



University of Rajasthan Jaipur

SYLLABUS

(Three/Four Year Under Graduate Programme in Science)

I & II Semester

Examination-2023-24

Rj/Tar

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(Academic)
University of Rajasthan
JAIPUR *(Signature)*

Subject: Geology

Following papers are proposed for Under-graduation course under NEP -2020

SEMESTER: I

Level	Semester	Title	Credit				Hours per week			
			L	T	P	Total	L	T	P	Total
5	I	Earth System Science and Geodynamics	4	0	0	4	4	0	0	4
5	I	Geology Lab-I	0	0	2	2	0	0	4	4
5	II	Crystallography & Mineralogy	4	0	0	4	4	0	0	4
5	II	Geology Lab-II	0	0	2	2	0	0	4	4
6	III	Petrology & Ore forming processes	4	0	0	4	4	0	0	4
6	III	Geology Lab-II	0	0	2	2	0	0	4	4
6	IV	Palaeontology & Stratigraphy	4	0	0	4	4	0	0	4
6	IV	Geology Lab-II	0	0	2	2	0	0	4	4

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Title of Course: Earth System Science & Geodynamics

Credit of the Course: 6 (T-4 +P-2)

Unit- 1

Origin of the Universe and Solar System. Origin, shape, and size of Earth. Internal structure: mechanical & chemical layering of Earth, constitution and composition of Earth. Concept of Sea-floor spreading and Continental drift.

Unit- 2

Plate tectonics, mid-oceanic ridges, trenches, transform faults, and island arcs. Origin of oceans, continents, mountains and rift valleys. Earthquakes and volcanism. Uniformitarianism, and catastrophism. Concept of time in geological studies.

Unit- 3

Geomorphology: Introduction, weathering and erosion, landform development and geological work of river, wind, groundwater, glacier and ocean. Natural water cycle and ground water.

Unit- 4

Structural Geology: concept of deformation, dip, strike, pitch and plunge. Linear and planer features. Clinometer-compass, bed and lamellae, top and bottom criterion. Folds and faults: their mechanism, classification and recognition. Unconformity, overlap, offlap, inlier and outlier. Basic concept of lineation, foliation and joints.

Practical:

Study of major geomorphic features and their relationships with outcrops through physiographic models. Detailed study of topographic maps and physiographic description of an area. Study of tectonic framework of India. Study and distribution of seismic zones of India. Major zones of volcanic activities of the world.

Geological maps, construction of geological sections, true and apparent dip problems, completion of outcrops, identifications of fold, faults, unconformities, overlap, offlap and intrusions.

Suggested books:

1. Klein, C., and Philpotts, A.R. 2016. Earth Materials: Introduction to mineralogy and petrology. Cambridge University Press.
2. Mahapatra, G. B. 2018. Text book of Physical Geology, CBS publications
3. Thornbury, W. D., 2004. Principles of Geomorphology, CBS publisher & distributor private Ltd.
4. Huggett, R. J. 2007. Fundamental of Geomorphology, Taylor & Francis.
5. Paul R. B., and David R. M., 2013. Key Concepts in Geomorphology, W. H. Freeman.
6. Kearey, P., Klepeis, K. A., & Vine, F. J. (2009). Global tectonics. John Wiley & Sons.

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7. Ghosh, S.K. (1983). Structural Geology: fundamentals and modern developments, elsvier.
8. Billings M.P. (2016). Structural Geology, Pearson
9. Van Der Pluijm B. A., Marshek, S. 2004 Earth Structure (Second Eds.). WW Norton & Company.

Learning Outcome of the course: After successful completion of this course, the student will be able to:

1. Understand the basic concepts of Geology.
2. Scope of Geology and its relevance to the society.
3. Understand internal constituents and structure of the Earth.
4. Understand different endogenic earth processes in relation to dynamic processes of the earth.
5. Origin of geological hazards and mitigation to minimize their impact.
6. Assess the mode of formation of landforms and their processes of formation in different climate zones and tectonic regimes.

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Title of Course: Crystallography and Mineralogy

Credit of the Course: 6 (T-4 +P-2)

Unit- 1

Geometric properties of crystals- faces, edges, solid angle. Elementary idea of symmetry elements, crystal symmetry, axial ratio. Crystal systems and their holohedral types.

Unit- 2

Definition of mineral, rock-forming, ore minerals and gemstones. Physical and Optical properties of minerals. Isomorphism, polymorphism, pseudomorphism and solid solution. Physical, optical and chemical characteristics of following mineral groups: Feldspar, Garnet, Olivine and Silica.

Unit- 3

Physical, optical and chemical characteristics of following mineral groups/minerals; Pyroxene, Amphiboles, Mica, Carbonates, Kyanite, Sillimanite, Andalusite, Talc, Wollastonite, Oxides and Sulfides.

Unit- 4

Mineral Resources of Rajasthan: Mode of occurrence, geologic and geographic distribution of following minerals: base metals, glass, cement, fertiliser, gem and dimensional stones.

Practical:

Crystallography: Determination of symmetry elements in crystal models and measurement of interfacial angles with contact goniometer. Clinographic Projection of crystals of cubic system. The study of the symmetry, forms and combination of forms in the following crystals : Cubic system- Galena, Fluorite, Magnetic and Garnet, Pyrite, Orthorhombic system- Barite, Olivine, Staurolite, Sulphur, Monoclinic system- Gypsum, Orthoclase, Augite, Hornblende, Epidote. Triclinic system-Axinite, albite, Study of Simple twinning in crystals.

Mineralogy: Study of Hardness, Lustre, Fracture, Cleavage and streak of minerals. Study of the Physical properties and diagnostic features of the following mineral groups: Silica, Feldspar, tourmaline, garnet, mica, pyroxenes and amphiboles. Study of the Physical properties and diagnostic features of the following minerals: hematite, magnetite, calcite, fluorite, tourmaline, beryl, topaz, kyanite, staurolite, talc, chlorite, apatite, garnet, wollastonite, pyrite, pyrrhotite.

Application of Petrological Microscope in study of minerals. Study of petrological microscope and its parts inclusive of polarizer and their function, observation of Becke line and relative refractive index. Study of pleochroism in biotite, hornblende, tourmaline, hypersthene, and staurolite; study of twinkling in

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calcite. Identification of common rocks in thin section. (Granite, basalt, limestone, sandstone, marble, and quartzite).

Suggested books:

1. Whittaker, E. J. W., 2013. Crystallography: an introduction for earth science (and other solid state) students. Elsevier.
2. Klein, C., Dutrow, B., Dana, J. D., & Klein, C., 2002. Manual of mineral science. New York: Wiley.
3. Ford W.E., 2006. Dana's Textbook of Mineralogy. CBS Publishers and Distributors.
4. Berry, L.G., Mason B. and Dietrich, R.V., 1985. Mineralogy. CBS Publishers & Distributors, 1985.
5. Deer, W.A., Howie R.A. and Zussman. J., 2013. An introduction to the Rock-Forming Minerals. The Mineralogical Society.
6. Gribble, C.D., 2005. Rutley's Elements of Mineralogy. CBS Publishers,
7. Kerr, P.F., 1977 Optical Mineralogy. CBS Publishers.
8. Perkins, D., 2013. Mineralogy. Pearson.

Learning Outcome of the course: The student will be able to understand

1. Internal structure, occurrence, and formation of crystals and also able to identify certain gem varieties of minerals in hand-specimen.
2. Occurrence, formation, and, properties of minerals. The student will also be able to identify minerals in hand-specimen and under petrological microscope.

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