statistics, Classification of data, graphical representation, measures of central tendency, dispersion, moments, skewness, probability- law, binomial distribution, correlation, scatter diagram, lines of regression.
7. Numerical Analysis: Numerical solutions of algebraic and transcendental equations. Bisection method, Secant method. Euler, Cauchy methods. Runge-Kutta method. Finite differences and interpolations, difference equations, numerical integration, rules.
8. Properties of Matter, Kinetic theory, Thermodynamics, Waves, Acoustics and Optics: Elasticity, elastic constants of solids, shearing force, Reynolds number, Stokes law, surface tension, pressure, Kinetic theory of matter, ideal gas, real gas, specific heats, Boyle's law, thermodynamic variables, entropy, indicator diagrams, laws of thermodynamics.
9. Electricity, Magnetism, Electromagnetic Theory, Atomic and Molecular Physics: electric currents, current density, circuits, impedance, reactance, resonance, q-factor, power consumptions, power factor, scalar and vector magnetic fields, theorems, field and wave equations. Electrons, atomic spectra, Zeeman effect, molecular spectra, scattering of light, lasers, X-rays, wave mechanics.
10. Nuclear Physics and Solid State Physics: The nucleus, neutron and its discovery, properties, Mass Spectrographs, radioactivity, radioactive series and units of radioactivity. Nuclear isomerism. Electron capture, Nuclear energy. Carbon dating. Age of the earth. Band theory of solids, semiconductors. Hall effect. Solar cells. PV cells. Superconductivity. Meissner effect. Nuclear reactions, Fission and fusion. Particles and anti-particles.

ELIGIBILITY NORMS:

**M.SC APPLIED GEOLOGY**

A) B.Sc Degree with Geology as a cognate subject together with any other Science combination.

**OR**

B) B.Sc Degree with Physics, Chemistry and Mathematics as majors

**OR**

C) B.Sc Degree with Earth Science and Resource Management as one of the combinations.