VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

Jnanasagara campus, Ballari.-583105

Web: www.vskub.ac.in, Email: Phone : 08392-242703 and Fax: 08392-242806

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Geology (GG) as one of the Majors

1st Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of SEE (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG1L	Earth Science	20	80	100	4	0	0	4	03
24MJGG1P	Earth Science Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24LGCC1L	Language 1	20	80	100	3	0	0	3	03
24LGCC1L	Language 2	20	80	100	3	0	0	3	03
24CVCM1L	Constitutional Values	10	40	50	2	0	0	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description: 24MJGG1L

24 – Year of Curriculum Implementation / Revision; MJ – Major, LG – Language, CV – Constitutional Values; GG– Course Specific (Geology – GG); CM – Common Course; 1 – Semester Number; L – Lecture, P - Practical

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Geology (GG) as one of the Majors
2nd Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG2L	Mineral Science	20	80	100	4	0	0	4	03
24MJGG2P	Mineral Science Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24LGCC2L	Language 1	20	80	100	3	0	0	3	03
24LGCC2L	Language 2	20	80	100	3	0	0	3	03
24ESCM2L	Environmental Studies	10	40	50	2	0	0	2	1.5*
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

Course Code Description: 24MJGG2L

24 – Year of Curriculum Implementation / Revision; MJ – Major, LG – Language, ES – Environmental Science GG– Course Specific (Geology – GG); CM – Common Course; 2 – Semester Number; L – Lecture, P – Practical

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Geology (GG) as one of the Majors
3rd Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG3L	Petrology	20	80	100	4	0	0	4	03
24MJGG3P	Petrology Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24LGCC3L	Language 1	20	80	100	3	0	0	3	03
24LGCC3L	Language 2	20	80	100	3	0	0	3	03
24MJGG3S	Field Geology and Instruments	10	40	50	2	0	0	2	02
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

Course Code Description: 24MJGG3L

24 – Year of Curriculum Implementation / Revision; MJ – Major, LG – Language, GG– Course Specific (Geology – GG); 3 – Semester Number; L – Lecture, P – Practical; S – Skill.

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Structure with Geology (GG) as one of the Majors

4th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG4L	Structural Geology	20	80	100	4	0	0	4	03
24MJGG4P	Structural Geology Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24LGCC4L	Language 1	20	80	100	3	0	0	3	03
24LGCC4L	Language 2	20	80	100	3	0	0	3	03
24MJGG4S	Field study / Mine visits /Geological tour	10	40	50	0	0	4	2	01**
TOTAL		**140**	**560**	**700**	**20**	**0**	**12**	**26**	**-**

*** * Internally conducted based on field report and presentation. The evaluation scheme will be provided by respective BoS.**

Course Code Description: 24MJGG4L

24 – Year of Curriculum Implementation / Revision; MJ – Major, LG – Language, GG– Course Specific (Geology – GG); 4 – Semester Number; L – Lecture, P – Practical, S – Skill

VSKUB SEP Proposed Curricular and Credits Structure under Choice Based Credit System [CBCS] of Scheme for the Three Years B.Sc. Undergraduate Programme with effect from 2024-25 (Three Major Combination)

Structure with Geology (GG) as one of the Majors

5th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG5L	Stratigraphic Principles and Palaeontology	20	80	100	4	0	0	4	03
24MJGG5P	Stratigraphic Principles and Palaeontology Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24MJGG5E	Indian Mineral Resources	10	40	50	2	0	0	2	02
24RMBS5S	Elementary Research Methodology#	10	40	50	2	0	0	2	01*
TOTAL		**110**	**440**	**550**	**16**	**0**	**12**	**22**	**-**

*** 40 Multiple Choice Questions for 40 Marks (OMR Based)**

The curriculum for Elementary Research Methodology will be set by special/common Board of Studies (BoS - Faculty of Science & Applied Science) set up by the University. The course code for Elementary Research Methodology shall be 24RMBS5S.

