

Faculty of Ocean Science and Technology**Subject Code: B1806****Earth Sciences**

Module. 1	Physical and chemical weathering, Geological action of wind, streams, glaciers and ocean. Morphometric analysis of drainage basin. Coastal and shoreline landform features.
Module. 2	Silicate structure and classification. Concepts of symmetry, space lattice and point groups. 32 crystal classes; its structure and common mineral in each systems. Common rock forming minerals and its distinguishing properties. Physical, optical and chemical properties of minerals.
Module .3	Partial melting and crystallization of magma. Bowen's reaction series. Intrusive and extrusive igneous bodies. Mineralogy, texture and structure of common felsic, mafic and ultramafic rocks. Metamorphism and its types; mineralogy, texture and structure of common metamorphic rocks. Grade of metamorphism and metamorphic facies. Role of fluids in metamorphic reactions. Sedimentary rocks and its texture and structure. Classification of Sandstone, limestone and conglomerate. Placer minerals and its provenance.
Module. 4	Principles of Stratigraphy: History and Development of Stratigraphy. Concepts of Magnetostratigraphy, Chemostratigraphy, Event stratigraphy, and Sequence stratigraphy; Nomenclature and the modern stratigraphic code. Radioisotopes and measuring geological time. Precambrian stratigraphy of India: Achaean stratigraphy - tectonic frame-work, geological history and evolution of Dharwar, and their equivalents; Eastern Ghats mobile belt; Proterozoic stratigraphy - tectonic framework, geological history and evolution of Cuddapahs and their equivalents. Paleozoic, Mesozoic and cenozoic stratigraphy of India. Evolution of Himalaya.
Module. 5	Stress-strain relationships for elastic, plastic and viscous materials. Measurement of strain in deformed rocks. Behaviour of minerals and rocks under deformation conditions. Structural analysis of folds, cleavages, lineation, joints and faults. Superposed deformation. Mechanism of folding, faulting and progressive deformation. Shear Zones: Brittle and ductile shear zones, geometry and products of shear zones; Mylonites and cataclasites, their origin and significance. Unconformities and basement-cover relations.
Module .6	Concepts of ore genesis; spatial and temporal distribution of ore deposits. Mode of occurrence of ore bodies; texture, paragenesis and zoning of ore and their significance. Ore bearing fluids; their origin and migration, wall rock alteration. Coal and its properties: Different varieties and ranks of coal. Origin of coal. Coalification process and its causes. Fundamentals of coal petrology, concept of coal maturity, peat, lignite, bituminous and anthracite coal. Application of coal geology in hydrocarbon exploration. Origin, migration and entrapment of natural hydrocarbons. Characters of source and reservoir rocks. Structural, stratigraphic and mixed traps. Techniques of exploration. Geographical and geological distributions of onshore and offshore petroliferous basins of India. Mineralogy and geochemistry of radioactive minerals. Instrumental techniques of detection and measurement of radioactivity. Radioactive methods for prospecting and assaying of mineral deposits. Distribution of radioactive minerals in India.
Module. 7	General and exploration geophysics: Seismology, Structure of the Earth and Heat Flow studies. Gravity, magnetic, electrical, electromagnetic and seismic prospecting methods. Surface geophysical prospecting for groundwater exploration. Surface and underground mining methods. Sea floor mineral resources and its exploration. Continental drift theory and its evidences. Sea floor spreading and plate tectonics. Geophysical offshore exploration techniques.

