

*Max. Marks: 75*

*Time: 3 hours*

**Group A: (Structural Geology)**

***Unit I: Introduction to Structural Geology and Fold***

Scope of structural geology: Introduction to basic structural elements, linear and planar structures and their measurement. Outcrops of rocks/folds on horizontal and uneven surfaces. Some common primary structures and their significance—bed, graded-bed, cross-bed, flute-cast, mud-crack, ripple-mark, load-cast, pillow structure. Unconformity: Definition, types and recognition. Folds: Definition, elements of folded surfaces, classification of folds on the basis of genesis, sense of curvature, fold shape, fold facing, Fleuty's and Ramsay's classification and fold shape in profile plane. Pumpelly's rule, fold symmetry. Mechanism of folding. Recognition of folds in field and map.

***Unit II: Fault, foliation and lineation***

Joints: Definition, surface morphology, types, joint arrays and origin of joints.

Faults: Definition, fault and shear zones, elements of faults, classification of faults on the basis of slip and separation. Changes in fault attitude. Fault length and termination. Recognition of faults in field and map. Mechanism of faulting.

Foliation: Definition, foliation in igneous, sedimentary and metamorphic rocks and fault zones. Rock cleavage: Powell's classification of foliation; Relation of foliation with other structures.

Lineation: Definition, primary and secondary lineation; Use of lineation in structural analysis.

***Unit III: Rock deformation:***

Concept of force, stress, resolution of stress; stress on a plane and at a point; stress ellipse and ellipsoid; components of stress and stress tensor; stress states.

Deformation and strain, homogeneous and heterogeneous strain; strain and strain parameters; angular strain and shear strain; strain ellipse and ellipsoid; strain path, co-axial and non-co-axial strain, pure shear simple shear and general shear; strain states. Variations of strain with confining pressure, temperature, time and solution.

## Group B (Geotectonics)

### *Unit IV: Continental Drift and Plate tectonics:*

Concept of continental drift as a forerunner to plate tectonics; geological, paleontological and paleo-climatological evidences. Gondwanaland and its break-up.

Concept, constitution of plates and plate margin, plate motion and causes of plate motion. Divergent boundaries- triple points, ridge and rift valley, sea floor spreading. Strike-slip boundaries- transform faults. Convergent boundaries- trench, Benioff zone, island arcs, mountain chain. Plate tectonics model for the evolution of ocean basins and mountain belts. Wilson cycle.

### *Reading Lists:*

1. Condie, K.C.(1989)*Plate Tectonics and Crustal Evolution*, Oxford Pergamon Press
2. Davis, G.H.(1984) *Structure of Rocks and Regions*, John Wiley
3. Hobbs, B. Means, W.D. & Williams, P.(1976) *An Outline of Structural Geology*, John Wiley
4. Keary, P. and Vine, F.J.(1990) *Global Tectonics*, Blackwell
5. Moores, E.M. and Twiss, F.(1995) *Tectonics*, W.H. Freeman
6. Pluigm, B. and Marshak, S.(1991) *Earth Structure: An Introduction to Structural Geology and Tectonics*, McGraw Hill
7. Wyllie, P.J.(1971) *Dynamic Earth*, John Wiley

*Paper: GELH 302 (PRACTICAL): Structural Geology*

*(Contact hours: 48)*

*Max. Marks: 25*

*Time: 4 hours*

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| 1. Reading of contour maps and geological maps.  | <i>Marks: 3</i>     |
| 2. Drawing of profiles and cross sections, and descriptions of simple and complex geological maps with folds, faults, unconformities and intrusions. | <i>Marks: 5</i>     |
| 3. Outcrop completion of beds. Solution to bore-hole problems.   | <i>Marks: 3</i>     |
| 4. Stereographic projection for determining trend, plunge, rake, strike, true and apparent dip, fold axis.   | <i>Marks: 5</i>     |
| 5. Plotting of pole to planes, Determination of paleo- current from cross-beds.  | <i>Marks: 4</i>     |
| 6. <i>Laboratory records and viva-voce</i>   | <i>Marks :2+3=5</i> |

***Reading List:***

1. Davis, G.H.(1984) *Structure of Rocks and Regions*, John Wiley
2. Ghosh, S.K.(1993) *Structural Geology*, Pergamon Press
3. Gokhale, N.(1987) *Manual of Geological Maps*, CBS Publication New Delhi