Course Code Description: 24MJGG5L

24 – Year of Curriculum Implementation / Revision; MJ – Major, RM – Research Methodology; GG– Course Specific (Geology – GG); BS – Bachelor of Science; 5 – Semester Number; L – Lecture, P – Practical, S – Skill, E – Elective Course

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Structure with Geology (GG) as one of the Majors
6th Semester

Course code	Title of the Course	Marks			Teaching hours/week			Credit	Duration of exams (Hrs)
		IA	SEE	Total	L	T	P		
24MJGG6L	Remote Sensing and GIS	20	80	100	4	0	0	4	03
24MJGG6P	Remote Sensing and GIS Lab	10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
		20	80	100	4	0	0	4	03
		10	40	50	0	0	4	2	03
24MJGG6E	Exploration Geology	10	40	50	2	0	0	2	02
24MJGG6R	Elementary Research Project	10	40	50**	0	0	4	2	01**
TOTAL		**110**	**440**	**550**	**14**	**0**	**16**	**22**	**-**

**** Internally conducted based on project report and presentation. The evaluation scheme will be provided by respective BoS.**

Course Code Description: 24MJGG6L

24 – Year of Curriculum Implementation / Revision; MJ – Major, GG – Course Specific (Geology – GG); R – Research Project; 6 – Semester Number; L – Lecture, P – Practical; E – Elective Course

Concept Note, Abbreviation Explanation and Coding:

Concept Note:

1. CBCS is a mode of learning in higher education which facilitates a student to have some freedom in selecting his/her own choices, across various disciplines for completing a UG/PG program.
2. A credit is a unit of study of a fixed duration. For the purpose of computation of workload as per UGC norms the following is mechanism be adopted in the university:
   One credit (01) = One Theory Lecture (L) period of one (1) hour;
   One credit (01) = One Tutorial (T) period of one (1) hour;
   One credit (01) = One practical (P) period of two (2) hours.
   One Credit (01) = One Field Study (F) period of one (1) hour
3. Students shall select any two languages during 1-IV semesters.
4. Student shall select only one Skill course from any one of the major courses opted in 3rd and 4th semesters.
5. Student shall select Elective course from any one of the major courses opted one in each in 5th and 6th semesters.
6. Elementary Research Methodology Course is common for all B.Sc. students.
7. Student shall perform Elementary Research Project in any one of the major courses opted in 6th semester.

Abbreviation Explanations:

1. SEC: Skill Enhancement Course;
2. L1: Language One
3. L2: Language One
4. L= Lecture; T= Tutorial; P=Practical; S= Skill; E = Elective; R = Research Project
5. MJ – Major
6. LG – Language
7. RM – Research Methodology
8. CM – Common Course

NOTE:

1. FOR A THEORY COURSE WITH 4 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 52-56 HOURS.
2. FOR A THEORY COURSE WITH 3 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 40-42 HOURS.
3. FOR A THEORY COURSE WITH 2 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 26-28 HOURS.
4. FOR A LAB COURSE/RESEARCH PROJECT WITH 2 CREDITS, SYLLABUS HAS TO SET FOR TOTAL OF 52-56 HOURS.
5. FOR A SKILL COURSE WITH 1 HOUR THEORY AND 2 HOUR LAB OF 2 CREDITS, SYLLABUS HAS TO BE SET FOR 40-42 HOURS.

Department Name: Geology

Semester – I

Course Title: Earth Science	**Course Code:** 24MJGG1L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and describe Earth's materials and the processes that form and change them.
2. Explain the interactions between the atmosphere, hydrosphere, geosphere, and biosphere.
3. Understand the processes that shape the Earth's surface and interior.
4. Understand oceanographic processes and the physical and chemical properties of seawater.
5. Apply Earth sciences thinking to environmental issues.

