

CLUSTER UNIVERSITY SRINAGAR

GEOLOGY

Semester - V

(Credits: Theory-4, Practicals-2)

Objectives and learning outcomes:

This course intends to impart the fundamental knowledge about the geological structures in different settings. In addition the fundamental concepts and different data-sets of structural analysis and synthesis, including field mapping and surveying will be defined and discussed. Students will learn to interpret the structures to unfurl the history of deformation in rocks including the advanced ideas of the internal structure of earth, and the tectonic evolution of Himalaya and the Indian Craton.

CLUSTER UNIVERSITY SRINAGAR
SYLLABUS – SEMESTER 5th (CBCS) – B.Sc. GEOLOGY
(DSE)

(Lectures-60)

TITLE:	Structural Geology and Tectonics
Course Code: GL-T5	CREDITS: 04 (Total: 60 Marks)

STRUCTURAL GEOLOGY

Unit-I (Lectures-20)

- 1.1. Basic concepts of field geology: Maps—definition, topographic and geological maps.
- 1.2. Dip and strike of stratified rocks, True dip, apparent dip, plunge and pitch of linear structures.
- 1.3. Outcrop patterns.
- 1.4. True thickness and vertical thickness, width of the outcrop,
- 1.5. Relation between true thickness and the width of outcrop.
- 1.6. Criteria for distinction between normal and overturned sequences: ripple marks, cross bedding, graded bedding, mud cracks, rain-imprints, Pillow lava, vesicular tops of lava beds, Relationship of cleavage with bedding, paleontological methods.
- 1.7. Stress; definition of force and stress, normal and shear stress, basic concept of stress ellipse.
- 1.8. Strain: definition and computation of changes in line length, basic concept of strain ellipse.

Unit-2 (Lectures-14)

- 2.1. Folds: Definition, and fold parameters/components and classification (geometrical)
- 2.2. Unconformities: Definition, types of unconformities and criteria for recognition of unconformities.
- 2.3. Concordant pluton (sills, laccoliths, lopoliths and phacoliths) and discordant pluton (dykes, volcanic vents, ring dykes)
- 2.4. Joints: Morphology and classification (Geometrical).
- 2.5. Foliation: Definition and classification: Schistosity, gneissosity and slaty cleavage
- 2.6. Lineation: Definition and classification: slickenside, mineral lineation, Cleavage/ bedding intersections, pucker lineation, boudinage, quartz roding and mullion.

Unit-3 (Lectures-12)

- 3.1. Faults: Definition, terminology and classification (geometrical)
- 3.2. Criteria for recognition of faults: discontinuity of structures, repetition and omission of strata, features characteristic of fault plane: slickenside, gouge, fault breccias, mylonites, silicification and mineralization, differences in sedimentary facies, physiographic criteria (scarps, triangular facets, offset streams).
- 3.3. Joints: Morphology and classification (Geometrical).
- 3.4. Important concepts about Earth dynamics: Contraction, Expansion, Plate tectonic.
- 3.5. Plate tectonics - basic concepts and definitions
- 3.6. Types of plate margins, important characters of plate margins and Mechanism of plate movement

Unit-4 (Lectures-14)

- 4.1. Mantle plumes vis-à-vis island chains.
- 4.2. Plate tectonics in relation to the distribution of seismic, volcanic and island arc belts.
- 4.3. Plate tectonic models for the origin of mountain belts: Ocean-ocean, ocean-continent, Continent-Continent types of convergent boundaries
- 4.4. Tectonics of the Indian subcontinent: Tectonic divisions (Extra-peninsula; Indo- Gangetic Plain and Peninsular Shield), their tectonic characters and major structural trends.
- 4.5. Northward movement of the Indian Plate and the origin and evolution of the Himalayas and its thrust belts.

- 4.6. Tectonic models for the origin and evolution of the Indo-Gangetic plain.
- 4.7. Seismicity of the Indian subcontinent

SUGGESTED READINGS:

1. Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley
2. Billings, M. P. (1987) Structural Geology, 4th edition, Prentice-Hall.
3. Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.
4. Pollard, D. D. (2005) Fundamental of Structural Geology. Cambridge University Press.
5. Ragan, D. M. (2009) Structural Geology: an introduction to geometrical techniques (4th Ed).
Cambridge University Press (For Practical)
6. Lahee F. H. (1962) Field Geology. McGraw Hill
7. Condie, K. C ., (1997). Plate Tectonics and Crustal Evolution. Butterworth & Heimmemann
8. Keary, P. and Vine, F. J., (2000). Global Tectonics, Blackwell Science.
9. Cox, A., 1996. Plate Tectonic. Blackwell Science
10. Ghosh, S.K. 1995. Structural Geology- Fundamentals and Modern Developments, Pergamon Press

CLUSTER UNIVERSITY SRINAGAR
SYLLABUS – SEMESTER 5th (CBCS) – B.Sc. GEOLOGY
(CORE COURSE - PRACTICAL)

TITLE: PRACTICAL

Course Code: GL-P5

CREDITS: 02 (Total: 30 Marks)

Structural Geology

A. Laboratory work- (1 credit)

1. Strike, true dip and Apparent dip problems
2. Measurement of thickness and width of outcrops
3. Completion of outcrops in geological maps and drawing of profiles and study of geological maps.

B. Field Work- (1 credit)

Geological Fieldwork comprises of synthesis of structural and lithological data (Dip, Strike and lithology), preparation of sketches lithologs and fossils collection if any available and preparation of field report.

The field work will be the compulsory component of practical and should be of at least two weeks (15 days) duration.