Details of Postgraduate Syllabus

The M. Sc. Examination will consist of four semesters, consisting of four theory papers in each semester I, II & III; however there will be three theory papers including one elective one and one Dissertation in Semester IV. Each theory paper will be of three hours duration and of 100 marks including dissertation (75 external + 25 Internal). There will be two practical examinations (Practical A and B) in each semester I, & III, each of four hours duration and of 100 marks (70 for written examination + 30 for internal assessment). Semester II & IV will have also two practical examination (Practical A and B); practical A of four hours duration and of 100 marks (70 for written examination + 30 for internal assessment) and practical B of two hours duration and of 50 marks (35 for written examination + 15 for internal assessment). In semester IV students will have to opt one paper as elective paper from given options.

Internal assessment will be made on the basis of assignments, presentation, seminar, and test and class room attendance.

There will be two field excursions (Mapping and Exploration) each in semester I & III for 50 marks each and of three weeks duration.

There will be two seminars each at semester II and IV each for 50 marks respectively.

It is essential to pass separately in theory papers, practical, dissertation, field work and seminar.

The modified curriculum will be applicable from the academic session 2014-15

SEMESTER: I

Paper Code	Paper Title	Max mark
GL 5101	Igneous Petrology	75
GL 5102	Metamorphic Petrology	75
GL 5103	Sedimentology	75
GL 5104	Structural Geology	75
GL 5105	Internal Assessment Theory (GL 5101 + GL 5102 + GL 5103 +GL 5104)	100
GL 5106	Practical – A (GL 5101 + GL 5102)	70
GL 5107	Practical – B (GL 5103 + GL 5104)	70
GL 5108	Sessional record and Viva Voice (Practical A+B)	60
GL 5109	Field Work (Mapping)	50
Total marks : Theory 400 + Practical 200 + Field work 50 = 650		

GL 5101: Igneous Petrology

Theory **Max. Marks 75**

Magma generation in the mantle, their nature and evolution; Magmatic processes: Partial melting, fractional crystallization, assimilation, liquid immiscibility; study of phase equilibria in binary and ternary silicate systems (Diopside-Anorthite, Foresterite- Silica, Leucite-Silica, Albite- Anorthite, Orthoclase-Anorthite, Orthoclase-Albite-Silica, Diopsite-Albite-Anorthite, Diopside-Foresterite-Silica, Fayalite-Leucite-Silica) in the light of modern experimental works.

IUGS classification schemes of igneous rocks; Petrognesis and tectonic setting of major igneous rock types and suites: Ultramafic rocks- komatite, lamprophyres, kimberlite, ophiolites, flood basalt, anorthosite, TTG, granitoids, alkaline rocks, carbonatites with special reference to Indian examples.

Practical **Max. Marks 50**

Megascopic and microscopic studies of major igneous rock types: CIPW norm calculation: Introduction to software: Newpet, Sinclass, GCD kit.

Books Recommended

Best,M.G., 1986: *Igneous Petrology*, CBS Publ.

McBirney, A.R., 1993: *Igneous Petrology*. Jones & Bartlet Publ.

Kretz, R., 1994: *Metamorphic Crystallization*, John Wiley.

Bose, M.K.,1997: *Igneous Petrology*. World Press.

Perchuk, L.L. and Kushiro, I. (eds), 1991: *Physical Chemistry of Magmas*. Springer Verlag.

GL 5102: Metamorphic Petrology

Theory **Max. Marks 75**

Mineralogical Phase rule of open and closed systems; Nature and types of metamorphic reactions; Concept and classification of metamorphic facies; Facies series; Graphical representation of minerals in ACF, AKF, AFM and A'F'M' diagrams; Time relation between phases of deformation and metamorphic crystallization.

Description of each facies of low pressure, medium to high pressure and very high pressure with special reference to characteristics minerals, subdivisions into zones/sub facies, mineral assemblages, metamorphic reactions and pressure-temperature conditions of metamorphism.

Introduction to Ultra high temperature and Ultra high pressure metamorphism.

