



University of Rajasthan

Jaipur

SYLLABUS

(UG0802/UG0803– Three/Four Year Bachelor of Science)

(Geology)

For Semester I-VI

SESSION-2025-2026

(From the Academic Year 2024-25 onwards)

(Syllabus as per NEP-2020 and Choice Based Credit System)

Name of University	University of Rajasthan, Jaipur
Name of Faculty	Arts/Commerce/Fine Arts/Social Science/Social Science
Name of Discipline	[Subject Name]
Type of Discipline	Major/ MDC
List of Programme were offered as Minor Discipline	
Offered to Non-Collegiate Students	Yes

SEMESTER-WISE PAPER TITLES WITH DETAILS

Course code UG0802/UG0803- B.Sc								
				GEOLOGY	Credits			
#	Level	Semester	Type	Title	L	T	P	Total
1.	5	I	MJR	GEL -51T-101 Earth System Science & Geodynamics	4	0	0	4
2.	5	I	MJR	GEL -51P-102 Geology Lab	0	0	2	2
3.	5	II	MJR	GEL -52T-103 Mineralogy and Structural Geology	4	0	0	4
4.	5	II	MJR	GEL -52P-104 Geology Lab	0	0	2	2
5.	6	III	MJR	GEL -63T-201 Igneous and Metamorphic Geology	4	0	0	4
6.	6	III	MJR	GEL -63P-202 Geology Lab	0	0	2	2
7.	6	IV	MJR	GEL -64T-203 Palaeontology and Sedimentology	4	0	0	4
8.	6	IV	MJR	GEL -64P-204 Geology Lab	0	0	2	2
9.	7	V	MJR	GEL -75T-301 Principles of Stratigraphy and Geology of India	4	0	0	4
10.	7	V	MJR	GEL -75P-302 Geology Lab	0	0	2	2
11.	7	VI	MJR	GEL -76T-303 Economic Geology and Mineral Economics	4	0	0	4
12.	8	VI	MJR	GEL -76P-304 Geology Lab	0	0	2	2

Examination Scheme

1. 1 credit = 25 marks for examination/evaluation
2. For Regular Students there will be Continuous assessment, in which sessional work and the terminal examination will contribute to the final grade. Each course in Semester Grade Point Average (SGPA) has two components- Continuous assessment (20% weightage) and (End of end-semester examination) EoSE (80% weightage).
3. For Regular Students, 75% Attendance is mandatory for appearing in the EoSE.
4. To appear in the EoSE examination of a course/subject a regular student must appear in the mid-semester examination and obtain at least a C grade in the course/subject.
5. Credit points in a Course/Subject will be assigned only if, the regular student obtains at least a C grade in the CA and EoSE examination of a Course/Subject.
6. In the case of Non-Collegiate Students there will be no Continuous assessment and credit points in a course/subject will be assigned only if, the non-collegiate student obtains at least a C grade in the EoSE examination of a Course/Subject.

Examination Scheme for Continuous Assessment (CA)

DISTRIBUTION OF CONTINUOUS ASSESSMENT (CA) MARKS

S. No.	CATEGORY	Weightage (out of total internal marks)		THEORY					PRACTICAL		
	Max Internal Marks			CORE (Only Theory)	CORE (Theory + Practical)	AEC	SEC	VAC	CORE (Theory + Practical)	SEC	VAC
				30	20	20	10	10	10	10	10
1	Mid-term Exam	50%		15	10	10	5	5	5	5	5
2	Assignment	25%		7.5	5	5	2.5	2.5	2.5	2.5	2.5
3	Attendance	25%		7.5	5	5	2.5	2.5	2.5	2.5	2.5
		Regular Class Attendance	= 75%	3	2	2	1	1	1	1	1
			75-80%	4	3	3	1.5	1.5	1.5	1.5	1.5
			80-85%	5	4	4	2	2	2	2	2
			> 85%	7.5	5	5	2.5	2.5	2.5	2.5	2.5

Note:

1. Continuous assessment will be the sole responsibility of the teacher concerned.
2. For continuous assessment no remuneration will be paid for paper setting, Evaluation, Invigilation etc.
3. For continuous assessment Paper setting and Evaluation responsibility will be of teacher concern.
4. For continuous assessment no Answer sheets/question papers etc. will be provided by the University.
5. Colleges are advised to keep records of continuous assessment, attendance etc.

