

SYLLABUS ADMISSION TO PH.D PROGRAMME IN : EARTH SCIENCES.

Unit 1: Earth as a Planet Branches of Earth Sciences. General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids. Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters. Origin of atmosphere, ocean and life.

Unit 2: Solid Earth, Hydrosphere, Atmosphere and Biosphere Mechanical layering of the Earth: lithosphere, asthenosphere, mantle and core. Earthquake and earthquake belts: seismic waves and internal constitution of the Earth. Volcanoes and volcanism, distribution of volcanoes. Concept of isostasy. Formation of core, mantle, crust, atmosphere, hydrosphere and biosphere. Convection in Earth's core and production of its magnetic field. Geothermal gradient and internal heat of the Earth.

Unit 3: Cosmic abundance of elements Distribution of elements in solar system and in Earth. Composition of the Earth. General concepts about geochemical cycles. Properties of common elements in Earth. Concepts of geochemical cycles.

Unit 4: Hydrosphere and Atmosphere Oceanic current system and effect of Coriolis force. Concepts of eustasy. Land-sea interaction: Wave erosion and beach processes. Atmospheric circulation. Weather and climatic changes.

Unit 5: Plate Tectonics Historical development of the concept of continental drift and plate tectonics. Plates and plate boundaries. Geodynamic elements of Earth: mid oceanic ridges, trenches, transform faults and island arcs. Plate tectonics: mountain belts and rift valleys.

Unit 6: Soil Soils: types, soil profile, processes of formation of soil.

Unit 7: Understanding the past from Stratigraphic records Nature of stratigraphic records. Fundamental laws of stratigraphy: laws of superposition and faunal succession. Absolute and relative time in Geology. Concept of time and geological time scale Concept of radiometric dating. Radiometric dating of rocks and minerals: U-Pb, Pb-Pb, K-Ar, Rb-Sr, Sm-Nd methods. Dating igneous and sedimentary rocks. Concepts of neptunism, plutonism, uniformitarianism, and catastrophism. Geological time scale.

Unit 8: Isostasy: Airy and Pratt; Folds and Faults—origin, types and their topographic expressions

Unit 9: General degradational processes: processes of rock weathering and their effects on landform.

Fluvial processes and landforms Glacial processes and landforms; fluvio-glacial landforms, Aeolian processes and landforms; fluvio-aeolian processes

Megascopic Identification of rocks and minerals

a) Rocks: granite, basalt, dolerite, shale, sandstone, limestone, conglomerate, laterite, slate, phyllite, schist, marble, quartzite, gneiss

b) Minerals: talc, gypsum, calcite, mica, feldsper, quartz, chalcopryrite, hematite, magnetite, bauxite, galena, Coal.

Unit 10: GIS and Remote Sensing Principles of Photogrammetry, Types of aerial photographs, Determination of scales of aerial photographs. Identification of physical and cultural features by fusing two overlapping photographs and their verification with topographical sheets with interpretation. Preparation and interpretation of land use/land cover map using three overlapping aerial photographs. Resolution of satellite sensors with special reference to landsat and IRS series; Preparation of standard false colour composites from Landsat and IRS data; Preparation of land use/land cover map with interpretation.