

**KURUKSHETRA UNIVERSITY
KURUKSHETRA**

**Scheme of Examination and Syllabus for
Under-Graduate Programme (Multidisciplinary)
Subject: Geology**

**Under Multiple Entry-Exit, Internship and
CBCS-LOCF in accordance to NEP-2020 w.e.f.
2023-24 (in phased manner)**

(First Year)

Course Type	Course Code	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
SEMESTER-1								
CC-1 @4 credit	B23-GGY-101	Physical Geology (T)	3	3	20	50	70	3 hrs.
		Physical Geology (P)	1	2	10	20	30	3 hrs.
CC-M1 @2 credit	B23-GGY-103	Fundamentals of Geology	2	2	15	35	50	3 hrs.
MDC-1 @3 credits	B23-GGY-104	An Introduction to Geology (T)	2	2	15	35	50	3 hrs.
		An Introduction to Geology (P)	1	2	5	20	25	3 hrs.
SEMESTER-2								
CC-2 @4 credit	B23-GGY-201	Petrology and Mineralogy (T)	3	3	20	50	70	3 hrs.
		Petrology and Mineralogy (P)	1	2	10	20	30	3 hrs.
CC-M2 @2 credit	B23-GGY-203	Geoscience and Society	2	2	15	35	50	3 hrs.
MDC-2 @3 credits	B23-GGY-204	Rocks and Minerals (T)	2	2	15	35	50	3 hrs.
		Rocks and Minerals (P)	1	2	5	20	25	3 hrs.

(Second Year)

Course Type	Course Code	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
SEMESTER-3								
CC-3/ CC-M3 @4 credit	B23-GGY-301	Palaeontology and Stratigraphy (T)	3	3	20	50	70	3 hrs.
		Palaeontology and Stratigraphy (P)	1	2	10	20	30	3 hrs.
MDC-3 @3 credits	B23-GGY-303	Earth Resources (T)	2	2	15	35	50	3 hrs.
		Earth Resources (P)	1	2	5	20	25	3 hrs.
SEMESTER-4								
CC-4 @4 credit	B23-GGY-401	Structural Geology and Engineering Geology (T)	3	3	20	50	70	3 hrs.
		Structural Geology and Engineering Geology (P)	1	2	10	20	30	3 hrs.

(Third Year)

Course Type	Course Code	Nomenclature of Paper	Credits	Hours/Week	Internal marks	External Marks	Total Marks	Exam Duration
SEMESTER-5								
CC-5 @4 credit	B23-GGY-501	GIS and Remote Sensing (T)	3	3	20	50	70	3 hrs.
		GIS and Remote Sensing (P)	1	2	10	20	30	3 hrs.
SEMESTER-6								
CC-6/ CC-M6 @4 credit	B23-GGY-601	Hydrogeology (T)	3	3	20	50	70	3 hrs.
		Hydrogeology (P)	1	2	10	20	30	3 hrs.

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	I		
Name of the Course	Physical Geology		
Course Code	B23-GGY-101		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-1		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: 1. Understand Geology and Its relation to mankind. 2. Understand Earth Interior. 3. Learn about the Lithospheric Plates of Earth. 4. Learn about formation of Volcanoes and Earthquakes. 5*. Understand the topography and physiography of an area.		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Th.+ 30 Pr.) Internal Assessment Marks: 30 (20 Th.+ 10 Pr.) End Term Exam Marks: 70 (50 Th.+ 20 Pr.)		Exam Time: 03 Hrs.	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.			
Unit	Topics		Contact Hours
I	Introduction to various branches of Earth Science, General characteristics and origin of the Universe, Solar System and its planets, Meteorites and Asteroids, Earth in the Solar System: origin, size, shape, mass, density, rotational and revolution parameters and its age.		11
II	Interior of Earth: Formation of core, mantle, crust, hydrosphere, atmosphere and biosphere, Convection in Earth's core and production of its magnetic field, Mechanical layering of the Earth.		11

