

Name of the Department: **Geology**

Name of the Programme: **M.Sc. Geology**

Vision

- To impart commendable knowledge-based integrity in the field of Geology to empower the skills of the students for the betterment of the geological community and relevant national development.

Mission

- Motivating the students is our prime mission to learn, practice, and implement their skills during the course duration.
- To maximize the research activities and make the department a shrine of geological knowledge.
- Adopting effective teaching methods, field, laboratory training, and extending the research activities to meet national and international standards.
- Creating awareness among the students about the job market in the Geological domain.
- Ensuring employment opportunities for the students upon successful completion of their M.Sc. programme.

Program Outcomes (PO)

- During the two-year tenure of the program, students can identify, examine, and understand different geological activities and also carry out their characterization using geological, geophysical, and geochemical knowledge.
- The students also learn fundamental requirements of geological mapping in varied geological terrains, analysis of the geological data, software used in the geological domain, petrological microscopy, identification of different fossils, the behavior of groundwater, and need for the hour engineering and environmental issues related to Planet Earth.
- At the fag end of the program, the student will be able to understand the different core concepts of the Earth and its processes.

- Another prime outcome of this program is geological exploration including rock sampling, and protocols for sample processing, geochemical analysis, interpretation, and targeting the ore deposits of economical importance.
- The student will be able to understand the causes of natural Geo-calamities including earthquakes, floods, landslides, tsunamis, and volcanic eruptions, and mechanisms for mitigating the damages.

Program Specific Outcomes (PSO)

- The specific outcome of the M.Sc. Geology is to up skill the student's geological knowledge for securing jobs as geo-scientists in the government, public, private sector, and in scientific organizations for research activities.
- The M.Sc. curriculum was prepared to meet the following challenges:
 - 1) Assume responsible positions in government agencies.
 - 2) Serve as Lecturer in colleges that offer geology as a subject.
 - 3) Ability to apply the imparted theoretical, conceptual, and observational knowledge to the analysis and interpretation of geologic information.
 - 4) Compile and compare the available geologic literature pertinent to original research and effectively communicate geologic knowledge, findings, and interpretations in both written and oral.
 - 5) Finally, students can establish consultancies in the domains of Groundwater exploration, Geophysical, Engineering, GIS, Remote sensing and Environmental studies.
 - 6) At the end of the program, students can able to demonstrate content knowledge appropriate to professional career goals.

Course Outcomes		
Semester-I		
Course code	Course name	Course Outcomes
G.1.1	Crystallography and Crystal Optics	<ul style="list-style-type: none"> • Ability to understand laws of crystallography, different crystals and crystal systems • Students can know the relationship between the crystal symmetry and physical properties of minerals • Students can understand the optical properties of minerals • Students can gain the knowledge to identify different minerals under a polarizing microscope

G.1.2	Mineralogy and Geochemistry	<ul style="list-style-type: none"> • Identify the different minerals based on physical properties. • Able to understand their uses and association with different rock types. • Ability to understand the abundance of chemical elements in the Universe and Earth as a whole. • Basic knowledge of geochemical analytical Instruments and operating procedures and protocols, data acquisition and interpretation. • Complete understanding of different geochemical techniques employed in geology
G.1.3	Physical Geology and Geomorphology	<ul style="list-style-type: none"> • Understanding the internal structure and composition of the Earth. • Students can learn about various geological processes involved in shaping various landforms due to varied geological agents. • Students can gain knowledge about volcanoes, earthquakes, and mountain-building activities.
G.1.4	Igneous and Metamorphic Petrology	<ul style="list-style-type: none"> • Students can able to understand the formational conditions of igneous and metamorphic rocks. • Ability to understand various forms, textures, structures, and classifications of igneous and metamorphic rocks. • Students can understand the genesis of igneous and metamorphic rocks
Practical-I		
G.1.5	Crystallography, Crystal Optics and Mineralogy	<ul style="list-style-type: none"> • Able to understand the symmetry of different crystals. • Ability to understand the components of petrological microscope and its applications • Ability to identify different minerals based on optical properties under the microscope.
Practical-II		
G.1.6	Igneous and Metamorphic Petrology	<ul style="list-style-type: none"> • Able to discriminate igneous and metamorphic rocks by physical and