Examination Scheme for EoSE-

EoSE – End of Semester Examination

Regular Students –

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory/ Practical	Course code UG0802/UG0803- B.Sc Geology	EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks

The theory question paper will consist of **two** parts A & B.

PART-A: 20 Marks

Part A will be compulsory having 10 very short answer-type questions (with a limit of 20 words) of two marks each.

PART-B: 60 Marks

Part B of the question paper shall be divided into four units comprising question numbers 2-5. There will be one question from each unit with internal choice. Each question will carry 15 marks.

Practical examination scheme for Regular Students

Duration: 4 Hours

Maximum Marks: 40 (Exercise: 30, Record: 05, Viva voce: 05)

Non-Collegiate Students –

Type	Course Code and Nomenclature	Duration of Examination	Maximum Marks (EoSE)	Minimum Marks (EoSE)
Theory /Practical	Course code UG0802/UG0803- B. Sc Geology	3 Hrs	100	36
		3 Hrs	50	18

The question paper will consist of **two** parts A & B.

PART-A: 20 Marks

Part A will be compulsory having 10 very short answer-type questions (with a limit of 20 words) of two marks each.

PART-B: 80 Marks

Part B of the question paper shall be divided into four units comprising question numbers 2-5. There will be one question from each unit with internal choice. Each question will carry 20 marks.

Practical examination scheme for Non-Collegiate Students

Duration: 4 Hours

Maximum Marks: 50 (Exercise: 40, Viva voce: 10)

Program Objectives:

The Objectives of the Program are:

1. To enhance basic learning of various branches of Geology.
2. Introduction of scope and opportunities in the field of geosciences.
3. Inculcation of skills needed in the field of geosciences.
4. Understanding role of geoscientist in nation-building and sustainability

Program Outcomes: The student graduating in Geology should be able to:

1. Acquire a fundamental/systematic or coherent understanding of the academic field of Geology, its different learning areas and applications in basic Geology like Mineralogy, Petrology, Stratigraphy, Paleontology, Economic geology, Hydrogeology, etc.
2. Demonstrate procedural knowledge that creates different types of professionals related to the disciplinary/subject area of Geology, including professionals engaged in research and development, teaching and government/public service;
3. Acquire skills in areas related to one's specialization area within the disciplinary/subject area of Geology and current and emerging developments in the field of Geosciences.
4. Demonstrate relevant generic skills and global competencies such as problem-solving skills that are required to solve different types of geoscience-related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary area boundaries.

Detailed Syllabus

SEMESTER: I

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -51T-101-5 Earth System Science & Geodynamics	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	This course is designed to teach the students about the origin of Universe, earth, its physical and chemical components. To give the elementary idea about the internal structure of the earth, natural processes on the earth and related landforms, structures.						

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. Earthquake 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

Origin of water, groundwater and its occurrences, importance. Hydrological cycle, water table, aquifer and its type. Physical and chemical parameters of groundwater for humans use. Elementary idea of the groundwater system in Rajasthan.

Practical

Practical	GEL -51P-102 Earth System Science &	CA	1 Hr	CA	10 Marks	CA	04 Marks
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	Geodynamics Lab	EoSE	03 Hrs	EoSE	40 Marks	EoSE	16 Marks
Course Objectives	This course is designed to teach the students about identification features and structures created by various natural agents and endogenetic, exogenetic processes.						
Credit	2						

Duration: 4 Hours

Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

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.

Suggested books:

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

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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.

SEMESTER: II

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -52T-103 Mineralogy and Structural Geology	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	This course is designed to create the understanding about the basics of mineralogy, crystallography and Structural geology.						

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, Silica, Pyroxene, Amphiboles, & Mica.

Unit- 3

Structural Geology: concept of deformation, dip, strike, pitch and plunge. Linear and planar features. Clinometer-compass, bed and lamellae, top and bottom criterion. Basic concept of lineation, foliation and joints.

Unit- 4

Folds and faults: their mechanism, classification and recognition.

Unconformity, overlap, offlap, inlier and outlier.