Unit	Description	Hours
1	**Introduction to planet Earth:** Introduction to various branches of Earth Sciences. Total understanding of dynamic planet 'Earth' through Astronomy, Geology, Meteorology and Oceanography. General characteristics and origin of the Universe, Solar System and its planets. The terrestrial and jovian planets. Meteorites and Asteroids. Earth in the solar system - origin, size, shape, mass, density, rotational and revolution parameters and its age.	10
2	**Plate Tectonics:** *Introduction to plate tectonics:* Key concepts and definitions; Historical development of plate tectonic theory. Layers of the Earth - crust, mantle, core; Lithosphere and asthenosphere. *Plate Boundaries: Divergent Boundaries* - Mid-ocean ridges and seafloor spreading; Rift valleys; Volcanic activity at divergent boundaries. *Convergent Boundaries:* Subduction zones and oceanic trenches; Mountain building and continental collision; Volcanism and earthquakes at convergent boundaries. *Transform Boundaries:* Characteristics of transform	12

	faults; Major transform fault systems (e.g., San Andreas Fault); Earthquake activity at transform boundaries.	
3	**Atmosphere:** *Introduction to the Atmosphere:* Composition of the atmosphere; Structure and layers of the atmosphere. *Atmospheric Processes:* Solar radiation and Earth's energy balance; Heat transfer in the atmosphere; Atmospheric pressure and wind patterns. Weather and Climate: Weather vs. climate; Formation of clouds and precipitation; Major weather systems and patterns.	10
4	**Hydrosphere:** *Introduction to the Hydrosphere:* Composition of the hydrosphere; Distribution of water on Earth; Properties of water. *The Water Cycle:* Processes of the water cycle (evaporation, condensation, precipitation); Groundwater and surface water; Human impact on the water cycle.	9
5	**Soil Science:** *Introduction to Soil Science:* Definition and importance of soil; Components of soil. *Physical Properties of Soil:* Soil texture and structure; Soil colour and consistency; Soil water retention and drainage. *Chemical Properties of Soil:* Soil pH and nutrient availability; Cation exchange capacity; Soil fertility. *Biological Properties of Soil:* Soil microorganisms and their functions; Organic matter and humus; Soil food web. *Soil Formation and Classification:* Factors of soil formation; Soil horizons and profiles; Soil taxonomy and classification systems.	13

References:

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Department Name: Geology

Semester - I

Course Title: Earth Science Lab	**Course Code:** 24MJGG1P
Total Contact Hours: 4 Hours per week	**No. of Credits:**
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the internal structure of the Earth layers.
2. Analyze topographic maps and geological features.
3. Interpret weather data and understand atmospheric processes.
4. Understand the basics of soil, including soil profile mapping and types.

List of Experiments

Sl.No	Experiments
1	Study the applications for various branches of Earth Science subjects with neat sketches
2	Study of solar system planets with drawings
3	Draw a model of the Earth's layers (crust, mantle, outer core, inner core) and discussion of the properties and composition of each layer
4	Study of topographic feature distribution of India
5	Study of divergent, convergent, and transform boundaries and observation of geological features formed at each type of boundary (e.g., mid-ocean ridges, trenches, faults).
6	Study of atmospheric layers with its applications
7	Study of water cycle with its applications
8	Study of different soil types in India
9	Study of soil profile any specific area

References:

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Department Name: Geology

Semester – II

Course Title: Mineral Science	**Course Code:** 24MJGG2L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify minerals based on their physical and chemical properties.
2. Understand the crystallographic and structural properties of minerals.
3. Explain the processes that lead to the formation and transformation of minerals.
4. Use laboratory techniques for mineral identification and analysis.
5. Recognize the role of minerals in the Earth's system and human society

Unit	Description	Hours
1	**Mineral and Crystallography:** Definitions and importance of minerals; Basic concepts in mineralogy. *Introduction to Crystallography:* Elementary ideas about crystal morphology in relation to internal crystal structures and symmetry; Unit cells and lattice parameters; classification of crystals into six systems and 32 point groups	12
2	**Properties of Minerals** *Physical Properties of Minerals:* Hardness, cleavage, and fracture; Luster, color, and streak; Density and specific gravity. *Chemical Properties of Minerals:* Mineral chemistry and bonding; Chemical formulas and compositional variation; Isomorphism and polymorphism.	10
3	**Light and Optical Mineralogy:** Polarized light and mineral optics; Nature of light and principles of optical mineralogy; Refractive index and birefringence; Optical identification techniques.	10

	Introduction to the petrological microscope and identification of common rock forming minerals.	
4	**Mineral Groups:** *Silicate Minerals:* Structure and classification of silicates; Common silicate minerals; Silicate mineral groups. *Non-Silicate Minerals:* Oxides and hydroxides; Sulfides and sulphates; Carbonates, phosphates, and halides.	12
5	**Economic Minerals and Resources:** Ore minerals and industrial minerals; Mineral exploration and mining; Environmental impact of mining; Toxic minerals and health impacts; Sustainable mineral resource management	10
References: 1. 2. 3.		