III	Plate Tectonics: Concept of plate tectonics, sea-floor spreading and continental drift, Geodynamic elements of Earth: Mid Oceanic Ridges, trenches, transform faults and island arcs.	12
IV	Continents, mountains and rift valleys, Earthquake and Earthquake belts, Volcanoes: types, products and their distribution.	11
V*	Detailed study of topographic sheets, preparation of physiographic description of an area, study of Seismic Zones in India.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 05 marks • Seminar/presentation/assignment/quiz/class test etc.: 05 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 marks • Mid-Term Exam: NIL 		End Term Examination: 50 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Principles of Physical Geology- A. Holmes • Plate Tectonics and Crustal Evolution- K.C. Condie • Aspects of Tectonics- K.S. Valdiya • Essentials of The Earth Science- K. Kelvin 		

Session: 2023-24		
Part A - Introduction		
Subject	Geology	
Semester	I	
Name of the Course	Fundamentals of Geology	
Course Code	B23-GGY-103	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M1	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	N.A.	
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. Understand Geology and its branches. 2. Understand the Earth and Solar system. 3. Learn about Geological Time Scale and Physiography of India. 4. Learn ecological spheres and their relationship with Earth's surface. 	
Credits	Theory	Total
	2	2
Contact Hours	30	30
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35		Exam Time: 3 Hrs.
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.		
Unit	Topics	Contact Hours
I	Geology as an interdisciplinary science, Branches of Geology and their basic understanding, Development of Geology: catastrophism, The birth of modern Geology.	7
II	Earth's place in the Solar System, physical features of the Earth, other basic features (mass, shape, size, density, etc.) of Earth. Interior of Earth.	8

III	Geological Time Scale, Physiographic and Geological sub-divisions of India, Basic concepts and Application of GIS and GPS.	7
IV	Physical and chemical properties of Earth's spheres: hydrosphere, atmosphere and biosphere, Distribution of land and water on Earth's surface.	8
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 02 marks • Seminar/presentation/assignment/quiz/class test etc.: 03 marks • Mid-Term Exam: 10 marks 		End Term Examination: 35
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Understanding the Earth, Press, F. and Siever, R., W.H. Freeman & Co. • An Introduction to Physical Geology, Tarbuck, Lutgens, Tasa, Eleventh Edition, Pearson Publication. • Principles of Physical Geology- A. Holmes 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	I		
Name of the Course	An Introduction to Geology		
Course Code	B23-GGY-104		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-1		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Understand Geology and its branches. 2. Understand the Earth and Solar system. 3. Learn about Geological time scale and Physiography of India. 4. Learn ecological spheres and their relationship with Earth's surface. <hr style="width: 20%; margin-left: 0;"/> <p>5*. Get Knowledge about interior of Earth through Models.</p>		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 75 (50 Th.+ 25 Pr.)		Exam Time: 3 Hrs.	
Internal Assessment Marks: 20 (15 Th.+ 05 Pr.)			
End Term Exam Marks: 55 (35 Th.+ 20 Pr.)			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.			
Unit	Topics		Contact Hours
I	Geology as a Multidisciplinary science, Branches of Geology and their basic understanding, Development of Geology: catastrophism, The birth of modern Geology.		7
II	Earth's place in the Solar System, physical features of the Earth, other basic features (mass, shape, size, density, etc.) of Earth. Interior of Earth.		8