Practical:

Practical	GEL -52P-104 Mineralogy and Structural Geology Lab	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks
Credit of the Course	2						
Course Objectives	To make the students able to identify the common rock-forming minerals based on physical and chemical, optical properties through specimens of minerals, thin sections, and their distribution.						

Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

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

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. 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. Klein, C., and Philpotts, A.R. 2016. Earth Materials: Introduction to mineralogy and petrology. Cambridge University Press.
4. Ford W.E., 2006. Dana's Textbook of Mineralogy. CBS Publishers and Distributors.
5. Berry, L.G., Mason B. and Dietrich, R.V., 1985. Mineralogy. CBS Publishers & Distributors, 1985.
6. Deer, W.A., Howie R.A. and Zussman.J., 2013. An introduction to the Rock-Forming Minerals. The Mineralogical Society.
7. Gribble, C.D., 2005. Rutley's Elements of Mineralogy. CBS Publishers,
8. Kerr, P.F., 1977 Optical Mineralogy. CBS Publishers.
9. Perkins, D., 2013. Mineralogy. Pearson.
10. Ghosh, S.K. (1983). Structural Geology: fundamentals and modern developments, elsvier.
11. Billings M.P. (2016). Structural Geology, Pearson
12. Van Der Pluijm B. A., Marshek, S. 2004 Earth Structure (Second Eds.). WW Norton & Company.

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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.

SEMESTER: III

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -63T-201 Igneous and Metamorphic Geology	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	To obtain knowledge on origin, texture, structures, processes of formation, and classification of different types of igneous and metamorphic rocks.						

Unit- 1

Definition, origin and composition of magma; intrusive and extrusive forms; structure and texture of plutonic, hypabyssal, and volcanic rocks. Elements of classification of igneous rocks and IUGS Classification. Bowen's Reaction Principle, Magma differentiation and assimilation.

Unit- II

Phase and Component, Crystallisation of uni-component (SiO₂) and bi-component silicate melts; eutectic and solid solution crystallization. Study of important igneous rocks; granite-rhyolite, gabbro-dolerite-basalt, pegmatite, syenite, diorite and peridotite.

Unit- III

Metamorphism: agents and types. Concept of index minerals, grade and facies. Texture, and structure of metamorphic rocks. Cataclastic, thermal and regional metamorphism.

Unit- IV

Regional metamorphism of argillaceous and calcareous rocks. Retrograde metamorphism and metasomatism. Study of important metamorphic rocks; slate, phyllite, schist, gneiss, migmatite, eclogite, quartzite, and marble.

Practical

Practical	GEL -63P-202 Igneous and Metamorphic Geology Lab	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks
Credit of the Course	2						
Course Objectives	To make students able identify the various rock types through studying the physical properties and microscopic studies.						

Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

Igneous Rocks: Diagrams of different forms of igneous rocks. Textures of plutonic, hypabyssal and volcanic rocks. Hand-specimen study of the following igneous rocks; granite, pegmatite, nepheline syenite, diorite, gabbro, dunite, peridotite, basalts, and trachyte. Petrographic study of granite-rhyolite, gabbro-dolerite-basalt, pegmatite, and syenite.

Metamorphic rocks: Textures and structures of metamorphic rocks. Hand-specimen and petrographic study of the following rocks types: schist, gneiss, marble, quartzite and migmatite.

Book Recommended

1. Tyrell, G.W., The principles of Petrology, Methuen & Co. London.
2. Winter, J.D., Principles of Igneous and Metamorphic Petrology, Pearson, Delhi.
3. William, Turner & Gilbert, Petrography, CBS Publisher, Delhi.
4. Philpotts and Ague, Principles of Igneous and Metamorphic Petrology, CUP.
5. Best, M.G., Igneous and Metamorphic Petrology, Wiley-Blackwell

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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

1. Understand the magma generation and formation of igneous rocks.
2. Understand the texture of rocks and its implications.
3. Understand petrogenesis of igneous and metamorphic rocks.
4. Understand factors of metamorphism, and to classify metamorphic rock

SEMESTER: IV

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -64T-203 Palaeontology and	CA	01 Hr	CA	20 Marks	CA	08 Marks

	Sedimentology	EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	This course is designed to give the introductory idea about origin of life, fossils: definition, processes, and index fossils. Uses of Fossils in reconstruction of evolutionary history of life, paleoenvironment, palaeoecology, palaeogeography etc. To give elementary knowledge about the origin, processes and types of sedimentary rocks.						

