

INDIRA GANDHI UNIVERSITY

MEERPUR-REWARI, HARYANA-122502

(A State University Established under Haryana Act No.29 of 2013)

(Recognized u/s 12(B) & 2(f) of UGC Act, 1956)

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Scheme of Examination and Syllabus

(in accordance with National Educational Policy 2020)

for

Undergraduate Programme

in

GEOLOGY

Effective from Academic Session 2026-27

Faculty of Earth and Space Sciences

Indira Gandhi University

Meerpur-Rewari (122502)

Haryana, India

Details of Approvals

Council/Board	Date	Remark
Staff Council	05.08.2026	
Board of Studies		Circulation Mode
Faculty		
Academic Council		
Year of implementation		

Dean



Faculty of Earth and Space Sciences
(Signature with Stamp)

VISION AND MISSION OF THE UNIVERSITY

VISION

To be a globally renowned university, recognized for excellence in teaching, innovative research, and welfare of the society, imbining the spirit of “*Vasudhaiv kutumbkam*”.

MISSION

- To introduce and implement innovation in teaching and learning process matching up the global standards to strengthen academic delivery through curriculum design, teaching pedagogy and usage of ICT.
- To develop a mechanism that attracts talented, qualified and experienced faculty from across the globe for pursuing their academic and research careers at the University.
- To offer academic programs at UG, PG, doctoral, Post-Doctoral levels which are learner-centric, industry focused, and adhere to outcome based international models.
- To create an ambiance that is conducive for undertaking sponsored research, innovation and consultancy services to a wide spectrum of societal and industrial requirements while encouraging interdisciplinary approach of learning, team work, and research.
- To establish state of art centres of excellence in frontier areas of research and design innovation through industry collaboration to innovate and incubate the products and services.
- To establish smart campus and promote e-governance activities in the university for the digitally empowered society and knowledge economy.
- To provide a hygienic, modern, environment friendly and vivacious campus attuned to the urgent needs of Green Technology.
- To consider and implement norms, metrics, standards, procedures and benchmarks for assessing and improving the quality in every aspect of University system and achieve quality certifications by National and International bodies.
- To make society self-reliant by organizing various programmes including literacy, gender sensitization, health awareness, and dissemination of information about livelihood generation.

VISION AND MISSION OF THE DEPARTMENT OF GEOLOGY

VISION

To be the center of National importance and International recognition in the field of Geosciences through the educational and research achievements. We are also committed to develop the scientific temperament in our students.

MISSION

To equip the students with quality education in Geosciences and inculcate the ethics so that to prepare them for dynamic professional career along with ethical human values.

ABOUT THE PROGRAMME

The UG Programme in Geology (3/4 years, as per NEP2020) has been running at Government College, Narnaul, since 1968. The college is affiliated with Indira Gandhi University, Meerpur, Rewari. The UG Programme in Geology has evolved into one of the pioneer programmes of the region, attracting students from various states for quality geological education.

Undergraduates of Geology prefer to go for masters and research in Geosciences. Over the years, the programme has produced a large number of skilled and successful geologists who have secured positions in reputed national and international organizations. Alumni of the programme have been placed in prestigious organizations such as the Geological Survey of India (GSI), Atomic Minerals Directorate for Exploration and Research (AMD), Oil and Natural Gas Corporation (ONGC), State Mines & Geology Departments, Public Sector Undertakings (PSUs), and various multinational companies (MNCs).

The programme continues to contribute significantly to geological education and the development of trained manpower in the fields of earth sciences, mineral exploration, mining, petroleum, and related industries.

MINIMUM ELIGIBILITY CRITERIA

As per IGU/DHE Haryana rules

PASSING CRITERIA

As per IGU guidelines

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	Prepare graduates with deep, theoretical, and field-based knowledge in core geological sub-disciplines (mineralogy, petrology, structural geology, paleontology, stratigraphy, and geochemistry) integrated with interdisciplinary domain knowledge (geophysics, remote sensing, GIS, data science, and environmental science).
PEO 2	Equip graduates with advanced field-mapping techniques, laboratory analytical methods, remote sensing, spatial modeling, and computational tools.
PEO 3	Train students in the application of geological principles to economic mineral exploration, energy resources (hydrocarbons, geothermal, critical minerals), hydrogeology, and engineering geology.
PEO 4	Instill an understanding of Earth processes in the context of climate change, natural hazards (earthquakes, landslides, floods), oceanography, and environmental conservation in line with local and global sustainability goals.
PEO 5	Foster a research mindset, critical thinking, scientific communication, scientific integrity, and an adaptive learning approach to keep pace with changing technology and global developments.

PROGRAMME LEARNING OUTCOMES (PLOs)

PLO 1	Knowledge	Capable of demonstrating comprehensive disciplinary knowledge gained during course of study.
PLO 2	Research Aptitude	Capability to ask relevant/appropriate questions for identifying, formulating and analysing the research problems and to draw conclusion from the analysis
PLO 3	Communication	Ability to communicate effectively on general and scientific topics with the scientific community and with society at large
PLO 4	Problem-Solving	Capability of applying knowledge to solve scientific and other problems
PLO 5	Individual and Team Work	Capable to learn and work effectively as an individual, and as a member Or leader in diverse teams, in multidisciplinary settings.
PLO 6	Investigation of Problems	Ability of critical thinking, analytical reasoning and research based Knowledge including design of experiments, analysis and interpretation of data to provide conclusions.
PLO 7	Modern Tool Usage	Ability to use and learn techniques, skills and modern tools for scientific Practices.
PLO 8	Scientific temperament	Ability to apply reasoning to assess the different issues related to Society and the consequent responsibilities relevant to the professional scientific Practices.
PLO 9	Life-Long Learning	Aptitude to apply knowledge and skills that are necessary for participating in learning activities throughout life.
PLO 10	Ethics	Capability to identity and apply ethical issues related to one's work, avoid unethical behaviour such as fabrication of data, committing plagiarism and unbiased truthful actions in all aspects of work
PLO 11	Project Management	Ability to demonstrate knowledge and understanding of the scientific principles and apply these to manage projects