III	Geological Time Scale, Physiographic and Geological sub-divisions of India, Basic concepts and Application of GIS and GPS.	7
IV	Physical and chemical properties of Earth's spheres: hydrosphere, atmosphere and biosphere, Distribution of land and water on Earth's surface.	8
V*	Physiographic models of India, Models of Interior of Earth, Preparation of Maps of Geological subdivisions of India.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 02 marks • Seminar/presentation/assignment/quiz/class test etc.: 03 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 05 marks • Mid-Term Exam: NIL 		End Term Examination: 35 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Principles of Physical Geology- A. Holmes • Understanding the Earth, Press, F. and Siever, R., W.H. Freeman & Co. • An Introduction to Physical Geology, Tarbuck, Lutgens, Tasa, Eleventh Edition, Pearson Publication. 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	II		
Name of the Course	Petrology and Mineralogy		
Course Code	B23-GGY-201		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-2		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Acquire knowledge about structural bonding and classification of the minerals. 2. Understand physical, chemical, and optical properties of silica group of minerals and mafic minerals. 3. Learn about Rocks, their types, composition and uses. 4. Get elementary idea of Magma and its composition, differentiation and Physical properties. <hr/> <p>5*. Understand the physical properties of Minerals and Rocks.</p>		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Th.+ 30 Pr.)		Exam Time: 03 Hrs.	
Internal Assessment Marks: 30 (20 Th.+ 10 Pr.)			
End Term Exam Marks: 70 (50 Th.+ 20 Pr.)			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.</p>			
Unit	Topics		Contact Hours
I	Mineral: definition; Types of bonding, Isomorphism, Polymorphism, Pseudomorphism, Classification of minerals, Physical and Chemical properties of minerals.		11
II	Optical properties of minerals, Study of physical, chemical and optical properties of Quartz (Amethyst, Rosy quartz, Rutilated quartz,		11

	Chalcedony and Agate), Amphibole (Hornblende, Tremolite and Actinolite), Pyroxene (Augite and Diopside) and Feldspar (K-Feldspar, Albite, Anorthite, Orthoclase and Anorthoclase) group of minerals.	
III	Rocks: Definition, Types of rocks, Igneous Rocks, Sedimentary Rocks, Metamorphic Rocks, Rock Cycle, uses associated with different Rock types, Introduction to Extraterrestrial Rocks.	12
IV	Composition and types of magma, Physical properties of magma: temperature, viscosity and density, Magmatic differentiation and assimilation, Bowen reaction series.	11
V*	Study of physical properties of minerals in hand specimen: Olivine, Garnet, Kyanite, Staurolite, Tourmaline, Augite, Actinolite, Tremolite, Hornblende, Talc, Muscovite, Biotite, Orthoclase, Plagioclase, Microcline and Quartz varieties (Chert, Flint, Chalcedony, Agate, Jasper, Amethyst, Rose quartz, Smoky quartz, Rock crystal). Study of Igneous rocks (Granite, Pegmatite, Microgranite, Dolerite, Granodiorite and Dolerite porphyry), Metamorphic rocks (Hornblende schist, Fuschite quartzite, Hematite jasper quartzite) and Sedimentary rocks (Shale, Limestone, Sandstone) in hand specimen.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 05 marks • Seminar/presentation/assignment/quiz/class test etc.: 05 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 marks • Mid-Term Exam: NIL 		End Term Examination: 50 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Petrology, Igneous, Sedimentary, Metamorphic- Ehlers Ernest G. and Blatt, Harvey. • A Text Book of Geology- P. K. Mukherjee. • Engineering and General Geology- Parbin Singh. • The Principles of Petrology- G. W. Tyrell. 		

Session: 2023-24		
Part A - Introduction		
Subject	Geology	
Semester	II	
Name of the Course	Geoscience and Society	
Course Code	B23-GGY-203	
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-M2	
Level of the course (As per Annexure-I)	100-199	
Pre-requisite for the course (if any)	N.A.	
Course Learning Outcomes (CLO):	After completing this course, the learner will be able to: <ol style="list-style-type: none"> 1. Acquire Knowledge of the origin of Earth. 2. Understand Plate Tectonics and different type of plates of Earth. 3. Learn about Engineering Geology. 4. Learn about earth's resources and its significance. 	
Credits	Theory	Total
	2	2
Contact Hours	30	30
Max. Marks: 50 Internal Assessment Marks: 15 End Term Exam Marks: 35		Exam Time: 3 Hrs.
Part B- Contents of the Course		
<u>Instructions for Paper- Setter</u>		
Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.		
Unit	Topics	Contact Hours
I	Origin and structure of Earth, Origin and evolution of life through Earth history, Elementary idea of rocks, their types, rock cycle, minerals and gemstones.	7
II	Elementary idea of various Earth processes, continental drift and plate tectonics, Orogenic and epeirogenic movements.	8
III	Elementary idea of geological considerations in site evaluation of engineering, construction, mining and other geological works.	7