Isograds and Reaction Isograds; Schreinmakers rule and construction of Petrogenetic grids; Metamorphic differentiation; Anatexis and origin of migmatites; Paired metamorphic belts.

Gibb's free energy; Entropy; Enthalpy; Clausius-Clapeyron equation; Geothermobarometry; Pressure-Temperature-Time (P-T-t) paths.

Practical **Max. Marks 50**

Study of metamorphic rocks of different metamorphic facies in hand specimens. Calculation of ACF, AKF, AFM and A'F'M values from the given chemical data/structural formula of minerals and their graphical representation.

Study of metamorphic rocks in thin sections with reference to texture/structure, time relation between phases of deformation and metamorphic crystallization, mineral association, parent rock, metamorphic facies/sub-facies/zones to which rock can be assigned and representation of assemblage in ACF, AKF, AFM and A'F'M' diagrams.

Estimation of pressure and temperature from important models of Geothermobarometry.

Books Recommended

Turner, F.J. 1980: *Metamorphic Petrology*, McGraw Hill, New York.

Yardley, B.W. 1989: *An Introduction to Metamorphic Petrology*. Longman New York.

Bucher, K. and Frey, M. 1994: *Petrogenesis of Metamorphic Rocks*, Springer - Verlag.

Philipotts, A, 1992: *Igneous and Metamorphic Petrology*. Prentice Hall.

Gl 5103: Sedimentology

No feedback so far

GL 5104: Structural Geology

Theory **Max. Marks 75**

Mechanical principles and properties of rocks and their controlling factors. Theory of rock failure; brittle and ductile deformation. Mechanics of folding and buckling. Folds geometry and classification. Superimposed folds and their interference patterns. Analytical methods of determining fold style.

Causes and dynamics of faulting. Normal faults and strike – slip faults. Overthrust and nappe with implications to thrust tectonics. Thin skinned deformation and decollement. Salt domes and diapers. Concept of balanced cross sections.

Joints, rock cleavage and foliations; their origin, domain character, relationship with major structures and geological significance. Transposed foliations. Linear structures and boudinage; their origin, relationship with major structures and significance. Deformation of linear structures.

Concept of stress and strain. Stress-strain relationships of elastic, plastic and viscous materials. Two dimensional strain and stress analyses. Types of strain ellipses and ellipsoids; their properties and significance.

Brittle and ductile shear zones; their geometry, strain pattern, kinematics and significance. Rotation of structural elements. Use of stereographic and equal area projections for representing different types of fabric.

Practical: **Max. Marks 50**

1. Study of naturally deformed rocks in hand specimens.
2. Geometrical analysis of folds and faults.
3. Preparation and interpretation of geological maps.
4. Applications of stereographic and equal area projections.

Books Recommended:

Ramsay J. G, 1967. Folding and Fracturing of Rocks. McGraw Hill.

Turner F.J. and Weiss, L.E., 1963. Structural Analysis of Metamorphic Tectonites. McGraw Hill.

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

Ramsay J.G. and Huber, M.I., 987. Modern Structural Geology, Vol. I & II. Academic Press.

Price N. J. and Cosgrove, J. W., 1990. Analysis of Geological Structures. Cambridge Univ. Press.

Bayle B., 1992. Mechanics in Structural Geology. Springer Verlag.

Ghosh, S. K., 1995. Structural Geology: Fundamentals of Modern Development. Pergamon.

Robert D. Hatcher, 1994. Structural Geology: Principles Concepts and Problems (2nd Edition)

Moores E. and Twiss R.J., 1995. Tectonics. Freeman.

Valdiya K.S., 1998. Dynamic Himalaya. University Press.

Passchier C. w. and Treuw R. a. J., 2005: Microtectonics, Springr.

Richard H. Groshong (Jul 24, 2008). 3-D Structural Geology: A Practical Guide to Quantitative Surface and Subsurface Map Interpretation. Springer

Donal M. Rangan, 2009. Structural Geology: An introduction to Geometrical Techniques. Cambridge, University Press.