Indira Gandhi University, Meerpur, Rewari

Scheme of Examination for the Geology Subject in Under Graduate Programmes

as per NEP 2020 Curriculum and Credit Framework for Undergraduate Programmes

(Multiple Entry-Exit, Internships and Choice Based Credit System LOCF) with effect from the session 2026-27 (in a phased manner)

Semester-1

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-1 MCC-1	Scheme A, B & C	26L4.5-GGY-101	General Geology	4	3	1	3	0	2	5	20	10	50	20	100	3	2
*CC-M1	Scheme A, B & D	26L4.5-GGY-103	Fundamentals of Geology	2	2	0	2	0	0	2	15	00	35	00	50	2	0
MDC 1	Scheme A, B & C	From Available pool of Multidisciplinary Courses from a subject of different discipline as per NEP.															
AEC-1	A, B & C	From Available pool of Ability Enhancement Courses as per NEP															
SEC-1	A, B & C	From Available pool of Skill Enhancement Courses as per NEP															
VAC-1	A, B & C	From Available pool of Value Added Courses as per NEP															

*For students who opt Geology as a minor subject

Semester-2

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-2 MCC-3	Scheme A, B & C	26L4.5-GGY-201	Economic Mineral Resources	4	3	1	3	0	2	5	20	10	50	20	100	3	2
*CC-M2	Scheme A, B & D	26L4.5-GGY-203	Geoscience and Society	2	2	0	2	0	0	2	15	00	35	00	50	2	0
MDC-2	A, B & C	From Available pool of Multidisciplinary Courses from a subject of different discipline as per NEP															
AEC-2	A, B & C	From Available pool of Ability Enhancement Courses as per NEP															
SEC-2	A, B & C	From Available pool of Skill Enhancement Courses as per NEP															
VAC-2	A, B & C	From Available pool of Value Added Courses as per NEP															
Internship	A, B & C	Internship of 4 Credits of 4-6 weeks duration after 2 nd Semester (Mandatory in case of exit)													100		

*For students who opt Geology as a minor subject

Semester-3

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-3 MCC-4	Scheme A, B & C	26L5.0-GGY-301	Mineralogy and Crystallography	4	3	1	3	0	2	5	20	10	50	20	100	3	2
CC-M3	Scheme A & C	From Available CC-3/MCC-4 of 4 credits as per NEP															
MDC-3	Scheme A, B & C	From Available pool of Multidisciplinary Courses from a subject of different discipline as per NEP															
AEC-3	Scheme A, B & C	From Available pool of Ability Enhancement Courses as per NEP															
SEC-3	Scheme A, B & C	From Available pool of Skill Enhancement Courses as per NEP															

Semester-4

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-4 MCC-6	Scheme A, B & C	26L5.0-GGY-401	Basic Petrology	4	3	1	3	0	2	5	20	10	50	20	100	3	2
CC-M4(V)	A, B & C	From Available pool of Minor (Vocational) Courses															
AEC-4	A, B & C	From Available pool of Ability Enhancement Courses as per NEP															
VAC-3	A & B	From Available pool of Value Added Courses as per NEP															
Internship	A, B & C	Internship of 4 Credits of 4-6 weeks duration after 4th Semester (Mandatory in case of exit if not done after 2 nd Semester)													100		

Semester-5

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-5 MCC-9	Scheme A, B & C	26L5.5-GGY-501	Structural and Engineering Geology	4	3	1	3	0	2	5	20	10	50	20	100	3	2
CC-M5(V)	A & C	From Available pool of Minor (Vocational) Courses															
Internship	A, B & C	Internship of 4 Credits of 4-6 weeks duration (After 4 th Semester)														100	

Semester-6

Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: Lecture P: Practical T: Tutorial				Internal Assessment Marks		End term Examination Marks		Total Marks	Examination hours	
				Total	Theory (Th)	Practical (P)	L	T	P	Total	Th	P	Th	P		Th	P
CC-6 MCC-11	Scheme A, B & C	26L5.5-GGY-	Paleontology and Stratigraphy	4	3	1	3	0	2	5	20	10	50	20	100	3	2
CC-M6	A	From Available CC-6/MCC-11 of 4 credits as per NEP															
CC-M7(V)	A																

Scheme of MDC, VAC, SEC, AEC and VOC courses
Offered in the University Pool
by the
Department of Geology

Scheme of MDC, VAC, SEC and VOC courses																		
Semester	Course Type	Applicable Scheme	Course Code	Nomenclature of the Course	Credits			Contact hours L: T: Tutorial P: Practical				Internal Assessment Marks		End term Examination Marks		Total Marks	Exam. Hours	
					Total	Theory (T)	Practical (P)	L	T	P	Total	T	P	T	P		T	P
1	MDC-1	Scheme A, B, C & D	26L4.5-MDC-GGY-101	An Introduction to Geology	3	2	1	2	0	2	4	15	05	35	20	75	2	2
2	MDC-2	Scheme A, B, C & D	26L4.5-MDC-GGY-201	Rocks and Minerals	3	2	1	2	0	2	4	15	05	35	20	75	2	2
3	MDC-3	Scheme A, B, C & D	26L5.0-MDC-GGY-301	Earth Resources	3	2	1	2	0	2	4	15	05	35	20	75	2	2
4	CC-M4(V)	A, B & C	26L5-VOC-GGY 401	Soil and Water Testing	4	2	2	2	0	4	6	15	15	35	35	100	2	2

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	1		
Nature of Course	Theory + Practical		
Name of the Course	General Geology		
Course Code	26L4.5-GGY-101		
Course Type	CC-1 (Core Course)		
Course Level	UG (100-199)		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Understand Geology and Its relation to mankind. CLO2: Understand the Interior of the Earth. CLO3: Learn about the Lithospheric Plates of Earth. CLO4: Learn the practical aspects of General Geology.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Geology and its scope. Origin of the Universe and Solar System. Origin and attributes of the Earth. Earth's Internal Structure, Basic idea of Seafloor Spreading and Continental Drift. Theory of Plate Tectonics. Earthquake and Volcanism.	CLO 1	15
II	Mountain building processes. Introduction to Geomorphology, Basic concepts of Geomorphology, Weathering and associated Landforms, Erosion and its types, Geological work of River.	CLO 2	15
III	Geological work of Wind, Study of important erosional and depositional features of wind, Geological work of Glacier, Study of important erosional and depositional features of Glacier.	CLO 3	15
IV	Study of important geomorphological (Erosional and Depositional) features. Earth models and their interpretation. Study of Seismic Zones in India. Preparation of Maps showing rivers of Haryana and India. Study of pie chart of chemical composition of Earth.	CLO 4	30
	Total Contact Hours		75

