

Programme Outcome: B.Sc. Geology

PO	Particulars
PO – 1	The syllabus is based on an integrated curriculum with an approach to provide learning through problem solving and hands on training techniques.
PO – 2	To provide adequate basic understanding of geology and its uses among students.
PO – 3	Program aims to develop intellectual ability and geological skills through an appropriate blending of theoretical subject education, practical exercises and field training.
PO – 4	To provide basic knowledge, training, skills and eligibility degree for various higher academic courses and Technical Assistant job position in research institutions.
PO – 5	To provide basic degree required to appear for job selections in various services as recruited by UPSC, State and Central Government organisations.
PO – 6	To train students to take up the technical assistant functions at various geological organisations like Survey of India, Oil and Natural Gas Commission, Geological Survey of India etc.
PO – 7	To motivate students to take up higher studies and ultimately research in different sub disciplines of the subject in India and abroad.
PO – 8	To develop appropriate skills in the students to make them competent to take up self employment in innovative geology related fields.
PO – 9	At the end of three years of B. Sc. Geology course students would gain through understanding in the fundamental concepts of geological sciences.

Programme Specific Outcome: B.Sc. Geology

B.Sc. I Semester

Paper	Subject	Outcome
Geology	Physical and Structural Geology	The first semester of B.Sc. Geology enables the students to understand the scope and application of Geology and gives them the confidence to go to the next level of learning in the subject. It aims to provide adequate basic knowledge about origin and age of the earth, various diastrophic processes like earthquakes, volcanism etc, besides understanding the phenomena of folding, faulting, structural mapping and handling of basic geological field instruments.

B.Sc. II Semester

Paper	Subject	Outcome
Geology CC (Core Course)	Crystallography & Mineralogy	This semester of B.Sc. Geology enables the students to understand the concepts of crystal characters, parameters, symmetry and systems. They also get the knowledge of handling petrologic polarizing microscope and about basic physical and optical properties of certain common rock forming minerals.

B.Sc. III Semester

Paper	Subject	Outcome
Geology CC (Core Course)	Petrology	This semester of B.Sc. Geology enables the students to understand origin, distribution, classification, textures and occurrences of igneous, sedimentary and metamorphic rocks.
Geology Skill Enhancement Course (SEC)	Photo Geology & Remote Sensing	This optional course for students of the semester aims to acquaint them with Remote Sensing and Geographic Information System (GIS). It provides the basic understanding of aerial photography and digital satellite imageries, associated interpretations, classifications, and their uses in geology and geomorphology.

B.Sc. IV Semester

Paper	Subject	Outcome
Geology CC (Core Course)	Stratigraphy & Palaeontology	This semester of B.Sc. Geology enables the students to appreciate the stratigraphic principles, distribution of rocks in geological time scale in the Indian Subcontinent and their correlation in global geology besides providing an understanding of classification, evolution and distribution of various invertebrate, vertebrate and plant fossils.
Geology Skill Enhancement Course (SEC)	Geomorphology & Geotectonics	This optional course for students of the semester aims to equip them with the knowledge of topography in relation to drainage and structures, lithology mapping, dynamic earth systems, continental drift, sea floor spreading and plate tectonics.

B.Sc. V Semester

Paper	Subject	Outcome
Geology DSE (Discipline Specific Elective)	Economic Geology & Hydrology	This semester of B.Sc. Geology enables the students to understand origin, occurrence, formation process and distribution in the Indian Subcontinent of various economic minerals. It also provides knowledge of ground water distribution, its parameters and exploration techniques.
Geology Skill Enhancement Course (SEC)	Environmental Geology	This optional course for students of the semester aims to equip them with the understanding of biosphere and its relationships with other spheres, energy budget, geological hazards and resource management.

