

BACHELORS WITH GEOLOGY AS MAJOR (CT – I)

6th SEMESTER

GLY622J1 GEOLOGY _ STRUCTURAL GEOLOGY AND TECTONICS

CREDITS: THEORY:3, PRACTICAL:1

OBJECTIVE/EXPECTED LEARNING OUTCOMES

The course deals with geological structures resulting from the action of these forces on rocks. The student will gain knowledge of the geometry of the rock structures, and understand the mechanism of the evolution of rock structures and its application in the field. The students learn the skills of identifying different structures and measurements using Brunton compass. This is fundamental to geological mapping. This course also helps to know how to use structures and helps students appreciate the dynamic nature of the Earth's lithosphere. Learn how to read geologic maps and solve simple map problems using strike and preparations of cross sections.

UNIT -1 (15 HOURS)

Basic concepts of field geology: Maps–definition, topographic and geological maps. Dip and strike of stratified rocks, True dip, apparent dip, plunge and pitch of linear structures. True thickness and vertical thickness. Outcrop patterns. Width of the outcrop, the relation between true thickness and the width of the outcrop. Criteria for the distinction between normal and overturned sequences.

UNIT -2 (15 HOURS)

Folds: Definition and classification (geometrical); fold parameters/components. Unconformities: Definition, types of unconformities. Criteria for recognition of unconformities. Concordant pluton: sills, laccoliths, lopoliths, and phacoliths. Discordant pluton: dykes, volcanic vents, ring dykes. Joints- Morphology and classification (Geometrical). Foliation: Definition and classification; Schistosity, gneissosity, slaty cleavage. Lineation: Definition and classification, slickenside, mineral lineation Cleavage/ bedding intersections, pucker lineation, pitch and swell, boudinage, quartz roding and mullion.

UNIT -3 (15 HOURS)

Faults: Definition, terminology and classification (geometrical). Criteria for recognition of faults: discontinuity of structures, repetition and omission of strata, field characteristics features of fault plane: slickenside, gouge, fault breccias, mylonites, silicification and mineralization, differences in sedimentary facies. Physiographic criteria: scarps, triangular facets. Offset streams. Stress: definition of force and stress. Normal and shear stress. The basic concept of stress ellipse. Strain definition and computation of changes in line length. The basic concept of strain ellipse.

PRACTICAL (1 CREDIT: 30 HOURS)

Study of contours and landforms; Strike, true dip and Apparent dip problems; Measurement of thickness and width of outcrops; Completion of outcrops in geological maps; and drawing of profiles.

Geological field tour of two days for observing and mapping various geological structures and outcrops.

BOOKS RECOMMENDED:

- Billings, M.P., (1972) Structural Geology. Prentice Hall.
- Condie, K. C., 1997: Plate Tectonics and Crustal Evolution, Butterworth & Heimnemann.
- Cox, A., 1996: Plate Tectonics. Blackwell Science.
- Davis, G.R., (1984) Structural Geology of Rocks and Region. John Wiley
- Hills, E.S., (1963) Elements of Structural Geology. Farrold and Sons, London.
- Jain, A.K., (2014) An introduction to structural geology. Text Book series in Geological Sciences for Graduate Students. Geological Society of India, Bangalore.
- Keary, P. and Vine, F. J., 2000: Global Tectonics, Blackwell Science.
- Ramsay, J.G. (1967) Folding and fracturing of rocks. McGraw-Hill, New York
- Singh, R. P., (1995) Structural Geology: A Practical Approach. Ganga Kaveri Publ., Varanasi
- Subramanian, V., 2001: Text Book on Environmental Science, Narosa International.