

Kurukshetra University, Kurukshetra

(Established by the State Legislature Act-XII of 1956)

("A++" Grade, NAAC Accredited)



Syllabus of the Programme for Post Graduate Programme

M.Sc. Applied Geology

as per NEP 2020

Curriculum and Credit Framework for Postgraduate Programme

With Multiple Entry-Exit, Internship and CBCS-LOCF

With effect from the session 2024-25 (in phased manner)

DEPARTMENT OF GEOLOGY
FACULTY OF SCIENCE

KURUKSHETRA UNIVERSITY, KURUKSHETRA -136119
HARYANA, INDIA



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

1152

Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	I		
Name of the Course	Fundamentals of Geology-I		
Course Code	M24-GGY-101		
Course Type	CC-1		
Level of the course	400-499		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 101.1: Know about the basics of geology, its related disciplines and its relation with mankind. CLO 101.2: Gain knowledge about the basics of mineralogy and petrology. CLO 101.3: Identify and classify rocks and minerals based on various physical properties and know the basics of structural Geology. CLO 101.4: Gain knowledge regarding the basics of surveying instruments and the techniques applicable in the field.		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.			
Unit	Topics		Contact Hours
I	Earth science: its subdivisions and relation to other sciences. Historical development of geological thoughts. Geo-morphological processes: exogenic processes, weathering, erosion, transportation and deposition by wind, river, glacier, waves and tides.		15
II	Chemical nature of minerals. Isomorphism, solid solution and Polymorphism. Physical properties of minerals, classification of minerals. Common rock forming and ore minerals. Rock cycle. Texture, structure, mineralogy and classification of igneous rocks. Sedimentary rocks and their texture, mineralogy and classification. Texture, structures, mineralogy and classification of metamorphic rocks. Metamorphic facies.		15
III	Primary and secondary structures in rocks, stress and strain, behaviour of rocks under stress. folds, faults, joints and unconformities- their definition, classification and criteria for recognition in the field and on maps. Shear zones, transform faults, and lineaments. Elementary idea about Engineering Geology and its significance, geological materials used in construction.		15

IV	Principles of surveying and leveling, methods of surveying by chain, plane table, compass, dumpy level, theodolite and total station. Use of field instruments such as Pocket compass, Prismatic compass, Clinometer compass, Brunton compass, Abney level, Pedometer and Altimeter. Indexing and reading of toposheets.		15
Total Contact Hours			60
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Theory	30	➤ Theory:	70
• Class Participation:	5	Written Examination	
• Seminar/presentation/assignment/quiz/class test etc.:	10		
• Mid-Term Exam:	15		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>Understanding the Earth</i> , Press, F. and Siever, R., W.H. Freeman & Co.			
2. <i>Physical Geology</i> , Moore, J.S. and Wicander, R., Brooks-Cole.			
3. <i>An Outline of Structural Geology</i> , Hobbs, M.B.E., Means, W.D. and Williams, P.F., John Wiley & Sons.			
4. <i>Structural Geology: An Introduction to Geometrical Techniques</i> , Ragan, D.M., John Wiley & son.			
5. <i>Fundamentals of Structural Geology</i> , Pollard, D.D. and Fletcher, R.C., Cambridge University Press.			
6. <i>Structural Geology</i> , Billings, M.P., Prentice Hall India.			
7. <i>Danas Manual of Mineralogy</i> , Klein, C., Cornelius, S.H., and Dana, J.D., John Wiley & Sons.			
8. <i>An Introduction to the Rock-Forming Minerals</i> , Deer, W.A., Howie, R.A. and Zussman, J., ELBS and Longman.			
9. <i>Rutley's Elements of Mineralogy</i> , Read, H.H., Springer.			
10. <i>Introduction to Mineral Sciences</i> , Putnis, A., Cambridge University press.			
11. <i>Igneous and Metamorphic Petrology</i> , Best, M.G., Blackwell.			
12. <i>Igneous and metamorphic petrology</i> , Turner, F.J. and Verhoogen, J., CBS Publishers.			
13. <i>Igneous Petrology</i> , Best, M.G., CBS Publishers.			
14. <i>Igneous Petrogenesis</i> , Wilson, M., Springer.			
15. <i>Igneous Petrology</i> , Bose, M.K., World Press.			
16. <i>An Introduction to Metamorphic Petrology</i> , Yardley, B.W.D., Longman series, Prentice Hall.			
17. <i>Surveying, Volume I</i> , Punmia, B.C. and Jain, A., Laxmi publications (P) Ltd.			
18. <i>Surveying and Leveling, Part I</i> , Kanetkar, T.P. and Kulkarni, S.V., Pune Vidyarthi Griha Prakashan, Pune.			
19. <i>Surveying, Volume II</i> , Punmia, B.C., Laxmi Publications (P) Ltd.			
20. <i>Surveying and leveling, Part II</i> , Kanetkar, T.P. and Kulkarni, S.V., Pune Vidyarthi Griha Prakashan, Pune.			



