EGE 5102. Structural Geology (4 credits)

Unit - 1

Deformation. Components of deformation: Homogeneous and heterogeneous deformation. Ideal material behaviours. Rheology- Elastic, plastic and brittle deformation. Deformation at the microscale. Concept of stress: Stress tensor-Stress matrix. Concept of strain: Simple shear and pure shear, Mohr circles for strain. Stress and strain ellipsoids. Faults, Joints and Fractures - Brittle and shear failure. Mohr-Coulomb failure criteria. Deep fractures. Analysis of fractures. Fault geometry and nomenclature. Features of fault planes. Use of stress and strain ellipsoids in the study of faults and joints.

Unit- 2

Buckling- Biot-Ramberg theory of buckling. Folds - cylindrical, non-cylindrical and conical folds. Geometry and classification of cylindrical folds. Canoe fold and inverted canoe fold. Minor folds and their use in determining the major fold structure. Mechanics of folding. Fold classifications of Donath and Parker and Ramsay. Superposed folding. Fold interference patterns - dome and basin, mushroom and boomerang patterns and Ramsay's classification.

Unit - 3

Tectonites: classification, tectonic fabric. Foliation: axial-plane foliation and its origin, fracture cleavage, crenulation cleavage and transposed foliation. Foliations and folds. Use of axial plane foliation and fracture cleavage in the determination of major structures. Lineation - types, classification and origin.

Unit- 4

Geologic bodies and scale, structural co-ordinates. Spatial orientation of planar and linear fabrics. Fundamentals of geometric analysis. Measurement and recording of structural attitudes. Stereographic and equal area projections in structural geology. $\boldsymbol{\pi}$ and $\boldsymbol{\beta}$ diagrams. Geometric analysis of simple and complex structures on macroscopic scale. Geometric analysis of folds. Analysis of fractures and faults.

References

- Billings, M. P. (2016) Structural Geology. Pearson Education; Third edition, 624p.
- Park, R.G. (1989), Foundation of Structural Geology, Blackie, 148p.
- Ragan, D.M. (1969), Structural Geology, Wiley, 2nd edition, 602p.
- Turner, E.J. and Weiss, L.E. (1963), Structural Analysis of Metamorphic Tectonites, Mc. Graw Hill, 545p.
- Hobbs, B.E., Means, W.D. and William, P.F. (1976), An outline of Structural Geology, John Wiley and Sons, 571p.
- Robert. J.Twiss and Eldridge.M.Moores (2007). Structural Geology, W.H.Freeman and Company, 695p.
- Ramsay, J.G. (1967) Folding and Fracturing of Rocks. Mc Graw Hill, 586p.
- Ramsay, J.G. and Huber M.I. (1987) The Techniques of Modern Structural Geology: Folds and Fractures, Academic Press, 391p.