Unit- 1

Definition, Scope, sub-division, and relationship of palaeontology with other branches.

Fossilization and fossil record Nature and importance of fossil record; Fossilization processes and modes of preservation. Species concept with special reference to paleontology. Taxonomic hierarchy. Theory of organic evolution interpreted from fossil record.

Unit- II

Invertebrate Palaeontology: Brief introduction to important invertebrate groups: Brachiopods, Mollusca (Bivalves, Gastropods and Cephalopods - Nautiloids, Ammonoids, Coleoids), Trilobites, Echinoids, Crinoids, Corals and their significance. Introduction to Paleobotany, Gondwana flora of India and their significance in reconstruction of palaeoclimate.

Unit- III

Origin of sediments: Weathering (Physical and chemical weathering). Fluid flow, sediment transport and sedimentary structures: Types of fluids, Laminar vs. turbulent flow, Particle entrainment, transport and deposition. Sedimentary textures and structures. Classification of sedimentary rocks. Diagenesis.

Unit- IV

Origin, occurrence and characteristics of common sedimentary rocks; Siliciclastic rocks (Conglomerates, sandstones, mudrocks), Carbonate rocks (limestone, Dolomite and dolomitisation). Sedimentary environments and facies.

Practical

Practical	GEL -64P-204 Palaeontology and Sedimentology Lab	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks
Credit of the Course	2						

Course Objectives	To give elementary knowledge about the Morphology of ancient organism and their relationship with the environment through the study of hand specimens of various fossils recovered from different parts of the country. To make students able to indentify various sedimentary rocks through characteristic properties and microscopic studies.
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Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

Palaeontology: Study of diagnostic morphological characters, systematic position, stratigraphic position, age of various invertebrate, and plant fossils.

Sedimentology: Study of mega structures, textures and mineralogy of sedimentary rocks.

Petrography of clastic and non-clastic rocks through hand specimens and thin sections.

Books recommended.

1. Michael Benton, David A. T. Harper, (2009). Introduction to Paleobiology and the Fossil Record, Wiley Blackwell.
2. Clarkson, E. N. K. (2012). Invertebrate paleontology and evolution 4th Edition by Blackwell Publishing.
3. Clare Milsom and Sue Rigby (2010). Fossils at a Glance. Wiley-Blackwell. (Second Edition).
4. Peter Doyle (1996). Understanding Fossils: An Introduction to Invertebrate Palaeontology
5. Prothero, D.R. 1998. Bringing fossils to life - An introduction to Paleobiology, McGraw Hill.
6. Lehmann, U., Hillmer, G. 1983; Fossil Invertebrates, Cambridge University Press.
7. Nield, E.W. and Tucker V.C.T., 1985; Palaeontology-An Introduction, Pergamon Press.
8. Benton, M. (2014). Vertebrate Palaeontology, 4th Edition. John Wiley & Sons.
9. Shukla, A. C., & Misra, S. P. (1975). Essentials of paleobotany. Vikas Publisher.
10. Prothero, D. R., & Schwab, F. (2004). Sedimentary geology. Macmillan.
11. Tucker, M. E. (2006) Sedimentary Petrology, Blackwell Publishing.
12. Collinson, J. D. & Thompson, D. B. (1988) Sedimentary structures, Unwin- Hyman, London.
13. Nichols, G. (2009) Sedimentology and Stratigraphy Second Edition. Wiley Blackwell
14. Sam Boggs V th Edition (2016). Principles of Sedimentology and Stratigraphy.

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>
2. <https://www.digitalatlasofancientlife.org/>

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

1. Know about fossils and their significance in understanding the evolutionary history of life on the earth.
2. Understand the changes that occurred in the history of the earth and their effects on diversity of life through the geological times.
3. Know about the processes from production of sediments to their conversion into sedimentary rocks.
4. Know the types of sedimentary rocks and their genesis, depositional environments of sedimentary rocks.

SEMESTER: V

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -75T-301 Principles of Stratigraphy and Geology of India	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	This course is designed to understand principles of stratigraphy, Geological time scale and rock formations of India: age determination, distribution, their correlation and economic significance.						