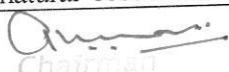
Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	I		
Name of the Course	Fundamentals of Geology-II		
Course Code	M24- GGY-102		
Course Type	CC-2		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 102.1: Understand different types of fossils and their various uses to mankind. CLO 102.2: Get to know about the geological time scale and stratigraphic division of India. CLO 102.3: Provide knowledge regarding various types of deposits of ores, petroleum and coal, their distribution and usefulness to mankind. CLO 102.4: Understand the basics and importance of sustainable development and environmental geology to society.		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course-learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Fossils, fossilization processes (taphonomy), modes of preservation, index fossils. Geological time scale, life through geological past, major mass extinctions in the geological past and significance of fossils.	15
II	Broad outline of physiographic and tectonic framework of India. Stratigraphic principles, introduction to lithostratigraphy, biostratigraphy, chronostratigraphy and magnetostratigraphy.	15
III	Classification of ore deposits, igneous, metamorphic and sedimentary processes of formation of ore deposits, hydrothermal process, supergene enrichment, evaporites and anoxic deposits, stratified and strata-bound deposits etc. Concept of ore, gangue, tenor, grade and specifications. Distribution and geological set up of important metallic and non-metallic mineral deposits of India including coal, petroleum and atomic minerals.	15
IV	Basic principles of environment and ecosystem in relation to Geology. Anthropogenic activities and their impact on the environment. Depleting natural resources and sustainable development, conservation of mineral	15


Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

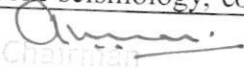
1155

resources, mitigation of pollution and environmental hazards and geogenic contamination of groundwater.			
Total Contact Hours			60
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Theory	30	➤ Theory:	70
• Class Participation:	5	Written Examination	
• Seminar/presentation/assignment/quiz/class test etc.:	10		
• Mid-Term Exam:	15		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>Geology of India and Burma</i> , Krishnan, M. S. CBS Publishers.			
2. <i>Palaeontology</i> , Jain, P.C. and Anantharaman, M.S., Vishal Publishing Co.			
3. <i>Economic mineral deposits</i> , Bateman, A.M., Jensen, M.L., John Wiley and Sons.			
4. <i>Ore Deposits of India</i> , Gokhale and Rao, Thomson Press, Delhi.			
5. <i>India's mineral resources</i> , Krishnaswami S., New Delhi, Oxford and IBH Pub. Co.			
6. <i>Handbook of minerals, Crystals, Rocks and Ores</i> , Parmod, A.O., New India Publishing Agency.			
7. <i>Economic Geology – Economic Mineral Deposits of India</i> , Prasad, U., CBS Publishers.			
8. <i>Natural Disasters</i> , Alexander, D. UCL Press Ltd, Univ College London.			
9. <i>Mitigation of Natural hazards and disasters: international perspectives</i> , Haque, C. Emdad., Dordrecht, Springer.			
10. <i>Environmental Geosciences</i> , Keller, E.A., Prentice Hall, New Jersey.			
11. <i>Fundamental of Historical Geology and Stratigraphy</i> , Kumar Ravinder., New Age International Publishers.			



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	I		
Name of the Course	Physics and Chemistry of the Earth		
Course Code	M24-GGY-103		
Course Type	CC-3		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	<p>CLO 103.1: Know about the Earth and its relation to other planets. Importance of Earth science to mankind.</p> <p>CLO 103.2: Acknowledge earth's interior and the dynamic processes of Earth.</p> <p>CLO 103.3: Understand the concept of Earth's magnetic field and its application.</p> <p>CLO 103.4: Understand tectonic evolution of the Himalayas and the Indian shield the significance of geochronology, dating techniques.</p>		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.			
Unit	Topics		Contact Hours
I	Theories of origin of Earth: Catastrophic and evolutionary theories. Brief review of knowledge about the solar system. Abundance of the elements in the solar system and earth. The Earth in relation to other planets and major surface features of the Earth. The Earth-Moon system.		15
II	The Earth's interior: the nature of the crust-mantle boundary, low velocity zone in the upper mantle, chemical composition and mineralogy of the Earth's crust, mantle and core, evidence from experimental petrology & study of meteorites, geochemical evolution of the Earth, thermal evolution and state of Earth, continental and oceanic heat flow and convection in mantle.		15
III	Earthquakes, global seismicity, Earth's internal structure derived from seismology, continental drift, earth's magnetic field,		15


 Chairperson
 Department of Geology,
 Kurukshetra University,
 Kurukshetra-136119.

1157

	origin of geomagnetic fields, paleomagnetism, polar wandering, sea-floor spreading, plate tectonics, triple junctions, hot spots & plumes.	
IV	Major features of the Earth's gravitational field and their relationship with tectonic processes in crust and upper mantle. Geochronology: radiometric dating and its significance, mountain belts and new global tectonics, tectonic evolution of the Himalaya and the Indian shield.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
➤ Theory	30	➤ Theory: 70
• Class Participation:	5	Written Examination
• Seminar/presentation/assignment/quiz/class test etc.:	10	
• Mid-Term Exam:	15	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. <i>The Solid Earth</i> , Fowler, C.M.R., Cambridge University Press, New York,		
2. <i>Understanding Earth</i> , Gauss, I.G., Smith, P.S. and Wilson, R.G.L., MIT Press.		
3. <i>The Dynamic earth - A textbook in Geosciences</i> , Wyllie, P.J., Wiley.		
4. <i>Physics and Geology</i> , Jacobs, J.J., Russel, R.D. and Wilson, J.T., McGraw Hill.		
5. <i>Fundamental of Geodynamics</i> , Schiedegger, A.E., Springer.		
6. <i>Aspects of tectonics: focus on south-central Asia</i> , Valdiya, K.S., Tata Mc Graw Hill.		
7. <i>The Inaccessible Earth</i> , Brown, G.C. and Mussett, A.E., Chapman and Hall.		
8. <i>Understanding the Earth</i> , Brown, J., Hawkesworth, C., and Wilson, C., Paperback, Book Depository, U.S.A.		
9. <i>Earth</i> , Siever, R., Frank Press.		
10. <i>Plate Tectonics & Crustal Evolution</i> , Condie, K.C., Butterworth-Heinemann Ltd.		



