

# **DEPARTMENT OF GEOLOGY**

## **Category-I** **BSc (Hons.) Geology**

### **DISCIPLINE SPECIFIC CORE COURSE -4 (DSC-4) – : Structural Geology**

**Credit distribution, eligibility and pre-requisites of the course:**

<b>Course title &amp; Code</b>	<b>Credits</b>	<b>Credit distribution of the course</b>			<b>Eligibility criteria</b>	<b>Pre-requisite of the course (if any)</b>
		<b>Lecture</b>	<b>Tutorial</b>	<b>Practical/ Practice</b>		
<b>Structural Geology (DSC-4)</b>	<b>4</b>	<b>3</b>	<b>0</b>	<b>1</b>	<b>12<sup>th</sup> Pass</b>	<b>---</b>

### **Learning Objectives**

Structural geology essentially deals with the geometry, kinematics and dynamics of deformation of rocks. In response to the instability of the lithosphere produced by complex plate tectonic movements, continuous and discontinuous deformation takes place within the rocks in solid or semi-solid state, at different scales and at different depths, which manifests in a variety of complex structures in these rocks.

### **Learning outcomes**

On completion of the course, the student should be able to:

- Identify the different geometric features of deformation, different types of deformation-induced structures,
- Understand basic techniques of measurement of different parameters in deformed rocks, and
- Understand a glimpse of the underlying deformation processes and mechanisms.

### **SYLLABUS OF DSC-4**

#### **UNIT – I (09 Hours)**

Introduction to Structure and Topography: Understanding a topographic map; Effects of topography on structural features: Rule of V; Planar and linear structures; Concept of dip and strike, trend and plunge.

#### **UNIT – II (09 Hours)**

Stress and strain in rocks: Concept of rock deformation: Definition of Stress and Strain, Strain ellipses of different types and their geological significance. Mohr circle for stress and its application.

#### **UNIT – III (08 Hours)**

Folds: Fold morphology; Geometric and genetic classification of folds; Introduction to the mechanics of folding: Buckling, Bending, Flexural slip and flow folding.

#### **UNIT – IV (08 Hours)**

Foliation and lineation: Description and origin of foliations: axial plane cleavage and its tectonic significance; different types of foliations: crenulation cleavage, disjunctive cleavage,

salty cleavage, schistosity, gneissosity etc. Description and origin of lineation and relationship with major structures; stretching lineation and its relationship with strain.

#### **UNIT – V (08 Hours)**

Fractures and faults: Geometric and genetic classification of fractures and faults; Effects of faulting on the outcrops; Geologic/geomorphic criteria for recognition of faults and Mechanism of faulting: Anderson theory of faulting. Joints – different types of joints and their geological significance – columnar joint, pinnate joint, plumose structure.

#### **UNIT – VI (03 Hours)**

Shear Zones: Introduction, Geometry, strain profile, shear zones rocks and shear sense indicators.

#### **Practical component - 30 Hours**

Basic idea of topographic contours, Topographic sheets of various scales.

Structural contouring and 3-point problems of dip and strike

Introduction to Geological maps: Drawing profile sections and interpretation of geological maps of different complexities.

Exercises of stereographic projections

#### **Essential/recommended readings**

Fossen, H. (2010) Structural Geology. Cambridge University Press

Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.

#### **Suggestive readings**

Fossen, H. (2010) Structural Geology. Cambridge University Press.

Davis, G. R. (1984) Structural Geology of Rocks and Region. John Wiley

Billings, M. P. (1987). Structural Geology, 4th edition, Prentice-Hall.

Park, R. G. (2004) Foundations of Structural Geology. Chapman & Hall.

Pollard, D. D. (2005) Fundamental of Structural Geology. Cambridge University Press.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**