

SARDAR PATEL UNIVERSITY
Programme & Subject: M.Sc (Earth Science)
Semester: IV
Syllabus with Effect from: June - 2014

Paper Code: PT04EESC02	Total Credit: 4
Title Of Paper: Advanced Geochemistry	

Unit	Description in Detail	Weightage (%)
I & II	Geochemistry: Structure and atomic properties of elements, the Periodic Table; ionic substitution in minerals; Phase rule and its applications in petrology, thermodynamics of reactions involving pure phases, ideal and non-ideal solutions, and fluids; equilibrium and distribution coefficients. Nucleation and diffusion processes in igneous, metamorphic and sedimentary environments, redox reactions and Eh-pH diagrams and their applications. Mineral/mineral assemblages as ‘sensors’ of ambient environments. Geochemical studies of aerosols, surface-, marine-, and ground waters. Radioactive decay schemes and their application to geochronology and petrogenesis. Stable isotopes and their application to earth system processes.	25%
III & IV	Mineralogy and Petrology: Concept of point group, space group, reciprocal lattice, diffraction and imaging. Concepts of crystal field theory and mineralogical spectroscopy. TEM and SEM applications. Lattice defects (point, line and planar). Electrical, magnetic and optical properties of minerals. Bonding and crystal structures of common oxides, sulphides, and silicates. Transformation of minerals- polymorphism, polytypism, and polysomatism. Solid solution and exsolution; Steady-state geotherms. Genesis, properties, emplacement and crystallization of magmas. Phase equilibrium studies of simple systems, effect of volatiles on melt equilibria. Magma-mixing, -mingling and –immiscibility; Metamorphic structures and textures; isograds and facies. Mineral reactions with condensed phases, solid solutions, mixed volatile equilibria and thermobarometry. Metamorphism of pelites, mafic-ultra mafic rocks and siliceous dolomites. Material transport during metamorphism. P-T-t path in regional metamorphic terrains, plate tectonics and metamorphism; Petrogenetic aspects of important rock suites of India, such as the Deccan Traps, layered intrusive complexes, anorthosites, carbonatites, charnockites, khondalites and gndites.	25%

Basic Text & Reference Books:-

- Introduction to Geochemical Modeling, Francis Albarede, Cambridge University Press (1996)
- W. M. White, Geochemistry, Wiley-Blackwell (2013)
- Cornelis Klein, Barbara Dutrow, The Manual of Mineral Science, Wiley (2014)
- Walter T. Huang, Petrology, Surjeet Publications (2012)
- [Nelson Eby](#), Principles of Environmental Geochemistry, Brooks/Cole (2003)

