

## MIPE3004 GEOMECHANICS (3-0-0)

### **Module - I: (07 hours)**

Geotechnical Investigations and Classification of rock mass and soil: fundamental physical and mechanical properties of intact rock and rock masses; rock mass classification methods (Rock Mass Rating (RMR), Q-system, Geological Strength Index (GSI)) and their applications; soil classification methods and their applications.

### **Module - II: (11 hours)**

Introduction and Concept of stress and strain in rock: Analysis of Stress, Analysis of Strain, Transformation of Stresses and strains, Principal stresses and stress invariants, Mohr's Circle of stress, Stress-Strain Relationships: Relationship between Principal Stresses and Principal Strains, Non-linear Elasticity, Plasticity, Plane Stress Conditions, Plane Strain Conditions, Axisymmetric Conditions, Equation of Equilibrium, Compatibility condition.

### **Module - III: (09 hours)**

Rock and Rock Mass Failure Criteria: Invariants of Deviatoric Stress, Mohr Coulomb (MC) Criterion, Hoek-Brown (HB) Criterion, Drucker-Prager Criterion. Strength and Deformability of Jointed Rock Mass: Fracture Strength of Jointed Rock Mass, Shear Strength of Rock Joint, Concept of Joint Compliance.

### **Module - IV: (09 hours)**

Rock Slope Engineering: Slope failure and causes; Basic approaches to slope stability analysis and stabilization Monitoring of Excavation Stability: Purpose and nature of monitoring, Instrumentation and monitoring systems - Load; Stress and Deformation measuring devices; Interpretation of monitoring data; Practical aspects of monitoring.

### **Module - V: (09 hours)**

Subsidence and Ground Control: Mechanisms of surface subsidence, including continuous and discontinuous subsidence, prediction, monitoring, and management techniques, design of supporting systems for underground workings, including pillars, roof supports (props, bars, cogs), and mine filling.

### **Books:**

1. Introduction to Rock Mechanics, Goodman, RE.
2. Engineering Rock Mechanics-An Introduction and Principles: Pergamon, Hudson, J.P. and Harrison, J.P
3. Fundamental of Rock Mechanics by Jaeger, J.C. and Cook, NGW
4. Finite element procedures by (1996) K. J. Bathe
5. Concept and Application of Finite Element Analysis by RD Cook