Unit- I

Stratigraphy: Principles of stratigraphy, lithology and environments of deposition, Homotaxis, contemporaneity and correlation. Standard stratigraphical scale. Imperfection in geological records. Tectonic framework and physiographic divisions of India.

Unit- II

Broad stratigraphic framework of India. Stratigraphy, distribution, lithology, correlation and mineral resources of the following; Archaeans, Cuddapahs and the Vindhya with special reference to Rajasthan.

Unit- III

Distribution, succession, sedimentation, fossil content and mineral resources of the Gondwana Supergroup. Mesozoic stratigraphy of India with reference to Triassic of Spiti and Jurassic of Kachchh. Deccan traps.

Unit- IV

Tertiary Period: Subdivisions, lithology, distribution, succession, and fossils. Siwalik Group: distribution, lithology, depositional environment and fossils. Pleistocene of Assam, Peninsular India and Kashmir. Glaciation.

Practical

Practical	GEL -75P-302 Principles of Stratigraphy and Geology of India Lab	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks
Credit of the Course	2						
Course Objectives	This course is designed to Understand the occurrence and distribution of rock formation in India through study of geological maps.						

Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

Standard stratigraphic Scale, Paleogeographic maps of India during Permo-Carboniferous. Plotting of various geological formation in outline map of India. Tectonic map of India. Identification and description of the following stratigraphic rocks; Banded Hematite, Quartzite, Khondalite, Charnockite, Gondite, Vindhyan Sand stone, Products Limestone, Barakar Sandstone, Golden Oolite, Dhosa Oolite, Nummulitic Limestone, Fenestella Shale, Gondwana Shales with plant impressions.

Book Recommended:

1. Ramakrishnan M & Vaidyanadhan R 2010. Geology of India vol I and II, Geological society of India.
2. Ravindra Kumar 2022. Fundamentals of Historical Geology and Stratigraphy of India, Wiley Eastern/ New age International Publisher.
3. Krishnan M.S. 2017 Geology of India and Burma, 6 ed, CBS publisher.
4. Brookfield M. E. 2005. Principles of Stratigraphy, Wiley Blackwell.

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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

1. Understand Principles of stratigraphy.
2. Importance of stratigraphic correlations.

3. Understand lithostatigraphic framework of India.
4. Understand process operative on earth in the geologic past.
5. Understand the fossil distribution in India and its implications.

SEMESTER: VI

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	GEL -76T-303 Economic Geology and Mineral Economics	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4						
Course Objectives	To learn the about the processes of formation, classification, significance and distribution of ore deposits and their uses.						

Unit- I

Economic Geology, developments and its relationship with various branches of Geology. Ore and gangue minerals. Ore forming Processes with special reference to Magmatic, Hydrothermal, Mechanical and Residual concentration.

Unit- II

Classification of mineral deposits: outlines of Lindgren's and Bateman's classification. Important ores, composition, physical properties, mode of occurrence and distribution in India of the following metal deposits; gold, silver, copper, lead-zinc, iron, manganese, chromium and aluminium.

Unit- III

Important industrial minerals: Mode of occurrence, physical properties, chemical composition and distribution in India; Abrasives, Ceramics, Cement, Gemstones, Glass, Paint and Fertilizers.

Unit- IV

Strategic, Critical & essential mineral. Coal, petroleum and radioactive minerals; their occurrences, distribution and origin-oil traps.

Practical

Practical	GEL -76P-304 Economic Geology and Mineral Economics Lab	CA	1 Hr	CA	10 Marks	CA	04 Marks
		EoSE	04 Hrs	EoSE	40 Marks	EoSE	16 Marks

Credit of the Course	P-2
Course Objectives	To train the students about identification of common ore forming minerals through hand specimens and microscopic studies.

Maximum Marks: 40

(Exercise: 30, Record: 05, Viva voce: 05)

Diagram depicting the following: (a) Gossan Oxidation zone and supergene enrichment zone, (b) Structural traps for oil accumulations, (c) Stratigraphical trap for oil accumulation.