B.Sc. VI Semester

Paper	Subject	Outcome
Geology DSE	Elements of	This semester of B.Sc. Geology enables the students to gain

(Discipline Specific Elective)	Applied Geology	knowledge about engineering properties of rocks and soils, soil groups, geological considerations in construction of dams and tunnels, landslide causes and prevention, Plane Table/ Theodolite surveying and geological mapping, mineral exploration and mining.
Geology Skill Enhancement Course (SEC)	Geochemistry	This optional course for students of the semester aims to provide them the understanding of bonds, colloids, periodic table, cosmic abundance of elements, geochemical classification, distribution of major, minor and trace elements in various rock types and the basics of geochemical thermodynamics.

Course Outcome: B.Sc. Geology

B.Sc. I Semester Physical and Structural Geology

CO I: Solar System	On completion of this unit student will be familiar with scope of geology, earth and solar system: origin, size, shape, mass, density and its atmosphere.
CO II: Origin and Structure of Earth	On completion of this unit student will be familiar with earth's origin theories and its interior composition.
CO III: Weathering and Erosion	On completion of this unit student will be familiar with process of weathering and erosion
CO IV: Earthquakes and Volcanoes	On completion of this unit student will be familiar with earthquakes and seismic waves, Volcanoes, their types and products.
CO V: Introductory Structural Geology	On completion of this unit student will be familiar with contours, topography, elementary idea of Bed, Dip & Strike, effect of structures on outcrop, use of clinometer / brunton compass
CO VI: Folds	On completion of this unit student will be familiar with types of deformation, nomenclature and types of folds.
CO VII: Faults	On completion of this unit student will be familiar with faults nomenclature, geometrical and genetic classifications, normal, thrust and dip faults.
CO VIII: Joints & Unconformities	On completion of this unit student will be familiar with definition, kinds and significance of joints and unconformity.

B.Sc. I Semester Practical (LAB)

CO I: Physical Geology	On completion of this unit student will have the ability to identify basic geomorphologic, physical & topographic features on maps and ground, besides deriving information from Survey Of India Maps
CO II: Structural	On completion of this unit student will have the ability to use

Geology	clinometers/ brunton compass, recognize different faults and fold types, solve structural problems based on dip and strike, besides preparing cross sections from basic geologic maps.
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B.Sc. II Semester Crystallography & Mineralogy

CO I: Crystal Characters	On completion of this unit student will be familiar with definition and other basic terms associated with crystal description.
CO II: Crystal Measurements	On completion of this unit student will develop familiarity with measurements of crystal axes, angles & interfacial angles.
CO III: Crystal Notations	On completion of this unit student will be able to understand the concept of crystal parameters and notation systems.
CO IV: Crystal Symmetry	On completion of this unit student will be familiar with different elements of crystal symmetry and will be able to describe the normal class of various crystal systems, mentioning nature of their crystal axes, symmetry and forms present.
CO V: Mineral Introduction	On completion of this unit student will familiarize themselves with concept of mineral, its definition & general characters.
CO VI: Mineral Properties	On completion of this unit student will be familiar with common physical properties displayed by minerals in hand specimens, their chemical composition and diagnostic physical properties of certain common rock forming minerals.
CO VII: Petrologic Microscope	On completion of this unit student will develop familiarity with parts and functioning of polarizing petrologic microscope, concept of ordinary and polarized light, various optical properties of minerals' thin sections studied under them and under crossed nicols.
CO VIII: Optical Properties of Minerals	On completion of this unit student will be familiar with optical properties of certain common rock forming minerals as studied under the petrologic microscope.

B.Sc. II Semester Crystallography & Mineralogy (LAB)

CO I: Crystallography	On completion of this unit student will have the ability of recognizing the symmetry elements of normal class of all crystal systems and will be able to draw certain simple and combination crystal forms, found in these classes of all crystal systems.
CO II: Mineralogy	On completion of this unit student will have the ability of recognizing and describing certain common minerals on the basis of their diagnostic physical properties, use of petrological polarizing microscope and study of optical properties of common rock forming minerals.
CO III: Field Training	On completion of this unit student will be familiar with elementary aspects of field geology, observations to be made there, collection of field samples and report preparation thereon.