Suggested Evaluation Methods					
Internal Assessment-30	Th-25	Pr-05	End Term Examination-70	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location 1. Press, F. and Siever, R., 1993. Understanding earth. New York: W.H. Freeman 2. Moore, J.S. and Wicander, R., 2007, <i>Physical Geology</i>, UK, Belmont, CA. 3. Hobbs, M.B.E., Means, W.D. and Williams, P.F., 1976, <i>An Outline of Structural Geology</i>, New Jersey, USA, John Wiley & Sons. 4. Pollard, D.D. and Fletcher, R.C., 2005, <i>Fundamentals of Structural Geology</i>, England, Cambridge University Press. 5. Billings, M.P., 1972, <i>Structural Geology</i>, Delhi, Prentice Hall India. 6. Klein, C., Cornelius, S.H., and Dana, J.D., 1848, <i>Danas Manual of Mineralogy</i>, New Jersey, USA, John Wiley & Sons. 7. e-PG Pathshala: https://epgp.inflibnet.ac.in					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hour's Devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	1		
Nature of Course	Theory		
Name of the Course	Fundamentals of Geology		
Course Code	26L4.5-GGY-103		
Course Type	CC-M1		
Course Level	100-199		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Understand Geology and its branches and relation with Solar system. CLO2: Learn about Geological Time Scale and Physiography of India.		
	Theory	Practical	Total
Credits	2	0	2
Teaching Hours per week	2	0	2
Internal Assessment Marks	15	0	15
End Term Exam Marks	35	0	35
Max. Marks	50	0	50
Examination Duration	02 hours	NA	02 hours
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 07 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Geology as an interdisciplinary science. Branches of Geology and their basic understanding. Elementary Idea about the Weathering and Erosion. Major Organic belts of Earth. Geological Time Scale Earth's place in the Solar System and other basic features (mass, shape, size, density, etc.) of Earth. Elementary idea about the Interior of Earth.	CLO 1	15
II	Definition of Stratigraphy and Principles of Stratigraphy. Major mass extinctions on the Earth. Earthquake and volcanism. Essential factor in Mineral deposition. Elementary Idea of: - Ore mineral, Tenor, and Gangue mineral. Basic idea of Geological Structures:-Fold, Fault, and Joints. Unconformities and their type. Metallogenetic Epochs & Provinces.	CLO 2	15
	Total Contact Hours		30
Suggested Evaluation Methods			

Internal Assessment: 15 marks Theory • Class Participation: 05 marks • Seminar/presentation/assignment/quiz/class test/ Lab records etc.: 05 marks • Mid-Term Exam: 05 marks	End Term Examination: 35 marks Written Examination
Part C-Learning Resources	
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location 1. Krishnan, M. S., 1968, Geology of India and Burma, New Delhi, CBS Publishers. 2. Jain, P.C., Anantharaman, M.S., Palaeontology, 2016, New Delhi, Vishal Publishing Co. 3. Bateman, A.M., Jensen, M.L., 2013, Economic mineral deposits, USA, John Wiley and Sons. 4. Gokhale and Rao, 1973, Ore Deposits of India, Delhi, Thomson Press. 5. Krishnaswami S., 1972, India's mineral resources, New Delhi, Oxford and IBH Pub. Co. 6. Parmod, A.O., 2009, Handbook of minerals, Crystals, Rocks and Ores, New India Publishing Agency. 7. NPTEL: https://nptel.ac.in 8. SWAYAM: https://swayam.gov.in 9. National Digital Library of India (NDLI) 10. e-PG Pathshala: https://epgp.inflibnet.ac.in	

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)

CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas

Field	Hours' Devoted
Employability	15
Entrepreneurship	
Skill Enhancement	
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	2		
Nature of Course	Theory + Practical		
Name of the Course	Economic Mineral Resources		
Course Code	26L4.5-GGY-201		
Course Type	CC-2 (Core Course)		
Course Level	UG (100-199)		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Understand the economic resources of Earth. CLO2: Know about the formation of economic minerals. CLO3: Learn about the distribution of economic minerals on Earth. CLO4: Practical aspects of economic Mineral Resources.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	2 hours
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Basic Terminology: Ore mineral, Tenor, Gangue mineral, Strategic, critical and essential minerals, Syngenetic and Epigenetic deposits. Essential factor in Mineral deposition. Basic elements of Mineral Exploration and Mining.	CLO 1	15
II	Endogenic Processes of formation of ore deposits: Magmatic Concentration, Contact metasomatism, and Metamorphism, Hydrothermal Processes-cavity filling and metasomatic replacement, Sublimation.	CLO 2	15
III	Exogenic Processes of formation of ore deposits: Oxidation and Supergene Replacement, Residual & Mechanical concentration. Formation of Coal and Petroleum. Groundwater as earth resource.	CLO 3	15