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25**Part A - Introduction**

Name of Programme	M.sc Applied Geology		
Semester	I		
Name of the Course	Mineralogy and Crystallography		
Course Code	M24-GGY-104		
Course Type	CC-4		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 104.1: Understand crystal systems CLO 104.2: Recognize optical properties of various mineral groups and its application in various geological techniques. CLO 104.3: Know about mineral optics and structure. CLO 104.4: Learn about crystallography and to infer the environment of formation of minerals.		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Crystals: Definition, elements of symmetry, notations-Weiss and miller, space lattice. Morphological classification of crystals into systems and symmetry classes (Holoohedral classes). Twinning in crystals. Projections in crystals - spherical, stereoscopic, and gnomonic.	15
II	Pleochroic scheme of minerals. Extinction phenomenon: Extinction angle and its determinations. Interference phenomenon, order of interference colors and figures, Uniaxial and biaxial minerals: optical indicatrix. Optic sign.	15
III	Structure of silicate minerals: neso-, soro-, cyclo-, iono-, phyllo- and tecto-silicates and their bearing on properties of minerals. Study of the following mineral groups/minerals with reference to structure, PT - stability, physical, chemical, and optical properties, and their mode of occurrence: quartz, feldspar, feldspathoid, pyroxene, amphibole, olivine, mica, clay minerals, garnet, alumino-silicates, staurolite, epidote, zircon, sphene, zeolite, carbonate, and phosphates.	15
IV	Crystal defects (point, line and planar), Basic concepts of mineral stability with emphasis on solid solution, exsolution and ordering. Crystal chemistry involving atomic substitution (simple, coupled) and solid solution between different end members.	15
Total Contact Hours		60

Signature
Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

1159

Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Theory	30	➤ Theory:	70
• Class Participation:	5	Written Examination	
• Seminar/presentation/assignment/quiz/class test etc.:	10		
• Mid-Term Exam:	15		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>An Introduction to the rock forming minerals</i> , Deer, W.A., Howie, R.A. and Zussman, J., Prentice Hall.			
2. <i>Manual of Mineralogy</i> , Klein, C. and Hurlbut, Jr.C. S., John Wiley.			
3. <i>Introduction to Mineral Sciences</i> , Putnis, A., Cambridge University press.			
4. <i>Mineralogical phase equilibria and Pressure-Temperature-Time paths</i> , Spear, F.S., Mineralogical Society of America Publication.			
5. <i>Optical Mineralogy</i> , Phillips, W.R. and Griffen, D.T., CBS publishers.			
6. <i>Introduction to crystallography</i> . Phillips, F.C., Longman Group Publication.			
7. <i>Dana's textbook of Mineralogy</i> , Ford, W.E., Wiley Eastern.			
8. <i>Rutley's Elements of Mineralogy</i> , Read, H.H., CBS publishers.			
9. <i>Mineralogy</i> , Berry, Mason and Dietrich, CBS publishers.			
10. <i>Optical Mineralogy</i> , Kerr, P.F., McGraw Hill.			
11. <i>Elements of Optical Mineralogy I & II</i> , Winchell, A.N. Read Books.			
12. <i>Practical Manual of crystal optics</i> , Babu, S.K. and Sinha, D.K., CBS Publishers.			
13. <i>Mineral optics</i> , Phillips, R.W., Freeman & Company, USA			



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of the Programme	M.Sc. Applied Geology		
Semester	I		
Name of the Course	Geology Lab-I (Practical based on M24- GGY-101, M24- GGY-102 & Field Work)		
Course Code	M24-GGY-105		
Course Type	PC-1		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 105.1: Get practical knowledge about fundamental and applied aspects of the petrology, palaeontology, structural geology and surveying. CLO 105.2: Preparation of geological cross sections of basic geological maps. CLO 105.3: Get field exposures where they can identify minerals, rocks, structures & their geological observations. CLO 105.4: Do the basic geological mapping in the field.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours (or as decided by PGBOS)	
Part B- Contents of the Course			
Practicals			Contact Hours
1.	Megascopic properties of important rocks in hand specimen.		120
2.	Elementary exercises relevant to recognition of folds, faults and unconformities on maps and in models. Preparation of geological cross sections from Geological Maps.		
3.	Megascopic study of important fossils. Study of important stratigraphic rocks in relation to Geological time and mineral deposits.		
4.	Preparation of site plans with the help of chain, tape and plane table. Profiling using dumpy level and determination of height using theodolite. Use of field instruments viz., clinometer, brunton, prismatic compass, abney level, altimeter and pedometer. Study of Toposheets, contour maps and total station.		
5.	The following activities will be performed by the students during about one-week Geological Field work and have to submit Field Work Report. a) Sampling. b) Identification of Minerals, Rocks and Structures. c) Preparation of Geological Maps. d) Measurement of Structural Features. e) And other Geological observations.		

Head of Department,
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

pg. 9

1161

Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
• Class Participation:	5	Lab record, Viva-Voce, write-up, execution of the practical, Field work and Field Report.	
• Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
• Mid-Term Exam:	15		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>An Outline of Structural Geology</i> , Hobbs, M B.E., Means, W.D. and Williams, P.F., John Wiley & Sons.			
2. <i>Ore Deposits of India</i> , Gokhale and Rao, Thomson Press, Delhi.			
3. <i>Rutley's Elements of Mineralogy</i> , Read, H.H., Springer.			
4. <i>Surveying Volume I</i> , Punmia, B.C. and Jain, A., Laxmi publications (P) Ltd.			
5. <i>Surveying Volume 2</i> , Punmia, B.C., Laxmi Publications (P) Ltd.			
6. <i>India's Mineral Resources</i> , Krishnaswami S., New Delhi, Oxford and IBH Pub. Co.			
7. <i>A Handbook of minerals, Crystals, Rocks and Ores</i> , Parmod, A.O., New India Publishing Agency.			
8. <i>Field Geology</i> , Lahee, F. H., CBS Publisher.			
9. <i>Introduction To Geological Structures and Maps</i> , George M. Bennison, Routledge.			