B.Sc. III Semester Petrology

CO I: Basics of Igneous Petrology	On completion of this unit student will be familiar with definition, composition, types and origin of magma, forms and textures of igneous rocks.
CO II: Crystallization of Magma	On completion of this unit student will be familiar with reaction principles, crystallization of uni-component and bi-component magma, mix crystals, Bowen's Reaction Series, and development of various igneous rocks through differentiation and assimilation.
CO III: Classification of Igneous Rocks	On completion of this unit student will be familiar with mineralogical and chemical classification of igneous rocks.
CO IV: Igneous Petrography	On completion of this unit student will be familiar with the study of petrography and writing description of igneous rocks.
CO V : Sedimentary Rocks	On completion of this unit student will be familiar with formation, classification, textures and structures of sedimentary rocks.
CO VI: Sedimentary Petrography	On completion of this unit student will be familiar with petrographic details of certain common and important siliciclastic and carbonate rocks.
CO VII: Metamorphic Rocks	On completion of this unit student will be familiar with process and products, types, factors, zones and grades of metamorphism, textures, structures and classification of metamorphic rocks.
CO VIII: Metamorphic Petrography	On completion of this unit student will be familiar with petrographic details of certain common and important metamorphic rocks.

B.Sc. III Semester Petrology (LAB)

CO I: Igneous Petrology	On completion of this unit student will develop the ability to identify certain igneous rocks in hand specimen as well as in thin sections, using the physical and optical properties of minerals present in them.
CO II: Sedimentary and Metamorphic Petrology	On completion of this unit student will develop the ability to identify certain Sedimentary and Metamorphic rocks in hand specimen as well as in thin sections, using the physical and optical properties of minerals present in them

B.Sc. III Semester Photo Geology and Remote Sensing (SEC)

CO I: Introduction to Photo Geology	On completion of this unit student will be familiar with elementary idea of Photo Geology, it's scope, uses and importance. Electromagnetic Spectrum, Types and geometry of aerial photographs, factors affecting aerial photographs and their scales; Types of camera, films and filters.
CO II: Introduction to Remote Sensing	On completion of this unit student will be familiar with fundamental concepts in remote sensing, it's applications in geomorphology and geology, remote sensing systems and sensors involved, electromagnetic signatures of rocks, minerals and soils.
CO III: Digital Image	On completion of this unit student will be familiar with various

Processing	types of national and foreign satellites, fundamental steps involved in digital image processing, elements of pattern recognition and classification.
CO IV: Geographical Information System	On completion of this unit student will be familiar with basics of GIS and it's components, products produced with GIS, tools for digital map analysis and integration of GIS with Remote Sensing.

B.Sc. IV Semester Stratigraphy and Paleontology

CO I: Basics of Stratigraphy	On completion of this unit student will be familiar with definition, principles of stratigraphy, geological time scale and stratigraphic classification. Physiographic divisions of India.
CO II: Stratigraphic Successions	On completion of this unit student will be familiar with Precambrian successions of Dharwar, Cuddapha, Vindhyan and Delhi Supergroups, Brief idea of Paleozoic succession of northwestern Himalayas, Triassic of Spiti, Mesozoic type succession of Kutch and Rajasthan, Cretaceous of Triuchirapalli.
COIII: Type Localities	On completion of this unit student will be familiar with type localities of Gondwana and Deccan Trap.
CO IV: Paleogene-Neogene	On completion of this unit student will be familiar with Paleogene-Neogene sequences of northwest Himalaya and Assam.
CO V: Understanding Fossils	On completion of this unit student will be familiar with fossils their characters and significance, taxonomical binomial nomenclature, modes and conducive conditions of fossilization.
CO VI: Shelly Invertebrate Texa	On completion of this unit student will be familiar with morphology and geological distribution of brachiopods, pelecypods (bivalves), and cephalopods.
CO VII: Higher Inverebrate Texa	On completion of this unit student will be familiar with morphology and geological distribution of trilobites and echinoids.
CO VIII: Vertebrate Paleontology and Paleobotany	On completion of this unit student will be familiar with evolutionary history of horses, morphology, distribution and significance of Gondwana flora.