IV	• Distribution of Metallic mineral deposits in India. • Distribution of Non-Metallic economic deposits in India. • Distribution of Coal and Petroleum deposits of India. • Distribution of Mineral Resources of Haryana.	CLO 4	30		
	Total Contact Hours		75		
Suggested Evaluation Methods					
Internal Assessment-30	Th-25	Pr-05	End Term Examination-70	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
Recommended Books/e-resources/LMS:					
1. Prasad, U., (2010). Economic Mineral Deposits of India, New Delhi, CBS Publishers.					
2. Charles J. Moon, Michael K.G. Whateley & Anthony M. Evans, (2006). Introduction to Mineral Exploration, UK: Blackwell.					
3. Parmod, A.O., 2009, Handbook of minerals, Crystals, Rocks and Ores, New India Publishing Agency.					
4. Bateman, A.M., Jensen, M.L., 2013, Economic mineral deposits, USA, John Wiley and Sons.					
5. Gokhale and Rao, 1973, Ore Deposits of India, Delhi, Thomson Press.					
6. NPTEL: https://nptel.ac.in					
7. SWAYAM: https://swayam.gov.in					
8. National Digital Library of India (NDLI).					
9. e-PG Pathshala: https://epgp.inflibnet.ac.in					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	2		
Nature of Course	Geoscience and Society		
Name of the Course	26L4.5-GGY-203		
Course Code	CC-M2		
Course Type	100-199		
Course Level	N.A.		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Acquire Knowledge of basic elements of Geology. CLO2: Importance of Geological knowledge for society.		
	Theory	Practical	Total
Credits	2	0	2
Teaching Hours per week	2	0	2
Internal Assessment Marks	15	0	15
End Term Exam Marks	35	0	35
Max. Marks	50	0	50
Examination Duration	02 hours	NA	
Part B- Contents of the Course			
Instructions for Paper- Setter: The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 07 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Origin and Evolution of Earth. Elementary idea about the Internal Structure of Earth. Origin and evolution of life through Earth history. Elementary idea of rocks and Mineral and their types. Rock cycle. Significance of Earth resources to mankind and society. Understanding of Important Engineering structure in terms of Geology.	CLO 1	15
II	Elementary Idea about the concept of Sea floor Spreading, Continental drift and Plate tectonics. Landforms associated with Plate Tectonics. Geological Processes and agents. Geological work of wind, glacier, and river. Landslides: classification, causes and preventative measures.	CLO 2	15
	Total Contact Hours		30
Suggested Evaluation Methods			

Internal Assessment: 15 marks Theory • ClassParticipation:05 marks • Seminar/presentation/assignment/quiz/ class test/ Lab records etc.:05 marks • Mid-TermExam:05 marks	End Term Examination: 35 marks Written Examination- 35 marks
Part C-Learning Resources	
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location 1. Press, F. and Siever, R., 1993. Understanding earth. New York: W.H. Freeman 2. Moore, J.S. and Wicander, R., 2007, <i>Physical Geology</i>, UK, Belmont, CA. 3. Hobbs, M.B.E., Means, W.D. and Williams, P.F., 1976, <i>An Outline of Structural Geology</i>, New Jersey, USA, John Wiley & Sons. 4. Pollard, D.D. and Fletcher, R.C., 2005, <i>Fundamentals of Structural Geology</i>, England, Cambridge University Press. 5. Billings, M.P., 1972, <i>Structural Geology</i>, Delhi, Prentice Hall India, NPTEL, https://nptel.ac.in 6. SWAYAM: https://swayam.gov.in 7. National Digital Library of India (NDLI) 8. e-PG Pathshala: https://epgp.inflibnet.ac.in	

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	
Skill Enhancement	
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	3		
Nature of Course	Theory + Practical		
Name of the Course	Crystallography and Mineralogy		
Course Code	26L5.0-GGY-301		
Course Type	CC-3		
Course Level	200-299		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Acquire knowledge about structural bonding and classification of the minerals. CLO2: Understand physical, chemical, and optical properties of various groups of Mineral CLO3: Understanding bonding and packing of atoms in crystal structures CLO4: Practical aspects of Crystallography and Mineralogy.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Elementary Ideas about crystal structures, Crystal faces, edges, solid angle, zones, and Concepts of Crystal Systems, class and forms. Interfacial angle and its measurement. Index system of miller.	CLO 1	15
II	Definition of Mineral, Physical, Optical and Chemical Properties of Minerals. Twinning and its types.	CLO 2	15
III	Silicate Structures, Descriptive Mineralogy of the important Mineral groups including Silicates, Pyroxene, Mica, Feldspars, Amphiboles.	CLO 3	15

IV	- Study of Physical properties of important rock forming minerals in hand specimen. - Study of Optical properties of important rock forming minerals. - Identification of crystal forms. - Measurement of Interfacial angle.	CLO 4	30		
	Total Contact Hours		75		
Suggested Evaluation Methods					
Internal Assessment-30 marks	Th-25	Pr-05	End Term Examination-70 marks	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
Recommended Books/e-resources/LMS:					
1. Deer, W.A., Howie, R.A. and Zussman, J., <i>An Introduction to the rock forming minerals</i> , Delhi, Prentice Hall India.					
2. Klein, C., Cornelius, S.H., and Dana, J.D., 1848, <i>Danas Manual of Mineralogy</i> , New Jersey, USA, John Wiley & Sons.					
3. Putnis, A., 1992, <i>Introduction to Mineral Sciences</i> , England, Cambridge University press.					
4. Condie, K.C., 1992, <i>Plate Tectonics & Crustal Evolution</i> , USA, Butterworth-Heinemann Ltd.					
5. Phillips, W.R. and Griffen, D.T., 1986, <i>Optical Mineralogy</i> , New Delhi, CBS Publishers.					
6. Phillips, F.C., 1977, <i>Introduction to crystallography</i> . London, Longman Group Publication.					
7. Klein, C., Cornelius, S.H., and Dana, J.D., 1848, <i>Danas Manual of Mineralogy</i> , New Jersey, USA, John Wiley & Sons.					
8. Read, H.H., 2012, <i>Rutley's Elements of Mineralogy</i> , Heidelberg, Germany, Springer.					
9. Mason, B., Dietrich, 2004, <i>Mineralogy</i> , New Delhi, CBS publishers.					
10. Kerr, P.F., 1942, <i>Optical Mineralogy</i> , New York, McGraw Hill.					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)

CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas

Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	4		
Nature of Course	Theory + Practical		
Name of the Course	Basic Petrology		
Course Code	26L4.5-GGY-401		
Course Type	CC-4 (Core Course)		
Course Level	UG (200-299)		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Learn about Rocks, their types, and composition. CLO2: Learn about identification of Rocks. CLO3: Knowledge about occurrence of rocks in different geological environment. CLO4: Practical aspects of petrology.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Introduction to Petrology. Rocks: Definitions, and Types of rocks. Rock Cycle. Significance of Rock. Basic characteristics and Differences between Igneous, Sedimentary and Metamorphic rocks.	CLO 1	15
II	Concepts of Igneous petrology. Origin and nature of magma. Classification of igneous rocks. Textures and structures of igneous rocks. Mode of occurrence of Igneous rocks. Descriptive petrology of common Igneous Rocks.	CLO 2	15
III	Introduction and Definition of metamorphism. Factors controlling metamorphism: Agents and types of metamorphism. Classification of Metamorphic Rocks. Structure and textures of metamorphic rocks. Descriptive petrology of common Metamorphic Rocks.	CLO 3	15

IV	• Procedure of Identifications of Rocks. • Megascopic characters of Igneous rocks. • Megascopic characters of Metamorphic rocks. • Megascopic characters and structures of sedimentary rocks.	CLO 4	30		
	Total Contact Hours		75		
Suggested Evaluation Methods					
Internal Assessment-30 marks	Th-25	Pr-05	End Term Examination-70 marks	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
Recommended Books/e-resources/LMS:					
1. Bucher, K. and Grapes, R., 2010. <i>Petrogenesis of Metamorphic Rocks</i> , Springer.					
2. Fry, N., 1985. <i>Field Description of Metamorphic Rocks</i> , New York, Geological Society of London Handbook Series.					
3. Best, M.G., 2003. <i>Igneous and Metamorphic Petrology</i> , Blackwell Science.					
4. Vernon, R.H.,and Clarke G. L. 2008. <i>Principles of Metamorphic Petrology</i> , Cambridge University Press.					
5. 2nd Ed., Winter, J. D. <i>Introduction to Igneous and Metamorphic Petrology</i> . PrenticeHall India,2010					
6. Yardley, B.W.D., 1997. <i>An Introduction to Metamorphic Petrology</i> , Longman Earth Science					
7. Stuwe, K. (2007) <i>Geodynamics of the Lithosphere</i> . Springer-Verlag,					
8. Philopotts, (A.R. 1994). <i>Principles of Igneous and Metamorphic Petrology</i> , Prentice Hall.					
9. https://egyankosh.ac.in NPTEL: https://nptel.ac.in					
10. SWAYAM: https://swayam.gov.in					
11. National Digital Library of India (NDLI).					
12. e-PG Pathshala: https://epgp.inflibnet.ac.in					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	V		
Nature of Course	Theory + Practical		
Name of the Course	Structural and Engineering Geology		
Course Code	26L4.5-GGY-501		
Course Type	CC-5 (Core Course)		
Course Level	UG (300-399)		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Understand about basics of structural geology. CLO2: Understand about the processes of folding, faulting and jointing of the strata and their identification in the field. CLO3: Get knowledge of engineering properties of rock and their use as construction material. CLO4: Practical aspects of Structural and Engineering Geology.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Elements of Structural Geology: Attitude of beds, Strike and Dip. Elementary idea of Force, Stress, and Strain. Folds: their morphology, genetic and geometric classification, recognition of folds on maps.	CLO 1	15
II	Faults: their morphology geometric and genetic classification, Joints and their classification and recognition in field. Unconformity: Types, significance.	CLO 2	15
III	Introduction to Engineering Geology. Engineering properties of rocks, Role of engineering geology in civil construction. Engineering structures: -dams, tunnels, highways and bridges, influence of geological factors on these.	CLO 3	15

IV	• Identification of elements of folds. • Identification of faults. • Identification and drawing the Unconformities on maps. • Drawing and Interpretation of Structural maps. • Determination of engineering properties of the Earth materials.	CLO 4	30		
	Total Contact Hours		75		
Suggested Evaluation Methods					
Internal Assessment-30 marks	Th-25	Pr-05	End Term Examination-70 marks	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
Recommended Books/e-resources/LMS:					
1. Hobbs, M.B.E., Means, W.D. and Williams, P.F., 1976, <i>An Outline of Structural Geology</i> , New Jersey, USA, John Wiley & Sons.					
2. Pollard, D.D. and Fletcher, R.C., 2005, <i>Fundamentals of Structural Geology</i> , England,					
3. Billings, M.P., 1972, <i>Structural Geology</i> , Delhi, Prentice Hall India.					
4. Krynine and Judd, (2005), <i>Engineering Geology</i> , New Delhi, CBS publishers.					
5. Lambe, T.W. and Whitman, R., (2005) <i>Soil mechanics</i> , Wiley India Pvt Ltd.					
6. Bharath Singh and Shamser, (1990) <i>Prakash Soil mechanics and foundation engineering, India: Nem Chand and Bros.</i>					
7. Tsytovich, N.A., (1976) <i>Soil mechanics</i> , Central Books Ltd.					
8. Udall, S.L. and Dominy, F.E., (1987) <i>Design of small dams</i> , United States Govt. Printing Office.					
9. Blyth, F.G.H. and Freitas, M., (1984). <i>Manual of Engineering Geology</i> , CRC Press.					
10. https://egyankosh.ac.in NPTEL: https://nptel.ac.in					
11. SWAYAM: https://swayam.gov.in					
12. National Digital Library of India (NDLI).					
13. e-PG Pathshala: https://epgp.inflibnet.ac.in					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	15
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	VI		
Nature of Course	Theory + Practical		
Name of the Course	Paleontology and Stratigraphy		
Course Code	26L4.5-GGY-601		
Course Type	CC-6 (Core Course)		
Course Level	UG (300-399)		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Learn about fossil and evolutionary history of life through morphology & habitat of fossils. CLO2: Learn about basic principles of stratigraphy and Geological Time Scale and unconformable contacts in detail. CLO3: Get knowledge of various branches of stratigraphy and basic concepts of correlation. CLO4: Practical aspects of Paleontology and stratigraphy.		
	Theory	Practical	Total
Credits	3	1	4
Teaching Hours per week	3	2	5
Internal Assessment Marks	20	10	30
End Term Exam Marks	50	20	70
Max. Marks	70	30	100
Examination Duration	3 hours	2 hours	
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner will set 7 questions asking two questions from each unit and one compulsory question from entire theory syllabus by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts with 2 marks each. The examinee will be required to attempt 4 questions, selecting one question from each unit and the compulsory question. All questions, other than compulsory, will carry equal marks.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Fundamentals: definition, objectives and scope of Palaeontology. Types of fossil and their mode of preservation. Evolution of life wrt. Geological Time Scale. Define stratigraphy, scope of stratigraphy, and principles of stratigraphy. Stratigraphic units: classification and nomenclature of units Concepts of Correlation.	CLO 1	15
II	Morphological characters and geological history of:-Trilobite brachiopods, gastropods, and cephalopods. Study of plant fossils of Gondwana Supergroup. Elementary Idea about Vertebrates and Micropaleontology.	CLO 2	15
III	Precambrian Stratigraphy: Dharwar, Cuddapah and Vindhyan. Paleozoic Stratigraphy of India with emphasis on Gondwana Sequence; Mesozoic stratigraphy of India. Cenozoic stratigraphy of India with emphasis of Siwalik group and Deccan Traps.	CLO 3	15