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Department Name: Geology

Semester - II

Course Title: Mineral Science Lab	**Course Code:** 24MJGG2P
Total Contact Hours: 4 Hours per week	**No. of Credits:**
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify minerals based on their physical and chemical properties.
2. Use laboratory techniques for mineral identification and analysis.
3. Understand the crystallographic and structural properties of minerals.

List of Experiments

Sl.No	Experiment
1	Observation and documentation on symmetry of crystals
2	Study of physical properties of minerals in hand specimens
3	Study of silicate minerals (any ten): [Olivine, Garnet, Andalusite, SilIimanite, Kyanite, Staurolite, Beryl, Tourmaline, Augite, Actinolite, Tremolite, Hornblende, Serpentine, Talc, Muscovite, Biotite, Phlogopite, Quartz, Orthoclase, Plagioclase, Microcline, Nepheline, Sodalite, Zeolite]
4	Study of Quartz varieties: [Chert, Flint, Chalcedony, Agate, Jasper, Amethyst, Rose quartz, Smoky quartz]
5	Study of metallic and non-metallic minerals: [Iron, Copper, Gold, Sulfur, Graphite, Pyrite, Corundum, Magnetite, Halides, Carbonates, Psilomelane, Fluorite, Calcite, Malachite, Gypsum, Apatite]
6	Study of minerals under optical microscope and their characteristic properties

References:

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Department Name: Geology

Semester – III

Course Title: Petrology	**Course Code:** 24MJGG3L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify igneous, sedimentary, and metamorphic rocks based on their mineralogical, chemical, and textural characteristics.
2. Understand the processes that lead to the formation of different types of rocks.
3. Interpret the geological history of an area based on rock types and their relationships.
4. Use laboratory techniques for rock identification and analysis.
5. Conduct fieldwork to collect and analyze rock samples.

Unit	Description	Hours
1	**Introduction to Petrology:** Definition, Scope and Basic concepts in petrology; Heat flow, geothermal gradients through time, origin and nature of magma, magma types and properties.	10
2	**Igneous Petrology:** Definition, Formation of igneous rocks; Textures of igneous rocks; *Classification of Igneous Rocks:* Chemical and mineralogical classification; IUGS classification scheme; Common igneous rocks. *Igneous Processes and Environments:* Magmatic differentiation and crystallization; Plutonic and volcanic environments; Igneous structures and field relations.	12
3	**Sedimentary Petrology:** Definition, Formation of sedimentary rocks; Weathering, erosion, and transportation; Sediment deposition and lithification. *Classification of*	11

	Sedimentary Rocks: Clastic, chemical, and biochemical sedimentary rocks; Sedimentary textures and structures; Common sedimentary rocks. *Sedimentary Environments and Processes:* Continental, marine, and transitional environments; Sedimentary facies and sequences; Diagenesis and sedimentary basins.	
4	**Metamorphic Petrology:** Definition, Formation of metamorphic rocks; Metamorphic agents and processes; Textures of metamorphic rocks. *Classification of Metamorphic Rocks:* Foliated and non-foliated metamorphic rocks; Metamorphic facies and grade; Common metamorphic rocks. *Metamorphic Processes and Environments:* Regional and contact metamorphism; Metasomatism and hydrothermal metamorphism; Metamorphic textures and structures.	11
5	**Laboratory Techniques and Field Work:** Microscopic identification of minerals and textures; Introduction to X-ray diffraction (XRD) and scanning electron microscopy (SEM). Field techniques for rock sampling; Recording field data and mapping; Laboratory analysis of field samples.	10

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Department Name: Geology

Semester - III

Course Title: Petrology Lab	**Course Code:** 24MJGG3P
Total Contact Hours: 4 Hours per week	**No. of Credits:**
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify igneous, sedimentary, and metamorphic rocks based on their mineralogical, chemical, and textural characteristics.
2. Understand the processes that lead to the formation of different types of rocks.
3. Use laboratory techniques for rock identification and analysis.

