DISCIPLINE SPECIFIC CORE COURSE (DSC-5): Igneous Petrology (L3, P1)

Credit distribution, Eligibility and Prerequisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
(DSC-5) Igneous Petrology (L3, P1)	4	3	0	1	12th pass with science	Studied Earth System Science, Mineral science, Stratigraphy and Equivalent

Learning Objectives
This course on Igneous Petrology is intended to provide students an understanding of the types of magma as well as types of igneous rocks. They will be taught about magma generation in relation to different geodynamic settings and its relation with the petrological and geochemical features of the igneous rocks.

Learning outcomes
On completion of the course, the students will be able to identify the igneous rocks in hand-specimen and in microscopic scale. They will be able to identify different textures and structures developed in the igneous rock. They will learn to use different petrographical, mineralogical and geochemical indices to characterise the rock. They will develop an understanding of the petrogenesis of different types of igneous rocks particularly in relation to different geodynamic settings.

SYLLABUS OF DSC- 5
Credits-4
Theory (45 hours)

UNIT – I (9 hours)
Detailed contents
Introduction to Igneous Petrology: Scope of Igneous petrology, classification of Igneous rocks, igneous textures, igneous structures.

UNIT – II (9 hours)
Detailed contents
Silicate melts and magmas: Physical properties of magma, the ascent of magmas, magmatic differentiation.

UNIT – III (9 hours)
Detailed contents
Igneous Phase diagrams: The phase rule, the lever rule, Two Component systems involving melt: Binary system with a Eutectic, Binary system with a peritectic, Binary system thermal barrier, Binary system with solid solution.

UNIT – IV (9 hours)
Detailed contents
The chemistry of igneous rocks: Modal mineralogy, normative mineralogy, variation diagrams based on major elements, trace elements and their significance, application of radioactive isotopes in igneous petrology.

UNIT – V (9 hours)

Detailed contents

Introduction to igneous environments: Basalts and mantle structure, Magma generation and igneous rocks associated with various plate tectonic settings.

Practical component (30 hours)

Study of important igneous rocks in hand specimens and thin sections- granite, granodiorite, diorite, gabbro, anorthosites, ultramafic rocks, basalts, andesites, trachyte, rhyolite.
Classification of Igneous Rocks.
Plotting and interpretation of variation diagrams.
Igneous rock occurrences in Indian context.

Essential/recommended readings

Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.
Wilson, M. (1989) Igneous Petrogenesis, Springer-Verlag Berlin Heidelberg.
Frost, B. R. and Frost, C. D., (2013) Essentials of Igneous and Metamorphic Petrology Cambridge University Press.

Suggestive readings (if any)

Frost, B. R. and Frost, C. D., (2013) Essentials of Igneous and Metamorphic Petrology Cambridge University Press.
Philpotts, A., & Ague, J. (2009). Principles of igneous and metamorphic petrology. Cambridge University Press.
Winter, J. D. (2014). Principles of igneous and metamorphic petrology. Pearson.
Rollinson, H. R. (2014). Using geochemical data: evaluation, presentation, interpretation. Routledge.
Sen, G. (2014) Petrology Principles and Practice, Springer-Verlag Berlin Heidelberg
Bose M.K. (1997). Igneous Petrology.
Wilson, M. (1989) Igneous Petrogenesis, Springer-Verlag Berlin Heidelberg.