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25

Part A - Introduction

Part A - Introduction			
Name of the Programme	M.Sc. Applied Geology		
Semester	I		
Name of the Course	Geology Lab-II (Practical based on M24- GGY-103 & M24- GGY-104)		
Course Code	M24-GGY-106		
Course Type	PC-2		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 106.1: Gain the practical knowledge about the Physics and Chemistry of the Earth. CLO 106.2: Study and interpret geochemical and geophysical data. CLO 106.3: Understand crystal systems, study of optical properties of various mineral groups, megascopic study of minerals and ore minerals. CLO 106.4: Identify and classify minerals and ore minerals.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours (or as decided by PGBOS)	
Part B- Contents of the Course			
			Contact Hour

Part B- Contents of the Course

Practicals		Contact Hours
<ol style="list-style-type: none"> Study and interpretation of geochemical data. To draw the internal structure of the Earth, and to demarcate the boundaries of crust, mantle and core. To draw the seismic maps of India by free hand and its interpretations in context of the geotectonic. To draw the tectonic evolution map of Himalaya and explain its different tectonic divisions. Understanding of crystal systems by using geological models. Identification of physical properties of different minerals and to categorized them in groups. Identification of optical properties of various minerals in plane polarized and crossed nicols. 		120

Suggested Evaluation Methods

Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
• Class Participation:	5	Lab record, Viva-Voce, write-up and execution of the practical	
• Seminar/Demonstration/Viva-voce/Lab records etc.:	10		
• Mid-Term Exam:	15		

[Signature]
 Chairman
 Department of Geology,
 Kurukshetra University,
 Kurukshetra-136119.

1163

Part C-Learning Resources

1. *Understanding Earth*, Gauss, I.G., Smith, P.S. and Wilson, R.G.L., MIT Press.
2. *The Dynamic earth - A textbook in Geosciences*, Wyllie, P.J., Wiley.
3. *Physics and Geology*, Jacobs, J.J., Russel, R.D. and Wilson, J.T., McGraw Hill.
4. *Fundamental of Geodynamics*, Schiedegger, A.E., Springer.
5. *An Introduction to the rock forming minerals*, Deer, W.A., Howie, R.A. and Zussman, J. Longman., Prentice Hall.
6. *Manual of Mineralogy*, Klein, C. and Hurlbut, Jr. C.S., John Wiley.
7. *Introduction to Mineral Sciences*, Putnis, A., Cambridge University press.
8. *Optical Mineralogy*, Phillips, W.R. and Griffen, D.T., CBS publishers.
9. *Laboratory handbook of petrographic techniques*, Hutchinson, C.S., John Wiley.



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25	
Name of the Programme	M.Sc. Applied Geology
Semester	I
Name of the Course	Seminar
Course Code	M24-GGY-107
Course Type: (CC/DEC/PC/Seminar/CHM/OEC/EEC)	Seminar
Level of the course	400-499
Course Learning Outcomes(CLO) After completing this course, the learner will be able to:	CLO 107.1: Prepare the power point presentation in an effective manner and to improve presentation skill. CLO 107.2: Improve communication skills and also discussion and questioning during the presentation will boost the knowledge and confidence level.
Credits	Seminar 2
Teaching Hours per week	2
Max. Marks	50
Internal Assessment Marks	0
End Term Exam Marks	50
Examination Time	1 hour
Instructions for Examiner: Evaluation of the seminar will be done by the internal examiner(s) on the parameters as decided by staff council of the department. There will be no external examination/viva-voce examination.	



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25

Part A - Introduction

Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Palaeontology and Stratigraphy		
Course Code	M24- GGY-201		
Course Type	CC-5		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 201.1: Understand different types of fossils and their various uses to mankind. CLO 201.2: Get to know about the geological time scale and stratigraphic division of India CLO 201.3: Provide knowledge regarding various types of deposits of ores, petroleum and coal, their distribution and usefulness to mankind. CLO 201.4: Understand the basics and importance of sustainable development and environmental geology to society.		
Credits	Theory	Practical	Total
Teaching Hours per week	4	0	4
Internal Assessment Marks	4	0	4
End Term Exam Marks	30	0	30
Max. Marks	70	0	70
Examination Time	100	0	100
	3 hours		
Part B - C			

Part B- Contents of the Course

Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.

Unit	Topics	Contact Hours
I	Vertebrate Palaeontology: Evolution of horse, elephant and man. Invertebrate Palaeontology: Functional morphology and geological history of Brachiopods, Mollusca, Trilobites, Echinoderms and Graptolites. Palaeobotany: General classification of plant kingdom, morphology and classification of Gondwana flora.	15
II	Micropalaeontology: Sampling and sample preparation techniques for microfossils. Morphology, classification, ecology and stratigraphic distribution of Ostracoda, Foraminifera, Conodonts, Radiolarians, Silicoflagellates, and Chitinozoans. Palynology, morphology of Spores and pollen. Application of Microfossils.	15
III	Code of stratigraphic nomenclature, stratigraphic correlation, cyclo-stratigraphy, pedo-stratigraphy, brief introduction to the concepts of sequence stratigraphy. Precambrian Stratigraphy: Dharwar, Cuddapah, Vindhyan and Delhi supergroups.	15