IV	• Identification and description of important fossils of Trilobites, Gastropods, Cephalopods etc. • Location of major stratigraphic Units of Precambrian, Palaeozoic and Cenozoic age in India. • Other practical aspects of Paleontology and stratigraphy.	CLO 4	30		
	Total Contact Hours		75		
Suggested Evaluation Methods					
Internal Assessment-30 marks	Th-25	Pr-05	End Term Examination-70 marks	Th-50	Pr-20
Class Participation	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar Demonstration/ Viva Voce	NA	05	Written Examination	50	NA
Mid-Term Exam	15	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
Recommended Books/e-resources/LMS:					
1. <i>Bucher, K. and Grapes, R., 2010. Petrogenesis of Metamorphic Rocks, Springer.</i>					
2. <i>Fry, N., 1985. Field Description of Metamorphic Rocks, New York, Geological Society of London Handbook Series.</i>					
3. <i>Best, M.G., 2003. Igneous and Metamorphic Petrology, Blackwell Science.</i>					
4. <i>Vernon, R.H.,and Clarke G. L. 2008. Principles of Metamorphic Petrology, Cambridge University Press.</i>					
5. <i>2nd Ed., Winter, J. D. Introduction to Igneous and Metamorphic Petrology. PrenticeHall India,2010</i>					
6. <i>Yardley, B.W.D., 1997. An Introduction to Metamorphic Petrology, Longman Earth Science</i>					
7. <i>Stuwe, K. (2007) Geodynamics of the Lithosphere. Springer-Verlag,</i>					
8. <i>Philopotts, (A.R. 1994). Principles of Igneous and Metamorphic Petrology, Prentice Hall.</i>					
9. https://egyankosh.ac.in NPTEL: https://nptel.ac.in					
10. SWAYAM: https://swayam.gov.in					
11. National Digital Library of India (NDLI).					
12. e-PG Pathshala: https://epgp.inflibnet.ac.in					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₄	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	15
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	15
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Examination Scheme and Course content of
MDC, VAC, SEC, AEC and VOC courses
Offered in the
University Pool
by the
Department of Geology

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	1		
Nature of Course	Theory + Practical		
Name of the Course	An Introduction to Geology		
Course Code	26L4.5- MDC-GGY-101		
Course Type	MDC-1		
Course Level	UG (100-199)		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Understand Geology and its branches. CLO2: Understand the Earth and Solar system. CLO3: Basic practical knowledge in Geology.		
	Theory	Practical	Total
Credits	2	1	3
Teaching Hours per week	2	2	4
Internal Assessment Marks	15	05	20
End Term Exam Marks	35	20	55
Max. Marks	50	25	75
Examination Duration (in hours)	02	02	
Part B- Contents of the Course			
Instructions for Paper- Setter: The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 7 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Relation of Geology with other sciences, Sub-domains in Geology and their basic understanding. Earth's Basic Properties: Shape, Size and Internal Structure of the Earth. Sources of information about interior of the Earth. Chemical composition of interior layers of the Earth. Role of Geology for society. Geological Time Scale (GTS): Meaning, importance and Geological events and evolution of life in different units of GTS.	CLO 1	15
II	Continental Drift: Wegener's theory, Evidences, Criticism. Movement of Indian plate. Theory of Isostasy: Airy's and Pratt views, Isostatic adjustment. Plate Tectonics: Origin and evolution of concept, Causes of plate motion, Plate boundaries and their characteristics. Evidences and significance of plate tectonics.	CLO 2	15
III	Physiographic models of India, Models of Interior of Earth, and Preparation of Maps of Geological subdivisions of India. Identification and demarcation of time units in GTS. Study of Models of plate tectonics.	CLO 3	30
	Total Contact Hours		60
Suggested Evaluation Methods			

Internal Assessment:20 marks	TH-15	PR-5	End Term Examination: 55 marks	TH-35	PR-20
Class Participation:	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar/Demonstration/Viva-voce/Lab records etc.:	NA	5	Written Examination	35	NA
Mid-Term Exam:	5	NA	Write-up and execution of the practical	NA	10

Part C-Learning Resources

Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location

1. Press, F. and Siever, R., 1993. Understanding earth. New York: W.H. Freeman
2. Moore, J.S. and Wicander, R., 2007, *Physical Geology*, UK, Belmont, CA.
3. Hobbs, M.B.E., Means, W.D. and Williams, P.F., 1976, *An Outline of Structural Geology*, New Jersey, USA, John Wiley & Sons.
4. Pollard, D.D. and Fletcher, R.C., 2005, *Fundamentals of Structural Geology*, England, Cambridge University Press.
5. Billings, M.P., 1972, *Structural Geology*, Delhi, Prentice Hall India.
6. Klein, C., Cornelius, S.H., and Dana, J.D., 1848, *Danas Manual of Mineralogy*, New Jersey, USA, John Wiley & Sons.
7. e-PG Pathshala: <https://epgp.inflibnet.ac.in>

