

5th Semester	RMN5D003	Computational Geomechanics	L-T-P 3-0-0	3 Credits
------------------------------------	-----------------	---------------------------------------	------------------------	----------------------

Module-I:**(10 Hours)**

Principles of continuum mechanics, Transformation of vector and tensor, Analysis of stress and strain, Mohr's circle of stress and strain in two dimensions, Stress Equilibrium Equation

Module-II:**(10 Hours)**

Airy Stress Function, Strain Compatibility Conditions, Stress-strain Relationship, Linear Isotropic Elasticity, Degree of Anisotropy, Non-linear Elasticity, Plasticity.

Module-III:**(16 Hours)**

Basics of FEM/FDM/BEM, Discretization of physical system with finite element, Nodal Shape function, Concept of Calculus of Variations, Numerical integration scheme, Assembly into Global Simultaneous unreduced equation, Application of Essential boundary conditions, Determination of Strains, stress and Reaction forces, Tunnel Example.

Module-IV:**(10 Hours)**

Rock and Rock mass failure criterion, Mohr-Coulomb yield criterion, Drucker-Prager criterion, Hoek-Brown criterion, Tensile Yield criterion, Analysis and design of structures and excavations in rocks-surface and underground, Strength and deformability of jointed rock mass.

Books:

1. Finite Element Method: Concept and Applications in Geomechanics, D. Deb, , second Eds., Prentice Hall of India, New Delhi, India, 2011
2. Finite Elements in Geotechnical Engineering, D.J. Naylor and G. N. Pande, , Pineridge Press, Swansea, UK, 1981
3. Analytical and computational Methods in Engineering Rock Mechanics E. T. Brown, Springer, 1987

Digital Learning Resources:

Course Name: Finite Element Analysis

Course Link: <https://nptel.ac.in/courses/105/105/105105041/#>

Course Instructor: Dr. D Maity, Prof. S. K. Bhattacharya, IIT Kharagpur