List of Experiments

Sl.No	Experiments
1	Introduction to rock identification for basic tools and techniques
2	Use of the petrographic microscope
3	Thin section preparation and analysis
4	Hand specimen igneous rock identification
5	Classification of igneous rocks by texture and composition
6	Identification of common sedimentary grains
7	Classification of sedimentary rocks by texture and composition
8	Hand specimen sedimentary rock identification
9	Classification of metamorphic rocks by texture and composition
10	Hand specimen metamorphic rock identification

References:

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Department Name: Geology

Semester – III

Course Title: Field Geology and Instruments	**Course Code:** 24MJGG3S
Total Contact Hours: 28	**No. of Credits:** 2
L:T:P	2 – 0 – 0
Internal Assessment Marks: 10	**Duration of SEE:** 2 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. To conduct geological field mapping and data collection.
2. To use geological instruments for field measurements and analysis.
3. To identify and classify rocks and minerals in the field.
4. To interpret geological features and construct geological maps and cross-sections.
5. Document and report field observations accurately.

Unit	Description	Hours
1	**Introduction to Field Geology:** Scope and objectives; Field safety and ethics; Basic tools and techniques. Geological Mapping: Topographic maps and scales; Orientation and use of compass. *Rock and Mineral Identification in the Field:* Identification techniques for common rocks and minerals; Field guide to rocks and minerals.	9
2	**Field Trip Preparation:** Planning and organizing a field trip; Packing and field gear essentials; Safety protocols and teamwork; Field mapping techniques; Rock sampling and identification; Recording field observations	8
3	**Introduction to Geological Instruments:** Overview of instruments (e.g., Global Navigation Satellite System [GNSS], Brunton compass, clinometer); Calibration and maintenance of instruments; Instrument handling and usage; GNSS principles and operation; Collecting and processing GNSS data; GNSS data collection and mapping; Advanced field	11

	mapping techniques; Structural measurements and data recording; Field trip report preparation; Introduction to more advanced instruments (e.g., portable XRF, seismic equipment).	

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Department Name: Geology

Semester – IV

Course Title: Structural Geology	**Course Code:** 24MJGG4L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the principles of stress and strain in geological materials.
2. Identify and classify geological structures such as faults, folds, and joints.
3. Use field and laboratory techniques to analyze and interpret geological structures.
4. Construct and interpret geological maps and cross-sections.
5. Apply structural geology concepts to understand tectonic processes and geological history

Unit	Description	Hours
1	**Introduction to Structural Geology**: Definitions and Basic concepts, Importance of structural geology; Overview of geological structures. *Principles of Stress and Strain:* Definition of stress and strain; Types of stress (compressional, tensional, shear); Strain measurement and analysis.	10
2	**Deformation Mechanisms:** Elastic, brittle, and ductile deformation; Factors affecting rock deformation. *Folds and Folding:* Classification and description of folds; Mechanisms of folding. *Faults and Faulting:* Types of faults (normal, reverse, strike-slip); Fault mechanics and kinematics. *Joints and Fractures:* Classification and description of joints; Formation and significance of fractures.	11
3	**Geological Maps and Cross-Sections:** Principles of geological mapping, Constructing and interpreting geological maps.	11

	Mapping and Structural Analysis: Field mapping techniques; Recording structural data in the field. *Microstructures and Deformation:* Microstructural analysis of deformed rocks; Techniques for studying microstructures.	
4	**Tectonics and Regional Geology:** Plate tectonics and regional structural geology; Tectonic settings and structural styles; Case studies of tectonic regions. *Advanced Structural Analysis Techniques:* Techniques for measuring and analyzing structures; Use of software for structural analysis	10
5	**Structural Geology Applications**: Applications in petroleum geology, mining, and engineering; Case studies of structural geology in industry. *Advanced Structural Mapping:* Detailed mapping of a structurally complex area. Structural data collection and interpretation	12