IV	Environmental changes through the Earth history, Significance of Earth resources to mankind and society, Hydrological cycle and water budget of an Earth.	8
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 02 marks • Seminar/presentation/assignment/quiz/class test etc.: 03 marks • Mid-Term Exam: 10 marks 		End Term Examination: 35
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Understanding the Earth, Press, F. and Siever, R., W.H. Freeman & Co. • Palaeontology, Jain, P.C. and Anantharaman, M.S., Vishal Publishing Co. • An Introduction to Physical Geology, Eleventh Edition, Tarbuck, Lutgens and Tasa, Pearson Publication. • Principles of Engineering Geology and Geotechnics, Krynine/Judd., Jain Book Agency. • Ground water Hydrology, Todd David K., PHI Learning. 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	II		
Name of the Course	Rocks and Minerals		
Course Code	B23-GGY-204		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-2		
Level of the course (As per Annexure-I)	100-199		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Acquire knowledge about structural bonding and classification of the minerals. 2. Understand physical, chemical, and optical properties of silica group of minerals and mafic minerals. 3. Learn about Rocks, their types, composition and uses. 4. Get elementary idea about Magma and its composition, differentiation and Physical properties. <hr/> <p>5*. Understand the physical properties of Minerals and Rocks</p>		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 75 (50 Th.+ 25 Pr.) Internal Assessment Marks: 20 (15 Th.+ 05 Pr.) End Term Exam Marks: 55 (35 Th.+ 20 Pr.)		Exam Time: 3 Hrs.	
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.</p>			
Unit	Topics		Contact Hours
I	Mineral: definition, Isomorphism, Polymorphism, Pseudomorphism, Uses of minerals, Classification of minerals. Physical and Chemical properties of minerals, Gem variety of minerals.		7
II	Physical and Chemical properties of Quartz (Amethyst, Rosy quartz, Rutilated quartz, Chalcedony and Agate) and Feldspar (K- Feldspar,		8

	Albite, Anorthite, Orthoclase and Anorthoclase) group of minerals.	
III	Rocks: Definition, Classification of Rocks and Types of rocks, Igneous Rocks, Sedimentary Rocks, Metamorphic Rocks. Rock Cycle.	7
IV	Composition and types of magma, Physical properties of magma: temperature, viscosity and density, Magmatic differentiation, Bowen reaction series.	8
V*	Study of physical properties of minerals in hand specimen: Olivine, Garnet, Kyanite, Staurolite, Tourmaline, Augite, Actinolite, Tremolite, Hornblende, Talc, Muscovite, Biotite, Orthoclase, Plagioclase, Microcline and Quartz varieties (Chert, Flint, Chalcedony, Agate, Jasper, Amethyst, Rose quartz, Smoky quartz, Rock crystal). Study of Igneous rocks (Granite, Pegmatite, Microgranite, Dolerite, Granodiorite and Dolerite porphyry), Metamorphic rocks (Hornblende schist, Fuschite quartzite, Hematite jasper quartzite) and Sedimentary rocks (Shale, Limestone, Sandstone) in hand specimen.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 02 marks • Seminar/presentation/assignment/quiz/class test etc.: 03 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 05 marks • Mid-Term Exam: NIL 		End Term Examination: 35 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Petrology, Igneous, Sedimentary, Metamorphic- Ehlers Ernest G. and Blatt, Harvey. • A Text Book of Geology- P. K. Mukherjee. • Engineering and General Geology- Parbin Singh. • The Principles of Petrology- G. W. Tyrell. 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	III		
Name of the Course	Palaeontology and Stratigraphy		
Course Code	B23-GGY-301		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-3/CC-M3		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Learn about fossils and evolutionary history of life. 2. Learn about morphology and classification of major vertebrate and invertebrate fossil species. 3. Learn about basic principles of stratigraphy and Geological Time Scale and unconformable contacts in detail. 4. Learn various branches of stratigraphy with special emphasis on sequence stratigraphy and basic concepts of correlation. <p>5*. Learn to study fossils and about stratigraphy of India.</p>		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Th.+ 30 Pr.)		Exam Time: 03 Hrs.	
Internal Assessment Marks: 30 (20 Th.+ 10 Pr.)			
End Term Exam Marks: 70 (50 Th.+ 20 Pr.)			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.</p>			
Unit	Topics		Contact Hours
I	Fundamentals: definition, objectives and scope, nature of fossil record and their uses, types of fossil and their mode of preservation, evolution of life through ages.		11

