CLUSTER UNIVERSITY SRINAGAR
SYLLABUS – SEMESTER 2nd (CBCS) – B.Sc. GEOLOGY
(CORE COURSE - THEORY)
(Lectures-60)

TITLE: Crystallography, Mineralogy and Igneous Petrology

Course Code: GL-T2 **CREDITS: 04** (Total: 60 Marks)

Crystallography (Lectures-18)
Unit-I

1.1.1. Crystallography: definition and conditions conducive for formation of crystal.
1.1.2. Morphology of crystals: face, edge and solid angle, interfacial angle and law of constancy of interfacial angles.
1.1.3. Symmetry of crystals: plane, axis and center of symmetry.
1.1.4. Crystallographic axes lettering and order of crystallographic axis.
1.1.5. Parameter system of Weiss Miller indices
1.1.6. Law of rationality of indices.
1.1.7. Symmetry elements and description of normal class of Isometric, tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems.
1.1.8. Twinning in crystals: Types, causes and laws.
1.1.9. Crystal forms: Crystallite, cryptocrystalline and amorphous.
1.1.10. Crystal habit: elongated, tabular, flattened, equant.
1.1.11. Crystal chemistry: Dimorphism, polymorphism pseudomorphs, Isomorphism and solid solution.

Mineralogy (Lectures-18)
Unit-II

2.1. Mineralogy: definition and characteristics of mineral.
2.2. Classification of silicate minerals.
2.3. Scaler and vector properties of minerals.
2.4. Moho's scale of hardness.
2.5. Physical properties and the mode of occurrence of the fallowing groups of minerals: Quartz, feldspar, mica, amphibole, pyroxene, olivine, garnet, chlorite and carbonate.
2.6. Mineral optics: elements of optics, refractive index, Snell's law of critical angle.
2.7. Isotropic and anisotropic medium.
2.8. Polarization and interference of light.
2.9. Polarizing microscope- parts and functioning.
2.10. Use of accessory plates.
2.11. Pleaochroism and Birefringence.
2.12. Optical indicatrix: isotropic, uniaxial and biaxial indicatrix.

2.13. Optical properties of minerals under plane-polarized and cross-polarized light: forms, cleavage, fractures and parting, refractive index and relief, Becke line and its use.

Igneous petrology (Lectures-12)
Unit-III

3.1. Introduction to igneous petrology: Definition, composition and types of magma,
3.2. Physio-chemical constitution of magma,
3.3. Bowen's reaction series
3.4. Processes resulting in diversity of igneous rocks: fractionation and differentiation, gravity settling, filter press differentiation, flow diffusion and gasses transfer with in magma, liquid immiscibility, mixing of magma and assimilation.
3.5. Crystallization of uni-component and bi-component systems.

Texture and structure of igneous rocks (Lectures-12)
Unit-IV

4.1. Textural elements- grain-size and shape;
4.2. Type of texture on the basis of: degree of crystallinity, granularity shape, mutual relationship of crystals, directive and intergrowth textures, and reaction textures.
4.3. Structures: Pillow structures, ropy structures, blocky structures, flow structures, sheet and platy structures, prismatic and columnar structures.
4.4. Forms of igneous bodies: intrusive- concordant and discordant, extrusive- lava flows.
4.5. Classification of igneous rocks,
4.6. Principles of classifications,
4.7. CIPW classification, chemical and tabular classification.
4.8. Description of common igneous rocks.

Recommended Books:

Best, M. G., 1986: Igneous Petrology, CBS Pub.
Bose, M. K.,1997: Igneous Petrology, World Press.
Ehlers and Blatt, 1999: Petrology, (igneous, sedimentary and metamorphic), CBS Pub.
Turner and Verhoogen, 1999: Igneous and metamorphic petrology, CBS Pub.
Tyrrell, G.W.,1987: Principles of Petrology. CBS Pub.
Winter, J. D. 2010. Igneous and Metamorphic petrology.
Gribble, D. D., 1998 Rutley's Elements of mineralogy, DBS publications.
Phillips, Wm, R. and Griffen, D. T., 1986: Optical Mineralogy. CBS Edition.
Putins,A., 2001: Introduction to mineral science. Cambridge University Press.
Richard, V. g., 1997: Dana's new Mineralogy. John willy.