References:

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Department Name: Geology

Semester - IV

Course Title: Structural Geology Lab	**Course Code:** 24MJGG4P
Total Contact Hours: 4 Hours per week	**No. of Credits:**
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify and classify geological structures such as faults, folds, and joints.
2. Use field and laboratory techniques to analyze and interpret geological structures.
3. Construct and interpret geological maps and cross-sections.

List of Experiments

Sl.No	Experiment
1	Study of Stress-strain relationships
2	Introduction to Geological maps: Lithological and Structural maps
3	Structural contouring and 3-point problems of dip and strike
4	Study of Fold analysis
5	Study of Fault identification and analysis
6	Study of Joint and fracture analysis
7	Drawing profile map interpretation and cross-section construction
8	Microstructural analysis using thin sections
9	Study of Field trip report preparation

References:

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Department Name: Geology

Semester – IV

Course Title: Field study / Mine visits / Geological tour	**Course Code:** 24MJGG4S
Total Contact Hours: Mini. 1 week field work	**No. of Credits:** 2
L:T:P	0 – 0 – 4
Internal Assessment Marks: 10	**Duration of SEE:** 01 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Conduct field observations and data collection in various geological settings.
2. Understand the processes and techniques used in mining operations.
3. Analyze and interpret geological features observed during field trips.
4. Document and report field experiences and findings.

Description	Course Guidelines
Field Visit: One week field visit for geological mapping in between IV semester. Students should submit a technical field report along with neat sketches. OR **Mine visit:** 7 days mine visit / training at selected mine-sites in between IV semester. Students should submit mine visit / training in the form of technical report. OR **Geological Tour:** One week, geological tour at selected locations in between IV semester. Based on tour, students have to submit a technical report.	The students will have to undertake Geological Study – Field Visit / Mine visit / geological Tours / Field Mapping Tours for at least 1 week in Semester- IV. Students will have to submit a report about the same. This will be compulsory and carries mark. Evaluation is based on field report and presentation

References:

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Department Name: Geology

Semester – V

Course Title: Stratigraphic Principles and Palaeontology	**Course Code:** 24MJGG5L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the principles of stratigraphy and their application to geological problems.
2. Identify and classify fossils and interpret their significance in the geological record.
3. Analyze sedimentary sequences and construct stratigraphic columns.
4. Apply biostratigraphic and chronostratigraphic techniques to correlate rock units.
5. Conduct fieldwork to collect and analyze stratigraphic and paleontological data.

Unit	Description	Hours
1	**Introduction to Stratigraphy and Palaeontology:** Definitions, Scope and objectives, Historical development of stratigraphy and paleontology; Basic concepts and terminology. Sedimentary Processes and Environments: Sediment transport and deposition; Sedimentary environments and facies.	11
2	**Principles of Stratigraphy:** Law of Superposition, Original Horizontality, and Lateral Continuity; Stratigraphic units and their classification. *Biostratigraphy and Chronostratigraphy:* Principles of biostratigraphy; Fossil succession and index fossils.	10
3	**Stratigraphic Section:** Measuring and describing stratigraphic sections; Collecting and recording data in the field. *Fossil Preservation and Taphonomy:* Processes of fossilization; Taphonomic biases and their implications.	10

4	**Invertebrate and Vertebrate Palaeontology:** Major groups of invertebrate fossils; Morphology, classification, and evolutionary trends. *Vertebrate Palaeontology:* Major groups of vertebrate fossils; Morphology, classification, and evolutionary trends. Techniques for correlating stratigraphic units.	12
5	**Paleobotany and Ichnology:** Fossil plants and their significance, Trace fossils and their interpretation. *Paleoecology and Paleoenvironments:* Reconstructing ancient environments; Fossil assemblages and paleoecological analysis. Basin analysis and sequence stratigraphy	11
References: 1. 2. 3.		