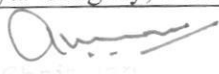

Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119. 1166

IV	Paleozoic stratigraphy: Spiti and Kashmir. Mesozoic Stratigraphy: Gondwana Supergroup, Deccan Traps, Triassic of Spiti, Jurassic of Kutch, Cretaceous of Trichinopoly. Mesozoic stratigraphy (Spiti, Kutch, and Narmada Valley. Cenozoic stratigraphy of Shimla Himalayas: Siwaliks, Subathu, Dagshai and Kasauli. Indo Gangetic alluvial plains.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
➤ Theory	30	➤ Theory: 70
• Class Participation:	5	Written Examination
• Seminar/presentation/assignment/quiz/class test etc.:	10	
• Mid-Term Exam:	15	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. <i>Palaeontology</i> , Jain, P.C. and Anantharaman, M.S., Vishal Publishing Co.		
2. <i>Essentials of paleobotany</i> . Shukla, A. C., & Misra, S. P., Vikas Publisher.		
3. <i>Invertebrate Palaeontology and Evolution</i> , Clarkson, E.N.K., Blackwell.		
4. <i>Palaeontology- The record of life</i> , Stearn, C.W. & Carroll, R.L., John Wiley.		
5. <i>Bringing Fossils to Life- An introduction to Palaeobiology</i> , Prothero, D.R., McGraw Hill.		
6. <i>Foraminifera</i> , Haynes, J.R., John Wiley.		
7. <i>Elements of Micropalaeontology</i> , Bignot, G., Graham and Trotman, Springer.		
8. <i>Introduction to Microfossils</i> , Jones, D.J., Hafner Publishing Co Ltd.		
9. <i>Microfossils</i> , Brasier, M. and Armstrong, H., Wiley Blackwell.		
10. <i>Invertebrate Fossils</i> , Moore, Lalicker and Fischer, McGraw Hill.		
11. <i>Principles of Invertebrate Palaeontology</i> , Shrock and Twenoffel, CBS Publishers.		
12. <i>Essentials of Palynology</i> , Nair, P.K.K., Asia Pub. House.		
13. <i>Palaeontology Invertebrate</i> , Woods, H., CBS Publishers.		
14. <i>Vertebrate Palaeontology</i> , Ramer, A.S., Univ. of Chicago Press.		
15. <i>Precambrian Geology: The Dynamic Evolution of Continental Crust</i> , Goodwin, A.M., Academic Press.		
16. <i>Principles of Sedimentology and Stratigraphy</i> , Boggs, Sam Jr., Prentice Hall.		
17. <i>Precambrian Geology of India</i> , Naqvi, S.M. and Rogers, J.J.W., Oxford Univ. Press.		
18. <i>Geology of India and Burma</i> , Krishnan, M. S., CBS Publishers.		
19. <i>Geology of India</i> , Wadia, D.N., Alpha Edition.		
20. <i>Fundamental of Historical Geology and Stratigraphy</i> , Kumar Ravinder., New Age International Publishers.		
21. https://egyankosh.ac.in/bitstream/123456789/69603/1/Block-2.pdf		
22. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000014ER/P000274/M027511/ET/1519204012paper4module_37_etext.pdf		



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Structural Geology and Tectonics		
Course Code	M24-GGY-202		
Course Type	CC-6		
Level of the course	400-499		
Pre-requisite for the course (if any)	Nil		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 202.1: Learn the concept and tectonics of deformation structures. CLO 202.2: Know the Kinematics of deformed structures and its significance. CLO 202.3: Learn the concept of petrofabric analysis and relationship between crystallization and deformation. CLO 202.4: Understand Himalayan Orogeny, various Map projections and its applicability in field and to the society.		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		
Part B- Contents of the Course			
Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.			
Unit	Topics	Contact Hours	
I	Mechanical principles and properties of rocks and their controlling factors. Theory of rock failure. Concept of stress and strain and their relationships of elastic, plastic and viscous materials. Strain markers in naturally deformed rocks. Behavior of minerals and rocks under deformation.	15	
II	Fold: mechanics of folding and buckling. Fractures and joints: their nomenclature, age relationship, origin and significance. Causes and dynamics of faulting. Strike-slip faults, normal faults, reverse faults and thrusts, overthrust, nappe, klippe and window. Planar and linear fabrics in deformed rocks, classification and significance. Structural behavior of diapirs and salt domes.	15	
III	Concept of petro-fabrics and symmetry: objective, field and laboratory techniques. Types of fabrics. Time relationship between crystallization and deformation.	15	
IV	Major tectonic division of Himalaya. Collision of India with Asia. Evolution of Volcanic Island Arc. Indus-Suture Zone. Emergence and evolution of Himalaya. Orogeny, Fore arc basin and Back arc basin. Study	15	


Chairperson
Department of Geology,
Kurukshetra University,
Kurukshetra-136119. 1168

