Subject Code : P8AG11

SEDIMENTARY AND METAMORPHIC PETROLOGY

UNIT 1

Sedimentation - Textures and structures of sedimentary rocks - Classification and composition of sedimentary rocks — Study of residual deposits – Terra rosa, Clay with flints, Laterite, Bauxite, Residual clays. Study of Clastic rocks – Rudaceous – Conglomerate – Breccia – Arenaceous – Sandstones – Classification - Volcaniclastic deposits – Siltstones – Mudstones. Study of Nonclastic rocks - Lime stones and Dolomites - Siliceous deposits – Ferruginous deposits – Carbonaceous deposits – Phosphatic deposits – Evaporites. Heavy minerals and their significance-provenance of sediments – sedimentary differentiation, Lithification and Diagenesis.

UNIT 2

Sedimentary environments – Marine environments – Non – marine environments – Mixed environments. Modern sedimentary environments.
Tectonics & sedimentation - Sedimentary basins – Downwarp basins – Rift basins – Interior basins- Foreland basins – Subduction basins – Pullapart basins – Delta type basins – Composite basins – Geosynclines - Types – Characteristics of sediments. Plate tectonics – Basin formation – Basins in compressional zones – Basins in Stike slip zones – Basins in transform fault zones.

UNIT 3

Stratigraphy and Sedimentation – Seismic Stratigraphy - Sequence stratigraphy. Basin analysis – Paleocurrents
Techniques in Sedimentology Collection and analysis of field data - Mechanical analysis of sediments – Graphical representation of size analysis data – statistical parameters and their geological significance. Microscopical techniques – Cathodoluminesence – X – ray diffraction – Scanning electron microscope - Application of trace element, rare earth element and stable isotope geochemistry to sedimentological problems.

UNIT 4

METAMORPHIC PETROLOGY Agents of metamorphism – Types of metamorphism – Metamorphic textures and structures – Study of Cataclastic metamorphism - Grades, Zones and facies of metmorphism – A critical review of facies concept – Facies of Contact Metamorphism – Facies of Regional metamorphism – Facies of Burial metamorphism - Graphical representation of facies, ACF, AKF, AMF diagrams. Classification of metamorphic rocks based on texture and mineralogy; chemical composition.

UNIT 5

Goldschmidth's mineralogical phase rule and its application – stress and antistress minerals – Retrograde metamorphism – Metamorphic diffusion and differentiation – Metasomatism – Granitisation and Migmatites – Metamorphism in relation to magma and orogeny – Paired metamorphic belts. Application of trace element, rare earth element and stable isotope geochemistry in metamorphism.

TEXT BOOKS

1. Tyrrell, G.W. 1963 – Principles of Petrology, Asia Publishing House
2. Turner, F.J. & Verhoogen, J – 1960 – Igneous and Metamorphic Petrology, McGraw Hill.
3. Huang, W.T. – 1962 – Petrology, McGraw Hill.
4. Williams, H. Turner, F.J. & Billbert, C.M. – 1954 – Petrography, Freeman.
5. Pettijohn, F.J.- 1967 – Sedimentary Rocks, Harpers and Bros
6. Bayly, B. – 1968 – Introduction to Petrology, Prentice Hall.

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1. Barth, F.W. – 1962 – Theoretical Petrology, Wiley.
2. Wahistrom, e.e. – 1962 – Theoretical Igneous Petrology, Wiley.
3. Hatch, F.H. Wells, A.K. & Wells, M.K. – 1949 – Petrology of Igneous Rocks, Thomas Murby.
4. Johannsen, A. – 1962 – Descriptive Petrography of Igneous Rocks, Vots. I to IV Allied Pacific.
5. Shand, S.H. – 1949 – Eruptive Rocks.
6. Krumbein, W.C. & Pettijohn, F.J. – 1938 – Manual of Sedimentary Petrography, Appleton century co.
7. Krumbein, W.C. & Sloss, L.L. – 1951 – Stratigraphy and Sedimentation, Freeman.
8. Harker, A – 1950 – Metamorphism, Methuen.
9. Winkler, H.G.F. – 1967 – Petrogenesis of Metamorphic Rocks, Springer and Werlog.
10. Hyndman, D.W. – 1972 – Petrology of Igneous and Metamorphic Rocks, McGraw Hill.
11. Miyashire, A – 1973 – Metamorphism and Metamorphic Rocks, George Allen & Unwin.