II	Invertebrate paleontology: morphology, classification, evolutionary trends, geological history and geographical distribution of brachiopods, gastropods, cephalopods and trilobite.	11
III	Define stratigraphy: scope of stratigraphy, principles of stratigraphy, Unconformity: angular unconformity, disconformity, paraconformity, and nonconformity, Stratigraphic units: classification and nomenclature of units (lithostratigraphy, biostratigraphy, chronostratigraphy and geochronology).	12
IV	Precambrian Stratigraphy: Dharwar, Cuddapah and Vindhya, Paleozoic Stratigraphy of India with emphasis on Gondwana Sequence, Deccan Traps.	11
V*	Practical & exercises on stratigraphy, Megascopic study of important invertebrate, vertebrate and plant fossils.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 05 marks • Seminar/presentation/assignment/quiz/class test etc.: 05 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 marks • Mid-Term Exam: NIL 		End Term Examination: 50 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • An Introduction to the Study of Fossil Plants, Walton, J., Adam & Charles Black. • Paleontology Invertebrate, Woods, H., CBS Publications. • Principles of Stratigraphy, Lemon, R.L., Merrill Publishing. • Fundamentals of Historical Geology and Stratigraphy of India, Boggs, S., Jr. Wiley. 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	III		
Name of the Course	Earth Resources		
Course Code	B23-GGY-303		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	MDC-3		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Learn about the energy scenario, production, demand and consumption of important mineral resources in India. 2. Learn about origin, types, physical and chemical properties of coal. 3. Know about origin, migration and entrapment of petroleum. 4. Learn concepts of nuclear energy. <p>5*. Learn about Coal, Petroleum and Nuclear deposits of India.</p>		
Credits	Theory	Practical	Total
	2	1	3
Contact Hours	30	30	60
Max. Marks: 75 (50 Th.+ 25 Pr.)		Exam Time: 3 Hrs.	
Internal Assessment Marks: 20 (15 Th.+ 05 Pr.)			
End Term Exam Marks: 55 (35 Th.+ 20 Pr.)			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.			
Unit	Topics		Contact Hours
I	A brief overview of energy mineral resources of India, sources of renewable and non-renewable energy, Importance of sustainable energy resources in the development of the country.		7

II	Coal: definition, types, coalification process, rank of coal, properties of coal: moisture, ash content, volatile matter.	8
III	Source rock, Reservoir rock, traps, migration of oil and gas, characteristics of Reservoir Rocks and Cap Rock, major oil and gas fields of India.	7
IV	Radioactivity and nuclear energy, important atomic minerals, their mode of occurrence and association, U and Th deposits of India, Peaceful uses of nuclear energy, nuclear environmental hazards.	8
V*	Distribution of coal, petroleum, uranium and thorium deposits of India.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 02 marks • Seminar/presentation/assignment/quiz/class test etc.: 03 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 05 marks • Mid-Term Exam: NIL 		End Term Examination: 35 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Economic Mineral Deposits, Bateman, A.M., Chapman and Hall. • Ore Deposits of India, Gokhale and Rao, Thomson Press, Delhi. • India's Mineral Resources, Krishnaswami S., Oxford & IBH. • A Handbook of Minerals, Crystals, Rocks and Ores, Parmod, A.O., New India Publishing Agency – 2009. • Economic Geology – Economic Mineral Deposits of India,, Prasad, U., CBS Publishers Ltd. 		