of stereographic projection.		Total Contact Hours		60
Suggested Evaluation Methods				
Internal Assessment: 30			End Term Examination: 70	
➤ Theory	30	➤ Theory:	70	
• Class Participation:	5	Written Examination		
• Seminar/presentation/assignment/quiz/class test etc.:	10			
• Mid-Term Exam:	15			
Part C-Learning Resources				
Recommended Books/e-resources/LMS:				
1. <i>Folding and Fracturing of Rocks</i> , Ramsay, J.G., McGraw Hill.				
2. <i>An outline of Structural Geology</i> , Hobbs, B.E., Means, W.D. and Williams, P.F., John Wiley.				
3. <i>Structural Geology of Rocks and Region</i> , Davis, G.R., John Wiley.				
4. <i>Modern Structural Geology, Volume I & II</i> , Ramsay, J.G. and Hubber, M.I., Academic Press.				
5. <i>Analysis of Geological Structures</i> , Price, N.J. and Cosgrove, J.W., Cambridge Univ. Press.				
6. <i>Structural Geology Fundamentals of Modern Developments</i> , Ghosh, S.K., Pergamon Press.				
7. <i>Geological Structures and Moving Plates</i> , Park, R.G., Springer science + Business Media Dordrecht.				
8. <i>Global Tectonics</i> , Keary, P. and Vine, F.J., Blackwell.				
9. <i>Dynamic Himalaya</i> , Valdiya, K.S., Universities press, Hyderabad.				
10. <i>Geomorphology and Global Tectonics</i> , Summerfield, M.A., Springer Verlag.				
11. <i>Mechanics in Structural Geology</i> , Bayly, B., Springer Verlag.				
12. <i>Micro-tectonics</i> , Passchier, C.W. and Trouw, R.A.J., Springer Berlin, Heidelberg.				
13. <i>Aspects of Tectonics: Focus on South-Central Asia</i> , Valdiya, K.S., Tata Mc Graw Hill Pub. Co.				



Chairman
Department of Geology,
Jawahar Education University,
Chennai - 600 017.


Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Environmental Geology		
Course Code	M24-GGY-203		
Course Type	CC-7		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 203.1: Understand ecology and their inter-relationship with mankind. CLO 203.2: Learn about water quality and waste management. CLO 203.3: Get knowledge regarding Natural resources and their conservation. CLO 203.4: Comprehend environmental impact assessment and knowledge of environmental laws.		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		
Part B-Contents of the Course			
Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.			
Unit	Topics	Contact Hours	
I	Components of environment, ecology and ecosystem. Interactions between atmosphere, hydrosphere, lithosphere, biosphere and man. Principles of environmental geology and ethics of conservation. Atmosphere: Increasing trend of CO ₂ and other greenhouse gases. Fossil fuel burning, ozone layer depletion and global warming. Smog pollution, acid rains, causes and remedies. Other causes of pollution.	15	
II	Hydrologic cycle and Earth's water balance. Pollution of surface and subsurface water. Water quality criteria for domestic and industrial use. Water quality degradation due to use of fertilizers, pesticides and geogenic causes. Hydro-geologic considerations for liquid waste disposal. Hydrologic implications of solid waste disposals. Waste (solid, liquid, gases) management and control.	15	
III	Natural resources of Earth and their depletion. Land degradation due to natural hazards. Land conservation and land use planning. Watershed management, impact of irrigation - water logging and soil degradation. Energy minerals and their conservation, non-conventional sources of energy,	15	

	nuclear waste and its disposal.		
IV	Types of microorganisms. Role of sulfur, nitrogen and iron bacteria in the environment. Biogeochemistry of iron, manganese and sulfur. Marine pollution- causes and controls. Environmental impact assessment – impact of mining on environment, environmental health and environmental law in India.	15	
Total Contact Hours		60	
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Theory	30	➤ Theory:	70
• Class Participation:	5	Written Examination	
• Seminar/presentation/assignment/quiz/class test etc.:	10		
• Mid-Term Exam:	15		
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>Environmental geology</i> , Lindgren, L., Prentice Hall.			
2. <i>Environmental geology</i> , Keller, E. A., Pearson.			
3. <i>Organic micro-pollutants in the aquatic environment</i> , Angeletti, G., Springer Science Business Media.			
4. <i>Environmental Geoscience: Interaction between natural systems and man</i> , Strahler, A. N. and Strahler, A. H., John Wiley and Sons Inc.			
5. <i>Water pollution</i> , Tripathi, A. K. and Panday, S. N., CBS publishers.			

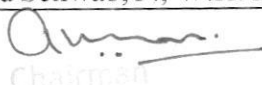


Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Sedimentology and Geomorphology		
Course Code	M24-GGY-204		
Course Type	CC-8		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	<p>CLO 204.1: Understand sedimentary rocks, structures, environments of sedimentation and sedimentary facies in nature.</p> <p>CLO 204.2: Understand characteristics of various sedimentary environments and palaeo-current analysis.</p> <p>CLO 204.3: Know about Field and laboratory methods to study and analyze sedimentary rocks.</p> <p>CLO 204.4: Know about Fundamental concepts of geomorphology and their application in society.</p>		
Credits	Theory	Practical	Total
	4	0	4
Teaching Hours per week	4	0	4
Internal Assessment Marks	30	0	30
End Term Exam Marks	70	0	70
Max. Marks	100	0	100
Examination Time	3 hours		
Part B- Contents of the Course			
<p>Instructions for Paper- Setter: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs) into consideration. The compulsory question (Question No. 1) will consist at least 4 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question. All questions will carry equal marks.</p>			
Unit	Topics		Contact Hours
I	Concept of size, size classification of sedimentary aggregates, causal factors of grain size distribution: provenance, transportation and depositional processes, shape, roundness, porosity and permeability. Sedimentary structures. Maturity of sediments: lithification and diagenesis. Facies.		15
II	Conglomerate types: ortho, para, intraformational. Sandstone types: feldspathic and arkose, lithic, wackes and quartz arenites. Shales and clays. Classification of sandstones. Sedimentological characteristics of fluvial, glacial and aeolian environments. Provenance of sediments, paleocurrent analysis.		15
III	Size analysis of sediments by sieving method, staining technique, X-ray and DTA analysis of clays, heavy mineral analysis and its significance. Application of sedimentary petrology to science, industry and technology. Active tectonic studies of sedimentary basins. Paleochannels of the ancient Saraswati and Drishadvati river systems and their geological significance.		15


 Chairman
 Department of Geology,
 Kurukshetra University,
 Kurukshetra-136119.