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)

CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas

Field	Content/s
Employability	15
Entrepreneurship	15
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	2		
Nature of Course	Theory + Practical		
Name of the Course	Rocks and Minerals		
Course Code	26L4.5-MDC-GGY-201		
Course Type	MDC-2		
Course Level	100-199		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Acquire knowledge about identification of Minerals. CLO2: Understand the importance of various rock types. CLO3: Practical knowledge of Mineralogy and Petrology.		
	Theory	Practical	Total
Credits	2	1	3
Teaching Hours per week	2	2	4
Internal Assessment Marks	15	05	20
End Term Exam Marks	35	20	55
Max. Marks	50	25	75
Examination Duration (in hours)	02	02	
Part B- Contents of the Course			
Instructions for Paper- Setter: The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 7 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Mineral: definition, Origin and characteristics. Classification of minerals. Physical properties of minerals. Study of common rock forming minerals and uses of minerals. Earth Movements: Endogenetic and Exogenetic forces, Weathering, Erosion and their types. Folds and faults and their types.	CLO 1	15
II	Rocks: Definition of Rocks, Origin and formation of three different types of Rocks. Rock Cycle. Characteristics of 3 Major rock types and their differences. Significance of Rock.	CLO 2	15
III	Study of physical properties of minerals in hand specimen. Study of Major rocks in hand specimen. Study of models of deformational features of earth material, Models Other practical aspects of Mineralogy and Petrology.	CLO 3	30
	Total Contact Hours		60

Suggested Evaluation Methods					
Internal Assessment:20	TH-15	PR-5	End Term Examination: 55	TH-35	PR-20
Class Participation:	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar/Demonstration /Viva-voce/Lab records etc.:	NA	5	Written Examination	35	NA
Mid-Term Exam:	5	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location 1. Deer, W.A., Howie, R.A. and Zussman, J., <i>An Introduction to the rock forming minerals</i> , Delhi, Prentice Hall India. 2. Klein, C., Cornelius, S.H., and Dana, J.D., 1848, <i>Danas Manual of Mineralogy</i> , New Jersey, USA, John Wiley & Sons. 3. Putnis, A., 1992, <i>Introduction to Mineral Sciences</i> , England, Cambridge University press. 4. Condie, K.C., 1992, <i>Plate Tectonics & Crustal Evolution</i> , USA, Butterworth-Heinemann Ltd. 5. Phillips, W.R. and Griffen, D.T., 1986, <i>Optical Mineralogy</i> , New Delhi, CBS Publishers. 6. Phillips, F.C., 1977, <i>Introduction to crystallography</i> . London, Longman Group Publication. 7. e-PG Pathshala: https://epgp.inflibnet.ac.in 8. Best, M.G., 2003. <i>Igneous and Metamorphic Petrology</i> , Blackwell Science. 9. Vernon, R.H., and Clarke G. L. 2008. <i>Principles of Metamorphic Petrology</i> , Cambridge University Press. 10. 2nd Ed., Winter, J. D. <i>Introduction to Igneous and Metamorphic Petrology</i> . PrenticeHall India, 2010. 11. Pettijohn, F.J., (2004) <i>Sedimentary Rocks</i> , New Delhi, CBS Publishers. 12. <i>Depositional Sedimentary Environments</i> , Reineck and Singh, Springer. 13. Krumbein, W.C. and Pettijohn, F.J., D., (1938) <i>Manual of Sedimentary Petrography</i> , New York, Appleton Century.					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours Devoted
Employability	15
Entrepreneurship	00
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A - Introduction			
Name of Programme	UG (Geology)		
Semester	3		
Nature of Course	Theory + Practical		
Name of the Course	Earth Resources		
Course Code	26L4.5-MDC-GGY-301		
Course Type	MDC-3		
Course Level	UG (200-299)		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO1: Learn about the energy scenario, production, demand and consumption of important mineral resources in India. CLO2: Understand the process of formation of coal and petroleum resources of India. CLO3: Distribution of energy resources in India.		
	Theory	Practical	Total
Credits	2	1	3
Teaching Hours per week	2	2	4
Internal Assessment Marks	15	05	20
End Term Exam Marks	35	20	55
Max. Marks	50	25	75
Examination Duration (in hours)	02	02	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter:</u> The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 7 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
Unit	Topics	CLO/s Attempt	Contact Hours
I	Definition and Significance of Natural Earth Resources. Types of Natural resources. Geological resources: Metallic Mineral resources, Non-Metallic Mineral resources. Soil and Groundwater as Earth resources. Coal: Theory of origin of Coal and its types, Distribution of Coal deposits in India. Unconventional source of Energy.	CLO 1	15
II	Petroleum System: Origin, formation, Migration and trapping. Source rock, Reservoir rock, traps, natural gas as source of energy. Major oil and gas fields of India. Nuclear energy: Important atomic minerals and their characters, U and Th deposits of India, Peaceful uses of nuclear energy, nuclear environmental hazards.	CLO 2	15

III (Practical)	• Distribution of metallic and non-metallic mineral resources of India. • Distribution of Coal deposits in India. • Understanding of Petroleum system. • Distribution of Petroleum and Natural Gas deposits in India. • Distribution of Atomic Minerals in India.	CLO 3	30		
	Total Contact Hours		60		
Suggested Evaluation Methods					
Internal Assessment: 20 marks	TH-15	PR-5	End Term Examination: 55 marks	TH-35	PR-20
Class Participation:	5	0	Lab record	NA	05
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	05
Seminar/Demonstration/Viva-voce/Lab records etc.:	NA	5	Written Examination	35	NA
Mid-Term Exam:	5	NA	Write-up and execution of the practical	NA	10
Part C-Learning Resources					
Recommended Books/e-resources/LMS: Author, Year, title, Publisher, location					
1. Tissot, B.P. and Welte, D.H. (1984) <i>Petroleum formation and occurrence</i>, Springer-Verlag 2. Selley, R.C., (1998) <i>Elements of Petroleum Geology</i>, Academic Press. 3. Ward, C.R. (1984) <i>Coal Geology and Coal Technology</i>, Blackwell Scientific, Australia. 4. Kumarmangalam, S.M. (1973) <i>Coal Industry in India</i>, Oxford and IBH. 5. Levorsen, A. (1967). <i>Geology of Petroleum</i>, San Francisco: W.H. Freeman and Company. 6. Hunt, J.M., (1996). <i>Petroleum Geochemistry and Geology</i>, 2nd Edn, San Francisco: W.H. Freeman and Company. 7. North, F.K., (1985) <i>Petroleum Geology</i>, USA: Unwin Hyman (Pub.). 8. e-PG Pathshala: https://epgp.inflibnet.ac.in 9. CEC e-learning platform.					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours Devoted
Employability	15
Entrepreneurship	00
Skill Enhancement	30
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	
Gender	
Current Issues and Social Awareness	
Public policies	
Any Other	