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Department Name: Geology

Semester - V

Course Title: Stratigraphic Principles and Palaeontology Lab	**Course Code:** 24MJGG5P
Total Contact Hours: 4 Hours per week	**No. of Credits:** 2
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the principles of stratigraphy and their application to geological problems.
2. Identify and classify fossils and interpret their significance in the geological record.
3. Analyze sedimentary sequences and construct stratigraphic columns.

List of Experiments

Sl.No	Experiment
1	Preparation of physiographic map of India.
2	Preparation of lithostratigraphic map showing distribution of main geological formations of India.
3	Preparation of stratigraphic column.
4	Morphological characters, systematic position and age of fossil genera pertaining to brachiopods.
5	Morphological characters, systematic position and age of fossil genera pertaining to pelecypods.
6	Morphological characters, systematic position and age of fossil genera pertaining to cephalopods.
7	Morphological characters, systematic position and age of fossil genera pertaining to trilobites.
8	Morphological characters, systematic position and age of fossil genera pertaining to echinoids.

References:

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Department Name: Geology

Semester – V

Course Title: Indian Mineral Resources	**Course Code:** 24MJGG5E
Total Contact Hours: 28	**No. of Credits:** 2
L:T:P	2 – 0 – 0
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Identify the major mineral resources found in India and understand their geological settings.
2. Discuss the processes of mineral exploration and extraction.
3. Evaluate the economic importance of mineral resources in India.
4. Analyze the environmental and regulatory aspects of mineral resource utilization.
5. Understand the role of mineral resources in India's development.

Unit	Description	Hours
1	**Introduction to Indian Mineral Resources:** Definitions, Scope and objectives, Importance of mineral resources to India's economy, Overview of geological settings in India, Major mineral Belts of India.	8
2	**Metallic and Non-Metallic Mineral Resources:** *Metallic Mineral Resources:* Major metallic minerals (iron ore, bauxite, manganese, copper, gold); Geological distribution and occurrence; Exploration and mining techniques. *Non-Metallic Mineral Resources:* Major non-metallic minerals (limestone, dolomite, gypsum, graphite, mica); Geological distribution and occurrence; Exploration and mining techniques.	10
3	**Energy, Strategic and Critical Mineral Resources:** *Energy Resources:* Coal, oil, and natural gas resources in India; Geological settings and distribution Exploration, extraction, and utilization. *Strategic and Critical Minerals:* Rare earth elements, uranium, and other strategic minerals; Importance and applications; Exploration and mining status in India	10

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Department Name: Geology

Semester – VI

Course Title: Remote Sensing and GIS	**Course Code:** 24MJGG6L
Total Contact Hours: 54	**No. of Credits:** 4
L:T:P	4 – 0 – 0
Internal Assessment Marks: 20	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 80	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the principles of remote sensing and GIS.
2. Acquire and process remote sensing data.
3. Use GIS software to analyze spatial data and create maps.
4. Apply remote sensing and GIS techniques to solve geological and environmental problems.
5. Design and execute a project using remote sensing and GIS tools.

Unit	Description	Hours
1	**Introduction to Remote Sensing:** Definitions, Scope and Objectives, History and development of remote sensing; Electromagnetic spectrum and radiation principles. *Remote Sensing Platforms and Sensors:* Types of remote sensing platforms (satellites, aircraft, drones); Sensor types and their characteristics; Data acquisition methods.	11
2	**Image Processing and Analysis:** *Image Processing and Analysis:* Image preprocessing (radiometric and geometric corrections); Image enhancement techniques. *Image Classification and Interpretation:* Supervised and unsupervised classification methods; Accuracy assessment of classification results.	10
3	**Introduction to GIS:** *Introduction to GIS:* Basic concepts and components of GIS; Types of spatial data (raster and vector); GIS data models and structures. *Data Input and Management in GIS:* Data acquisition and input methods; Database management and data	11

	storage.	
4	**Remote Sensing Applications in Geology:** *Applications in Geology:* Geological mapping and mineral exploration; Land use/land cover change detection. Combining remote sensing and GIS data; Case studies of integrated applications	11
5	**GIS Applications and Modelling:** *GIS applications:* Environmental monitoring and management; Natural hazard assessment and mitigation. *Spatial Analysis and Modeling in GIS:* Spatial analysis techniques (overlay, buffer, interpolation); Digital elevation models (DEMs) and terrain analysis.	11