IV	Fundamental concepts of geomorphology, base level erosion and peneplanation, cycle concept, rejuvenation and interruption of geomorphic cycle. Climate and geomorphic processes. Factors governing evolution of landforms. Influence of structure and lithology on drainage. Application of geomorphology in civil engineering and strategic terrain evaluation.	15
Total Contact Hours		60
Suggested Evaluation Methods		
Internal Assessment: 30		End Term Examination: 70
➤ Theory	30	➤ Theory: 70
• Class Participation:	5	Written Examination
• Seminar/presentation/assignment/quiz/class test etc.:	10	
• Mid-Term Exam:	15	
Part C-Learning Resources		
Recommended Books/e-resources/LMS:		
1. <i>Sedimentary Rocks</i> , Pettijohn, F.J., CBS publishers.		
2. <i>Depositional Sedimentary Environments</i> , Reineck and Singh, Springer.		
3. <i>Manual of Sedimentary Petrography</i> , Krumbein, W.C. and Pettijohn, F.J., D. Appleton Century, New York.		
4. <i>Principles of Sedimentary deposits: Stratigraphy and Sedimentology</i> , Friedman, Gerald and Sanders, Macmillan USA.		
5. <i>Introduction of Sedimentology</i> , Shelly, R.C., Academic Press.		
6. <i>Petrography of Sedimentary rocks</i> , Folk, R.L., Hemphill Pub. Co.		
7. <i>Procedures in Sedimentary environments</i> , Carver, R.F., New York, Wiley Interscience.		
8. <i>Palaeocurrent and Basin analysis</i> , Pettijohn and Potter, Springer.		
9. <i>Sedimentology</i> , Mclane, M., OUP USA.		
10. <i>Petrology of the Sedimentary rocks</i> , Greensmith, J.T., Springer.		
11. <i>Applications of Sedimentology</i> , Trask, scholarly article.		
12. <i>Sequence in Layered rocks</i> , Shrock and Robert, R., McGraw Hill.		
13. <i>Introduction to Sediment analysis</i> , Rouse, F., Arizona State Univ.		
14. <i>Principles of Geomorphology</i> , Thornbury, W.D., CBS Publishers.		
15. <i>Introduction to Sedimentology</i> , Sengupta, S., Oxford and IBH.		
16. <i>Sand and Sandstone</i> , Pettijohn, F.J., Potter, P.E. and Siever, R., Springer Verlag.		
17. <i>Introduction to Physical Geology</i> , Dutta, A.K., Kalyani Publishers.		
18. <i>Geomorphology</i> , Sharma, V.K., Tata McGraw Hill.		
19. <i>A Text Book of Geomorphology</i> , Worcester, P.G., D. Van Nostrand Co.		
20. <i>Fundamentals of Geomorphology</i> , Rice, R.J., Longman.		
21. <i>An Introduction to Physical Geology</i> , Miller, W.J., D. Van Nostrand Co.		
22. <i>An outline of Geomorphology: the physical basis of geography</i> , Morgan, R.S. and Wooldridge, S.W., Orient Longman Limited.		
23. <i>Introduction to Marine Geology and Geomorphology</i> , King, A.M.C., Hodder and Stoughton Educational.		
24. <i>Principles of Physical sedimentation</i> , Allen, J.R.L., The Blackburn Press and Springer.		
25. <i>Earth Surface Processes</i> , Allen, P., Wiley-Blackwell.		
26. <i>Sedimentology and Stratigraphy</i> , Nichols, G., Wiley India Pvt. Ltd.		
27. <i>Sedimentary Environments</i> , Readings, H.G., Wiley-Blackwell.		
28. <i>Depositional Systems</i> , Davis, R.A., Pearson College Div.		
29. <i>Sedimentary Basins: Evolution, Facies and Sediment budget</i> , Einsele, G., Springer- Verlag.		
30. <i>Sedimentary Geology</i> , Prothero, D.R. and Schwab, F., W.H. Freeman.		



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119

pg. 36

1173

Session: 2024-25			
Part A - Introduction			
Name of the Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Geology Lab-III (Practical based on M24- GGY-201 & M24- GGY-202)		
Course Code	M24-GGY-205		
Course Type	PC-3		
Level of the course	400-499		
Pre-requisite for the course (if any)			
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 205.1: Study vertebrate, invertebrate, and plant fossils. CLO 205.2: Determine the order of geologic events, delineate environmental conditions on the basis of fossil assemblages. CLO 205.3: Preparation of geological cross sections of horizontal, dipping, folded and faulted structures. Interpretation of simple and complex geological maps and sections. CLO 205.4: Deal with structural geological problems concerning economic mineral deposits and. Students will be able to apply it in the field in geo-scientific projects professionally. Students will also be able to study tectonic features of the Earth especially the Himalayas.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours (or as decided by PGBOS)	
Part B- Contents of the Course			
Practicals			Contact Hours
1.	Study of rocks from different stratigraphic horizons. Exercises on stratigraphic correlation. To determine the order of geologic events.		120
	Study of vertebrate, invertebrate, and plant fossils.		
2.	Processing of samples, picking and mounting of fauna. Identification and morphological study of the microfossils under microscope. Delineation of environmental conditions on the basis of fossil assemblages.		
3.	Preparation of geological cross sections from different structural geological maps. Preparation and interpretation of geological map and section.		
4.	Structural problems concerning economic mineral deposits.		
5.	Plotting and interpretation of petro-fabric data and resultant diagrams, Study of large-scale tectonic features of the earth. Kinematic analysis of discontinuous planes using stereographic projection.		
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum	30	➤ Practicum	70
• Class Participation:	5		