		<p>optical properties.</p> <ul style="list-style-type: none"> • Able to classify the igneous rocks based on norm calculation.
Semester-II		
Course code	Course name	Course Outcomes
G.2.1	Principles of Stratigraphy and Palaeontology	<ul style="list-style-type: none"> • Students can able to understand the description, interpretation and classification of different geological formations. • Detailed Stratigraphy of India and Standard Geological Time scale • Able to understand different species of fossils, morphology, mode of fossilization and age. • Understand the evolution of life on Earth based on fossil record • Application of fossils in Stratigraphic correlation and hydrocarbon exploration.
G.2.2	Indian Geology	<ul style="list-style-type: none"> • Students are able to know the sequence stratigraphy and their subdivisions with Indian examples • Students can understand the physiographic divisions of India • Able to learn the availability of the mineral wealth of Indian geological formations.
G.2.3	Structural Geology and Tectonics	<ul style="list-style-type: none"> • Students can able to recognize different deformative geological structures, their geometry and associated mineralization in rocks. • Have an understanding of rock deformation and types of primary and secondary structures • Learn the concepts and evidences of Continental Drift and plate tectonic theories.
G.2.4	Sedimentology and Fuel Geology	<ul style="list-style-type: none"> • Able to understand different sedimentary rocks and their structures, textures and modes of formation. • Able to gain the knowledge about fuel minerals like coal, petroleum and

		atomic minerals, their origin, occurrence and distribution in India
Practical-I		
G.2.5	Palaeontology and Structural Geology	<ul style="list-style-type: none"> • Identification of fossils based on morphological characters. • Preparation of geological cross sections based on geological maps. • Able to learn and practice the usage of Clinometer and Brunton compass in the field.
Practical-II		
G.2.6	Sedimentology and Fuel Geology	<ul style="list-style-type: none"> • Identification of sedimentary rocks based on megascopic and microscope observation. • Grain size analysis by sieve method to understand the environment of deposition. • Identification of different varieties of fuel minerals. • Calculating the fuel mineral-related problems
Semester-III		
Course code	Course name	Course Outcomes
G.3.1	Oreogenesis	<ul style="list-style-type: none"> • Able to understand the different genetical processes, proposed theories, and classification of Ore minerals • Able to learn mode of occurrences of Ore deposits with in different geological formations.
G.3.2	Hydrogeology	<ul style="list-style-type: none"> • Importance of Groundwater its source and usage. • Able to understand the statistics of the Earth's water. • Able to understand the Hydrological cycle, water-bearing properties of rocks. • Occurrence and distribution of groundwater in various geological formations and provinces of India.
G.3.3(a)	Remote sensing (Elective-I)	<ul style="list-style-type: none"> • Able to learn the principles of remote sensing.