Systematic study, identification, description, mode of occurrences and uses of the following minerals -Haematite, magnetite, siderite, pyrites, pyrolusite, psilomlance, chromite, ilmemente, chalcophyrite, malachite, azurite, galena, sphalerite. Magnesite, bauxite, beryl, stibnite, barite, muscovite, graphite, kyanite, garnet, corundum, gypsum, talc, apatite, rock phosphate, calcite, coal and its varieties.

In an outline map of India plot occurrence of the following mineral deposits; copper, lead-zinc-silver, gold, chromite, manganese, aluminium, rock-phosphate, mica, iron, coal and diamond. Plane table survey.

Book Recommended:

1. Batman, A.M.: Introduction to economic mineral deposits.
2. Wadia, M.D. Minerals of India, Book Trust of Publ.
3. Rao, T.C. and Gokhle, K.V.G.K.: Ore deposits of India, their distribution and processing.
4. Krishna Swamy, S.: India's Economic Oxford & I.B.H. Publishing Co., New Delhi.
5. Prasad U.: Economic Geology, CBS Publisher, Delhi.
6. Robb L.: Introduction to Ore Forming Processes, Wiley-Blackwell.

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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

1. Understand ore forming processes.
2. Importance of mineral deposits for a country.
3. Understand coalification and formation of petroleum.
4. Understand relevance of strategic and critical minerals.
5. Assess the mineral deposits of India and scope of developments.

Multidisciplinary papers in Geology

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	MDM GEL 51T-101 Introduction to Geology	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4 (T-4)						
Course Objectives	This course is designed for students of all faculties to learn about the Geology subject, its different branches. Aim of this course to give idea about origin of our universe, Earth, and different endogenic and exogenic processes of earth. To learn about ancient life through fossils.						

Unit- 1

Holistic understanding of dynamic planet 'Earth' through Geology. Introduction to various branches of Geology. General characteristics and origin of the Universe, Solar System and its planets. Meteorites.

Unit- 2

Origin, size and shape of Earth. Internal structures. constitution and composition of Earth. Concept of Sea-floor spreading, Continental drift and Plate Tectonics.

Unit- 3

Geomorphology: Introduction, weathering and erosion, landform development and geological work of river, wind, groundwater, glacier and ocean. Introduction and types of Folds, Faults, Joints, Fractures.

Unit- 4

Definition, Scope, sub-division, and relationship of palaeontology with other branches.

Fossilization and fossil record Nature and importance of fossil record; Fossilization processes and modes of preservation. Species Theory of organic evolution interpreted from fossil record.

Suggested books:

1. Mahapatra, G. B. 2018. Text book of Physical Geology, CBS publications
2. Thornbury, W. D., 2004. Principles of Geomorphology, CBS publisher & distributor private Ltd.

3. Huggett, R. J. 2007. Fundamental of Geomorphology, Taylor & Francis.
4. Paul R. B, and David R. M., 2013. Key Concepts in Geomorphology, W. H. Freeman.
5. Michael Benton, David A. T. Harper, (2009). Introduction to Paleobiology and the Fossil Record, Wiley Blackwell.
6. Clarkson, E. N. K. (2012). Invertebrate paleontology and evolution 4th Edition by Blackwell Publishing.
7. Ghosh, S.K. (1983). Structural Geology: fundamentals and modern developments, Elsevier.
8. Van Der Pluijm B. A., Marshak, S. 2004 Earth Structure (Second Eds.). WW Norton & Company.

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>
2. <https://www.digitalatlasofancientlife.org/>

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. Assess the mode of formation of landforms and their processes of formation in different climate zones and tectonic regimes.
6. Know about fossils and their significance in understanding the evolutionary history of life on the earth.

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	MDM GEL -63T 201 Introduction to Earth Materials and Geology of India	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the	4 (T-4)						

Course	
Course Objectives	This course is designed for students of all faculties to learn about the origin and occurrence of different types of rock forming minerals, and rocks and a brief introduction of geology of India.

Unit- 1

Definition of mineral, rock-forming, minerals. Physical and Optical properties of minerals. Physical, optical and chemical characteristics of following mineral groups: Feldspar, Garnet, Olivine and Silica. Pyroxene, Amphiboles, Mica, Carbonates, Kyanite, Sillimanite, Andalusite, Talc, Wollastonite, Oxides and Sulfides.