Part A – Introduction			
Name of the Programme	UG (Geology)		
Semester	IV		
Nature of Course/Course Composition	Theory & Practical		
Nomenclature of the Course	Soil and Water Testing		
Course Code	26L5-VOC-GGY-401		
Course Type	CC-M4(V) VOC-1		
Course Level	200-299		
Pre-requisite for the course (if any)	NA		
Course Learning Outcomes (CLOs) After completing this course, the learner will be able to:	CLO1: Learn about basic concept Of soil and water. CLO2: Understand about types of soil and aquifers. CLO3: Learn the analysis of soil and water samples.		
	Theory	Practical	Total
Credits	2	2	4
Teaching hours per week	2	4	6
Internal Assessment Marks	15	15	30
End Term Exam Marks	35	35	70
Max. Marks	50	50	100
Examination Duration (in Hours)	02	02	
Part B- Contents of the Course			
<u>Instructions for Theory Paper-Setter</u>			
The paper setter shall prepare 5 questions selecting two questions from each of the two units with consideration given to the Course Learning Outcomes. Among these, question number 1 will be compulsory question comprising 7 short answer type questions carrying one mark each (total 07 marks) and covering the entire syllabus. The remaining questions will be carrying 14 marks each. Examinees will be required to attempt three questions: the compulsory question no. 1 and 1 question from the each of the two units.			
<u>Instructions for Practical Examiner</u>			
Write-up and execution of the practical will be conducted as per the nature of the practical by the external examiner, with consideration given to the Course Learning Outcomes.			
Unit	Topics	CLO Attempt	Contact Hours
I	Soil Science: Definition & formation, Components of Soil, Soil Profile and classification of soil. Distribution of different types of soil in India. Soil sample collection and purpose of soil testing and analysis, Important parameters of soil for its analysis.	CLO1	15
II	Water Science: Origin of water and hydrologic cycle. Distribution of water. Groundwater and its importance. Vertical distribution of Groundwater. Aquifer and its types. Important physical, chemical and biological parameters of water quality. BIS and WHO standards for drinking water.	CLO2	15
III (Practical)	1. Process of Soil sampling for analysis. 2. Preparation of soil sample. 3. Analysis of soil samples	CLO3	30
IV (Practical)	1. Process of water sampling. 2. Physico-chemical analysis of water. 3. Presentation and Interpretation of soil and water quality data.	CLO3	30

Total Contact Hours					90
Evaluation Methods					
Internal Assessment:30 marks	TH-15	PR-15	End Term Examination: 70 marks	TH-35	PR-35
Class Participation:	5	5	Lab record	NA	5
Seminar/presentation/assignment/quiz/class test etc.:	5	NA	Viva-Voce	NA	10
Seminar/Demonstration/Viva-voce/Lab records etc.:	NA	10	Written Examination	35	NA
Mid-Term Exam:	5	NA	Write-up and execution of the practical	NA	20
Part C-Learning Resources					
Recommended Books/Journals/ e-resources/ Learning Management Systems (LMS):					
1. Raghunath, H. M. (2006). <i>Hydrology: Principles, analysis and design</i> (2nd ed.). New Age International. 2. Trivedi, P. C. (Ed.). (2008). <i>Pollution and bioremediation</i>. Pointer Publishers. 3. Tan, K. H. (1996). <i>Soil sampling, preparation, and analysis</i>. Marcel Dekker. 4. Pelczar, M. J., Chan, E. C. S., & Krieg, N. R. (1986). <i>Microbiology</i> (5th ed.). McGraw-Hill. 5. Bureau of Indian Standards. (2012). <i>Drinking water — Specification</i> (IS 10500:2012). 6. World Health Organization. (2022). <i>Guidelines for drinking-water quality: Small water supplies</i> (4th ed.). 7. SWAYAM & NPTEL: <i>Soil Science and Technology</i> (IIT Kharagpur) – Covers physical/chemical analysis, continuous sampling, and sensors. <i>Water Quality Management Practices</i> – Focuses on sampling protocols, analytical methods, and water chemistry parameters. 8. e-PG Pathshala & e-GyanKosh (IGNOU): Search under Environmental Sciences and Agriculture modules for downloadable open-access PDFs, laboratory manuals, and video lectures on soil testing techniques and water quality parameter analysis. 9. ICAR e-Course Portal: Open-access courseware covering practical soil chemistry, fertility evaluation, and irrigation water quality standards.					

Mapping of Course Learning Outcomes (CLOs) to Program Learning Outcomes (PLOs)											
CLOs	PLO ₁	PLO ₂	PLO ₃	PLO ₄	PLO ₅	PLO ₆	PLO ₇	PLO ₈	PLO ₉	PLO ₁₀	PLO ₁₁
CLO ₁	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₂	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0
CLO ₃	3.0	3.0	2.0	1.0	3.0	1.0	3.0	3.0	3.0	2.0	2.0

Content Mapping with NEP thrust areas	
Field	Hours devoted
Employability	15
Entrepreneurship	15
Skill Enhancement	15
Communication Development	15
Indian Knowledge System	
Environmental Awareness/SDGs	15
Gender	
Current Issues and Social Awareness	15
Public policies	
Any Other	