		<ul style="list-style-type: none"> • Able to understand, observe and discriminate the Earth's surface features using remote sensing techniques. • Application of remote sensing in mineral exploration and allied fields.
G.3.3 (b)	Statistical Geology (Elective-II)	<ul style="list-style-type: none"> • Able to learn the applications of statistics to geological concepts • Making use of standard software analysis and interpretation of geological data. • Studying the multivariate data in varied fields of geology.
G.3.4 (a)	Mining and Mineral Beneficiation (Elective-I)	<ul style="list-style-type: none"> • Able to learn different types of mining methods and their importance. • Methods of open cast and underground mining special reference to coal mining. • Able to study different mineral processing techniques and beneficiation methods.
G.3.4 (b)	Mineral Exploration and Mineral Economics (Elective-II)	<ul style="list-style-type: none"> • Able to learn different mineral exploration methods. • Guides for locating mineral deposits • Conservation and substitution of minerals • Mineral policy of India.
Practical-I		
G.3.5	Orogenesis and Elective-I-3.3 (a)/Elective-II-3.3(b)	<ul style="list-style-type: none"> • Identification of Ore minerals by physical properties. • Identification of textures and structures of ore minerals using microscope. • Estimation of Ore reserves by direct and indirect methods. • Determination of thickness, dip direction of ore deposits using borehole data.
Practical-II		
G.3.6	Hydrogeology and Elective-I-3.4(a)/Elective-II-3.4(b)	<ul style="list-style-type: none"> • Able to determine hydrological characters of geological formations. • Rainfall data analysis and interpretation. • Interpretation of geo-morphological and structural features using satellite

		<p>images and aerial photographs.</p> <ul style="list-style-type: none"> • Studying the land use land cover, and drainage patterns using remote sensing techniques
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Semester-IV		
Course code	Course name	Course Outcomes
G.4.1	Mineral Deposits	<ul style="list-style-type: none"> • Students are able to study the origin, mode of occurrence, uses and distribution of metallic and non-metallic minerals in India.
G.4.2	Groundwater Exploration and Management	<ul style="list-style-type: none"> • Groundwater exploration by geological and geophysical methods. • Types of wells and its rehabilitation. • Groundwater quality based on physical and chemical parameters. • Surface and subsurface water pollution. • Water conservation and management techniques.
G.4.3(a)	Geographical Information System (GIS) (Elective-I)	<ul style="list-style-type: none"> • Able to learn basic concepts of GIS techniques. • Knowledge about digitization software techniques • Editing, manipulation, and restoration of spatial data. • Applications of GIS in national development activities.
G.4.3(b)	Chemical Geology (Elective-II)	<ul style="list-style-type: none"> • Able to learn methods of sampling, preparation, and analysis. • Knowledge about the geochemical instrumentation • Major and Rare elemental distribution in the rocks. • Variation diagrams
G.4.4(a)	Environmental Geology (Elective-I)	<ul style="list-style-type: none"> • Man-induced activities in Environmental quality

		<p>modification.</p> <ul style="list-style-type: none"> • Understanding fundamental concepts of Geological Hazards. • Able to understand geotechnical construction and its effects on the environment. • Understanding the causes of Global warming and its effect. • Policy planning of environment.
G.4.4(b)	Engineering Geology (Elective-II)	<ul style="list-style-type: none"> • Studying the engineering properties of different rocks and soils • Able to understand geological considerations for site selection of Dams and Tunnels etc... • Able to understand the impact of natural hazards on civil engineering structures and preventive methods.
Practical-I		
G.4.5	Mineral Deposits and Elective-I-4.3(a)/Elective-II-4.3(b)	<ul style="list-style-type: none"> • Identification of metallic and nonmetallic minerals by physical properties, their uses, mode of occurrence and distribution in India. • Preparing data sets as input for GIS software. • Analysis and manipulation of data in the GIS. • Graphical representation of data using GIS software • Plotting of geochemical data in bivariant and triangular classification diagrams. • Plotting and interpretation of geochemical data against petrogeny's residua system. • Preparation of trace and REE normalized diagrams.
G.4.6	Groundwater Exploration and Elective-I- 4.4(a)/ Elective-II-4.4(b)	<ul style="list-style-type: none"> • Exploration of groundwater by geophysical methods. • Interpretation of geophysical data and curve matching

		<p>techniques.</p> <ul style="list-style-type: none">• Collection of water samples for analysis and graphical interpretation of data.• Interpretation of water quality for Irrigation purposes by Wilcox and USSL diagrams.• Air quality instruments and monitoring.• Interpretation of Geological maps pertaining to the dams and tunnel sites.• Locating the suitable sites for Dams and Tunnels using geological maps.
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