

Course Name: ADVANCED STRUCTURAL GEOLOGY

Marks: 50

Duration: One Semester

Course content:

- **Rock mechanics:** force, strain and stress (including Mohr diagram and strain analysis methods)
 - **Experimental rock deformation tests and failure criteria:** uniaxial and triaxial, compressive test, tensile test
 - **Ductile and Brittle rock deformation:** simple shear and pure shear, deformation modes and mechanisms, brittle-ductile transition, shear zone, faulting (including fault rock development, palaeostress analysis from fault slip data) and fracturing (including joint development) in the upper crust
 - **Role of fluids:** fluid pressure and fluid flow
 - **Advanced techniques in structural geology:** meso to micro scale
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Environmental Micropaleontology (50 Marks)

History of micropaleontology and its position in the context of the natural sciences. Overview of the systematic, biology and ecology of major microfossil groups including foraminifera, radiolarians, diatoms, dinoflagellates, calcareous nannofossils and acritarchs.

Detailed study of foraminifera-preparation and research techniques, taphonomic aspects, applications to palaeoecology, environmental monitoring and palaeo-oceanography, geochemistry of tests and transfer function, distribution in polar regions and mangroves their stratigraphic significance.

Course Name: Shear zone pattern and granite emplacement

Marks: 50

Course content: Types of Shear zone pattern, mechanism of granite emplacement in both compression and extensional regime of a shear zone, distinguishing field and microscopic features of granite emplacement in relation to the formation of different shear zones.

1. Geochemistry of Groundwater and Deterioration of Groundwater Quality:

Expression of groundwater quality – Graphical treatment (Collins, Stiff, Hem, Piper, Gibbs, and Schoeller) - Hydrochemical facies - Correlating geochemical sequence and hydrogeological condition - Geogenic (As, F and heavy metals) and anthropogenic groundwater contamination - Mitigation processes - Interaction of saline and fresh water – Ghyben-Herzberg relation - Saltwater interface in a layered coastal aquifers - Upcoming of saltwater in coastal aquifer.

2. Geomorphology and Quaternary Stratigraphy:

Principles of sedimentation and Quaternary stratigraphy - Quaternary land form and geologic events-The process of interflow - Principle of multiphase flow and diffusion - Land use and influence on water yield, quality, stream regimen - Environment of aquifer system and data interpretation on fluvial, fluvial-deltaic, and coastal aquifers.