Unit- II

Definition, origin and composition of magma; intrusive and extrusive forms; structure and texture of plutonic, hypabyssal, and volcanic rocks. Bowen's Reaction Principle. Study of important igneous rocks- Granite and Basalt.

Unit- III

Common metamorphic rocks. Agents of metamorphism. Concept of facies. Common types of metamorphism.

Unit- IV

Introduction, origin of sedimentary rocks. Classification of sedimentary rocks. Occurrence and characteristics of common sedimentary rocks; Siliciclastic rocks (Conglomerates, sandstones, mudrocks), Carbonate rocks (limestone, Dolomite and dolomitisation). Introduction to Stratigraphy. Introduction to Geology of India.

Book Recommended

1. Klein, C., Dutrow, B., Dana, J. D., & Klein, C., 2002. Manual of mineral science. New York: Wiley.
2. Ford W.E., 2006. Dana's Textbook of Mineralogy. CBS Publishers and Distributors.
3. Tyrell, G.W., The principles of Petrology, Methuen & Co. London.
4. Winter, J.D., Principles of Igneous and Metamorphic Petrology, Pearson, Delhi.
5. Sam Boggs V th Edition (2016). Principles of Sedimentology and Stratigraphy.
6. Ramakrishnan M & Vaidyanadhan R 2010. Geology of India vol I and II, Geological society of India.
7. Brookfield M. E. 2005. Principles of Stratigraphy, Wiley Blackwell

Suggested E-resources:

1. <https://egyankosh.ac.in/simple-search?query=geology>

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

1. Understand about the different types of rock forming minerals
2. Understand about the magma generation and formation of igneous rocks.
3. Understand petrogenesis of igneous and metamorphic rocks.
4. Understand origin and types of sedimentary rocks.

Type of Examination	Course Code and Nomenclature	Duration of Examination		Maximum Marks		Minimum Marks	
Theory	MDM-GEL75T-301 Applications of Geology	CA	01 Hr	CA	20 Marks	CA	08 Marks
		EoSE	03 Hrs	EoSE	80 Marks	EoSE	32 Marks
Credit of the Course	4 (T-4)						
Course Objectives	This course is designed for students of all faculties to learn about economic significance of geological studies through study of ore forming minerals, mining methods, exploration of mineral resources using remote sensing, and ground water studies.						

Unit- I

Economic Geology, developments and its relationship with various branches of Geology. Ore and gangue minerals. Ore forming Processes. Common ore minerals and rocks. Strategic, essential and

critical minerals. Coal, petroleum and radioactive minerals; their occurrences, distribution and origin-oil traps.

Unit- II

Common mining methods employed in India. Introduction to prospecting. Introduction to opencast and underground mining. Important industrial minerals: Mode of occurrence, physical properties, chemical composition and distribution in India

Unit- III

Introduction, definition and scope of remote sensing. Basic Principles of Remote Sensing: GIS: Definition & its Components, Hardwares and Softwares. Basics of Geographic Information Systems (GIS): Representation of Raster and Vector. Applications of remote sensing and Basic Geographic Information Systems (GIS) in geosciences.

Unit- IV

Origin of water and its importance. Hydrological cycle and occurrence of ground water and its distribution. Aquifer and types of aquifers. Hydrological properties of formation. Ground water management, traditional and rainwater harvesting.

Books Recommended:

1. Batman, A.M.: Introduction to economic mineral deposits.
 2. Rao, T.C. and Gokhle, K.V.G.K.: Ore deposits of India, their distribution and processing.
 3. Fundamentals of Remote Sensing: A Canada Centre for Remote Sensing Remote Sensing Tutorial
 4. Principles of Geographic Information Systems An introductory textbook Editor Rolf A. de By 2001.
 - 5. Groundwater Hydrology, Publisher: John Wiley & Sons Inc, [Todd David Keith](#) third edition.
- Suggested E-resources:**

1. <https://egyankosh.ac.in/simple-search?query=geology>

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

1. Understand ore forming processes.
 2. Importance of mineral deposits for a country.
 3. Understand the methods of mining.
 4. Basics of remote sensing and applications of remote sensing.
 5. Understand the ground water holding properties of rocks and occurrence of ground water.
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