Entrance Test Syllabus for
Five Years Integrated Masters Programme in Applied Geology
(Programme Code: FYIMPGL)

Geology

Unit 1

Origin of the solar system and Earth; age of the Earth; internal layering of Earth (Crust, Mantle, Core); physical and chemical characteristics of Earth's layers; Lithosphere, Hydrosphere, Atmosphere, and Biosphere; concept of Continental Drift; basic principles of Plate Tectonics; types of plate boundaries and their relation to earthquakes, volcanism, and mountain building.

Unit 2

Processes of weathering, erosion, transportation, and deposition; weathering types (chemical, mechanical, and biological); agents of erosion and deposition (wind, rivers, glaciers, and oceans); development of fluvial landforms such as valleys, floodplains, and deltas; aeolian landforms such as sand dunes; glacial landforms including cirques, U-shaped valleys, and moraines; coastal landforms and basic concepts of landscape evolution.

Unit 3

Definition and characteristics of minerals; physical properties of minerals (colour, streak, lustre, hardness, cleavage, fracture); common rock-forming minerals (quartz, feldspar, mica, calcite); concept of the rock cycle; formation and classification of igneous rocks (granite, basalt); sedimentary rocks (sandstone, shale, limestone); metamorphic rocks (marble, slate, schist); significance of rocks in understanding Earth history.

Botany

Unit 4

External structure of plants including roots, stems, and leaves; functions of plant organs; modifications of roots, stems, and leaves for adaptation and survival; internal tissue systems including epidermis, cortex, vascular bundles; structure and function of xylem and phloem; basic plant tissues; importance of plant anatomy in identification of fossil plant remains and introduction to paleobotany.

Unit 5

Principles of plant classification and taxonomy; major plant groups including algae, bryophytes, pteridophytes, gymnosperms, and angiosperms; concept of plant communities and vegetation types; plant adaptations to different environments; ecological succession with special reference to lithosere succession on bare rocks; role of vegetation in soil formation, slope stabilization, and prevention of soil erosion and landslides.

Zoology

Unit 6

Basic principles of classification of animals; characteristics of major invertebrate groups including molluses, brachiopods, corals, and arthropods; overview of vertebrate groups;

concept of biological evolution; theories of evolution including Lamarckism and Darwin's theory of natural selection; importance of fossils as evidence of evolution and tools for interpreting geological history.

Unit 7

Basic structural organization of animals including body symmetry and skeletal systems; hard parts such as shells, bones, and exoskeletons and their preservation potential; differences between hard-bodied and soft-bodied organisms in fossilization; types of fossils including molds, casts, impressions, and petrified fossils; processes of fossilization; introduction to the Geologic Time Scale based on fossil records.

Geography

Unit 8

Major physiographic divisions of India including the Himalayan Mountains, Indo-Gangetic Plains, Peninsular Plateau, Thar Desert, Coastal Plains, and Island groups; geological origin and characteristics of the Himalayas and Deccan Plateau; major river systems including Indus, Ganga, and Brahmaputra; influence of tectonics, climate, and rivers on landscape development.

Unit 9

Fundamentals of cartography; map scales and types of maps; geographic coordinates including latitudes and longitudes; conventional symbols used in maps; representation of relief using contours and contour intervals; interpretation of topographic sheets (toposheets); identification of slopes, drainage patterns, and terrain features from maps; basic skills for geological field mapping.

Physics

Unit 10

Newton's laws of motion; concepts of force, work, and energy; mass, weight, and density; gravity and gravitational field of the Earth; concept of buoyancy and isostasy; introduction to stress, strain, and elasticity; application of these concepts in understanding rock deformation, folding, faulting, and earthquakes.

Unit 11

Concepts of heat, temperature, and energy transfer; modes of heat transfer including conduction, convection, and radiation; heat flow within the Earth and mantle convection; basic properties of waves; types of seismic waves including P-waves, S-waves, and surface waves; use of seismic waves in studying Earth's interior and locating earthquakes.

Chemistry

Unit 12

Structure of atoms including atomic number, mass number, and electronic configuration; periodic table and periodic properties of elements; types of chemical bonds including ionic, covalent, and metallic bonding; concept of crystal lattices and crystal structures; role of atomic bonding in mineral formation and crystal growth.

Unit 13

Concepts of solutions and concentration; solubility and solubility product; acids, bases, and pH scale; chemical equilibrium in natural systems; precipitation reactions; dissolution of minerals in groundwater; crystallization of minerals from magma and aqueous solutions.

Mathematics

Unit 14

Measurement of angles and distances; basic trigonometric ratios including sine, cosine, and tangent; applications of trigonometry in measurement of heights and slopes; basic geometric concepts including triangles and circles; coordinate geometry; applications in geological measurements such as calculation of dip and strike of rock layers.

Unit 15

Collection and presentation of data; measures of central tendency including mean, median, and mode; measures of dispersion including range and standard deviation; graphical representation of data such as histograms and frequency curves; basic concepts of probability; applications of statistical methods in geological data analysis including grain size distribution and environmental datasets.