 Chairman
 Department of Geology,
 Kurukshetra University,
 Kurukshetra-136119. 1174

• Seminar/Demonstration/Viva-voce/Lab records etc.:	10	Lab record, Viva-Voce, write-up and execution of the practical
• Mid-Term Exam:	15	

Part C-Learning Resources

1. *Folding and fracturing of rocks*, Ramsay, J.G., McGraw Hill.
2. *An outline of Structural Geology*, Hobbs, B.E., Means, W.D. and Williams, P.F., John Wiley.
3. *Structural Geology of rocks and region*, Davis, G.R., John Wiley.
4. *Modern Structural Geology, Volume I & II*, Ramsay, J.G. and Hubber, M.I., Academic Press
5. *Analysis of geological structures*, Price, N.J. and Cosgrove, J.W., Cambridge Univ. Press.
6. *Structural Geology fundamentals of modern developments*, Ghosh, S.K., Pregamon Press.
7. *Global tectonics*, Keary, P. and Vine, F.J., Blackwell.
8. *Palaeontology*, Jain, P.C. and Anantharaman, M.S., Vishal Publishing Co.
9. *Essentials of paleobotany*, Shukla, A. C., & Misra, S. P., Vikas, Publisher.
10. *Invertebrate Palaeontology and Evolution*, Clarkson, E.N.K., Blackwell.
11. *Microfossils*, Brasier, M. and Armstrong, H., Wiley Blackwell.
12. *Invertebrate Fossils*, Moore, Lalicker and Fischer, McGraw Hill
13. *Vertebrate Palaeontology*, Ramer, A.S., Univ. of Chicago Press.
14. *Precambrian Geology: The Dynamic Evolution of Continental Crust*, Goodwin, A.M., Academic Press.
15. *Principles of Sedimentology and Stratigraphy*, Boggs, Sam Jr., Prentice Hall.
16. *Geology of India and Burma*, Krishnan, M. S., CBS Publishers.
17. *Geology of India*, Wadia, D.N., Alpha Edition.
18. <https://egyankosh.ac.in/bitstream/123456789/69603/1/Block-2.pdf>



Chairman
Department of Geology,
Kurukshetra University,
Kurukshetra-136119.

Session: 2024-25			
Part A - Introduction			
Name of the Programme	M.Sc. Applied Geology		
Semester	II		
Name of the Course	Geology Lab-IV (Practical based on M24- GGY-203 & M24- GGY-204)		
Course Code	M24-GGY-206		
Course Type	PC-4		
Level of the course	400-499		
Pre-requisite for the course (if any)	NIL		
Course Learning Outcomes (CLO) After completing this course, the learner will be able to:	CLO 1: Study the environmental geological parameters for the conservation and management of the Earth's resources, and to study geological factors and suggest adequate waste disposal sites and management practices. CLO 2: Gain practical knowledge regarding the assessment of air, water and soil pollution and will be able to apply it in the field in geo-scientific projects professionally. CLO 3: Understand the diagenetic and depositional features of sedimentary rocks along with sedimentological and paleo-current interpretations. CLO 4: Study different landforms, other geomorphological features and its applications in other geological studies.		
Credits	Theory	Practical	Total
	0	4	4
Teaching Hours per week	0	8	8
Internal Assessment Marks	0	30	30
End Term Exam Marks	0	70	70
Max. Marks	0	100	100
Examination Time	0	4 hours (or as decided by PGBOS)	
Part B-Contents of the Course			
Practicals			Contact Hours



Chairman
Department of Geology,
Kumaun University,
Nainital-263119.

1.	Preparation of ecological maps and their interpretation.	120	
2.	Evaluation of water quality criteria for potable, domestic, industrial, irrigation and waste water.		
3.	Evaluation of environmental impact of air pollution.		
4.	Numerical and case studies on groundwater pollution, land degradation and landslide assessment.		
5.	Study of primary, secondary and biogenic sedimentary structures in hand specimens, in photographic atlases, field photographs and wherever possible on the outcrops.		
6.	Analysis and interpretation of depositional sedimentary environments using actual case histories from the Indian stratigraphic records.		
7.	Megascopic and microscopic study of clastic, chemical sedimentary rocks and detailed study of diagenetic features in thin sections.		
8.	Microscopic study of heavy minerals and exercises on mineralogical and geochemical data plots for environmental interpretations.		
9.	Interpretation of different sedimentological characteristics from size data, roundness and sphericity analysis.		
10.	Paleo-current data interpretation and geomorphological analysis from maps and toposheets.		
Suggested Evaluation Methods			
Internal Assessment: 30		End Term Examination: 70	
➤ Practicum		30	➤ Practicum
• Class Participation:		5	Lab record, Viva-Voce, write-up and execution of the practical
• Seminar/Demonstration/Viva-voce/Lab records etc.:		10	
• Mid-Term Exam:		15	
Part C-Learning Resources			
Recommended Books/e-resources/LMS:			
1. <i>Sedimentary Rocks</i> , Pettijohn, F.J., CBS publishers.			
2. <i>Palaeocurrent and Basin analysis</i> , Pettijohn and Potter, Springer.			
3. <i>Introduction to Sedimentology</i> , Sengupta, S., Oxford and IBH			
4. <i>Environmental geology</i> , Lindgren, L., Prentice Hall.			
5. <i>Water pollution</i> , Tripathi, A. K. and Panday, S. N., CBS publishers.			



Department of Geology,
Kurukshetra University,
Kurukshetra-136119.