Session: 2023-24			
Part A - Introduction			
Subject	Geology		
Semester	IV		
Name of the Course	Structural Geology and Engineering Geology		
Course Code	B23-GGY-401		
Course Type: (CC/MCC/MDC/CC- M/DSEC/VOC/DSE/PC/AEC/VAC)	CC-4		
Level of the course (As per Annexure-I)	200-299		
Pre-requisite for the course (if any)	N.A.		
Course Learning Outcomes (CLO):	<p>After completing this course, the learner will be able to:</p> <ol style="list-style-type: none"> 1. Understand about basics of structural geology. 2. Understand about the processes of folding, faulting and jointing of the strata and their identification in the field. 3. Get knowledge of engineering properties of rock and their use as construction material. 4. Know about various engineering structures, their site selection, evaluation and impact of natural hazards on engineering structures <p>5*.Learn about data analysis of Fold, Fault and RMR</p>		
Credits	Theory	Practical	Total
	3	1	4
Contact Hours	45	30	75
Max. Marks: 100 (70 Th.+ 30 Pr.)		Exam Time: 03 Hrs.	
Internal Assessment Marks: 30 (20 Th.+ 10 Pr.)			
End Term Exam Marks: 70 (50 Th.+ 20 Pr.)			
Part B- Contents of the Course			
<u>Instructions for Paper- Setter</u>			
<p>Question No. 1 is compulsory and comprising short answer type questions spread over the entire syllabus, to be answered in 15-20 words. In addition to Question No. 1, there will be eight (08) questions, two (02) from each unit. A candidate has to answer four (04) questions, selecting at least one (01) question from each unit. All questions carry equal marks.</p>			
Unit	Topics		Contact Hours
I	Elements of Structural Geology: Attitude of beds, Strike and Dip, Deformation of rocks - Force, Stress, Strain and Rupture, Folds: their morphology, genetic and geometric classification, recognition of folds on maps and in the field.		11

II	Faults, their geometric and genetic classification, recognition of faults on maps and in the field, Joints and their classification and recognition in field.	11
III	Introduction to Engineering Geology, Engineering properties of rocks, rocks as building and construction materials and basis of their selection and use, Rock mass rating.	12
IV	Engineering structures: dams, tunnels, buildings, highways and bridges, Techniques for selection and evaluation of sites for various engineering structures.	11
V*	Study of diagnostic morphological characters of faults and fold in hand specimen, Study of Geological/ Structural maps and cross-sections, Numerical exercise on structural problems, Numerical based on stress/strain and RMR.	30
Suggested Evaluation Methods		
Internal Assessment: > Theory <ul style="list-style-type: none"> • Class Participation: 05 marks • Seminar/presentation/assignment/quiz/class test etc.: 05 marks • Mid-Term Exam: 10 marks > Practicum <ul style="list-style-type: none"> • Class Participation: NIL • Seminar/Demonstration/Viva-voce/Lab records etc.: 10 marks • Mid-Term Exam: NIL 		End Term Examination: 50 20
Part C-Learning Resources		
Recommended Books/e-resources/LMS: <ul style="list-style-type: none"> • Structural Geology -M.P. Billing. • Foundation of Structural Geology -R.G. Park. • Principles of Structural Geology -G.M. Mevin. • Theory of Structural Geology- N.W. Gokhale. • Engineering Geology- Krynine and Judd. • Engineering Geology- Blyth. • Soil Mechanics- T.W. Lambe and R. Whitman. 		