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Department Name: Geology

Semester - VI

Course Title: Remote Sensing and GIS Lab	**Course Code:** 24MJGG6P
Total Contact Hours: 4 Hours per week	**No. of Credits:**
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 03 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Use GIS software to analyze spatial data and create maps.
2. Apply remote sensing and GIS techniques to solve geological and environmental problems.
3. Design and execute a project using remote sensing and GIS tools.

List of Experiments

Sl.No	Experiment
1	Introduction to Remote Sensing Softwares
2	Introduction to GIS Softwares
3	Study of Coordinate systems
4	Study of Datum, Projections.
5	Study of GNSS operations and its uses
6	Study of Remote Sensing Satellites
7	Study and interpretation of satellite imagery and aerial photos
8	Study of map features (Point, Line and Polygon) extraction from the GIS softwares
9	Preparation of AOI maps using GIS softwares

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Department Name: Geology

Semester – VI

Course Title: Exploration Geology	**Course Code:** 24MJGG6E
Total Contact Hours: 28	**No. of Credits:** 2
L:T:P	2 – 0 – 0
Internal Assessment Marks: 10	**Duration of SEE:** 02 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Understand the basic principles of geological exploration.
2. Identify and apply various exploration methods.
3. Interpret geochemical and geophysical data.
4. Evaluate mineral potential and resource estimation.

Unit	Description	Hours
1	**Introduction to Exploration Geology:** Introduction, Definitions, Scope and Objectives; History and significance of mineral exploration; the exploration process and stages. *Geological Mapping and Remote Sensing:* Principles of geological mapping; Remote sensing techniques in exploration.	9
2	**Geochemical and Geophysical Exploration Methods:** *Geochemical Exploration Methods:* Soil, rock, and stream sediment sampling; Geochemical anomalies and their significance. *Geophysical Exploration Methods:* Overview of geophysical techniques (magnetic, gravity, seismic); Application of geophysics in mineral exploration.	10
3	**Drilling, Sampling Techniques and Resource Estimation:** *Drilling and Sampling Techniques:* Drilling methods (core, rotary, percussion); Sampling protocols and quality control. *Mineral Resource Estimation:* Techniques for resource estimation Classification of mineral resources and reserves; Case studies: Resource estimation examples	9

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Department Name: Geology

Semester - VI

Course Title: Elementary Research Project	**Course Code:** 24MJGG6R
Total Contact Hours: 4 Hours per week	**No. of Credits:** 2
L:T:P	0 – 0 – 2
Internal Assessment Marks: 10	**Duration of SEE:** 01 Hours
Semester End Exam Marks: 40	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. The students are allowed to work in various domains of Geology / Earth science and make them collect, process, analyze and interpret the data to bring out new results

NOTE:

Elementary Research Project Descriptions
The candidate should submit an independent or in group, hard bond form of elementary research project report by the end of final year course on a topic relevant to Geology / Earth Science, based on the laboratory experiments / case studies / field studies carried out in a Geoscience / Mining / Industry; it will be evaluated by external and internal examiners. It will be carried out VI semester, but will be started in the V semester. Three copies of the elementary research project report shall be submitted to the Project Guide, Department of Geology before 15 Days of the examination of VI semester

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PROVIDE QUESTION PAPER PATTERNS FOR ALL THEORY PAPERS AND EVALUATION METHODS FOR LABOARATORY AND RESEARCH PROJECT SEMESTER END EXAMINATION.

QUESTION PAPER PATTERNS FOR ALL SKILL PAPERS IS 40 MULTIPLE CHOICE QUESTIONS. HOWEVER, IT NEEDS TO BE APPROVED IN RESPECTIVE BOS