B.Sc. IV Semester Geomorphology and Geotectonics (SEC)

CO I: Principles and Techniques	On completion of this unit student will be familiar with basic principles of geomorphology, geomorphological cycles, weathering and erosion, geomorphic mapping tools and techniques.
CO II: Physical Processes	On completion of this unit student will be familiar with Epigene/exogenic processes, degradation and aggradation, hypogene/endogenic processes, diastrophism and volcanism, extraterrestrial processes, geological work of wind, glacier, river, underground water and ocean.
CO III: Dynamic Earth	On completion of this unit student will be familiar with earth as a dynamic system, elementary idea of continental drift, sea floor

	spreading, mid-oceanic ridges, paleomagnetism and its application.
CO IV: Plate Tectonics	On completion of this unit student will be familiar with the concept of plate tectonics, plate margins, orogeny, deep sea trenches, island arcs and volcanic arcs.

B.Sc. IV Semester Stratigraphy and Paleontology (LAB)

CO I: Paleontology	On completion of this unit student will be able to describe the morphological characters, taxonomic classification and age of selected invertebrate groups, viz., brachiopods, bivalves, cephalopods, trilobites and echinoids.
CO II: Stratigraphy	On completion of this unit student will be able to prepare lithostratigraphic maps of India showing distribution of important geological formations.
CO III: Field Training	On completion of this unit student will be familiar with geological field observations in sedimentary or petrologically important terrains of Himalayas and report preparation thereon.

B.Sc. V Semester Economic Geology and Hydrology

CO I: Ores	On completion of this unit student will be familiar with ore and ore deposits, ore minerals and gangue minerals, tenor of ores, metallic and non-metallic ore minerals, strategic, critical and essential minerals.
CO II: Ore Formation	On completion of this unit student will be familiar with processes of formation of ore deposits, magmatic, contact metasomatic and hydrothermal sedimentation process.
CO III: Metallic and Industrial	On completion of this unit student will be familiar with important metallic and non-metallic (industrial) minerals.
CO IV: Organic Fuels	On completion of this unit student will be familiar with distribution of coal and petroleum in India.
CO V: Introduction To Hydrology	On completion of this unit student will be familiar with definition and hydrological cycle.
CO VI: Hydrological Parameters	On completion of this unit student will be familiar with hydrologic parameters like precipitation, evaporation, transpiration and infiltration.
CO VII: Groundwater	On completion of this unit student will be familiar with origin of groundwater, its vertical distribution and types of aquifers, porosity, permeability, specific yield and specific retention.
CO VIII: Groundwater Exploration and Provinces	On completion of this unit student will be familiar with geological and geophysical methods of groundwater exploration and ground water provinces of India.

B.Sc. V Semester Economic Geology and Hydrology (LAB)

CO I: Economic Geology	On completion of this unit student will be able to study ore and economic minerals in hand specimen, preparation of maps showing distribution of important metallic and non-metallic deposits and important coal and oil fields of India.
CO II: Hydrology	On completion of this unit student will be able to study hydro-geological models, estimation of porosity and permeability from the given data, preparation and interpretation of water table maps.

B.Sc. V Semester Environmental Geology (SEC)

CO I: Earth Materials	On completion of this unit student will be familiar with earth and its spheres, atmosphere, hydrosphere, lithosphere, biosphere and man and various earth materials.
CO II: Environment and Climate	On completion of this unit student will be familiar with energy budget, solar radiation, global environments: coastal, riverine, desertic, tropical, cold, polar; global warming and climate change.
CO III: Geological Hazards	On completion of this unit student will be familiar with important geological hazards: earthquakes, volcanoes, landslides, avalanches, floods and draughts; hazard mitigation.
CO IV: Resource Management	On completion of this unit student will be familiar with Conventional and non-conventional energy resources and their management, water resources and watershed management, land use planning and land reclamation.

B.Sc. VI Semester Applied Geology

CO I: Engineering Properties of Rocks	On completion of this unit student will be familiar with basic engineering properties of rocks and soils.
CO II: Soils	On completion of this unit student will be familiar with various types of soils, conditions of their development and their distribution in India.
CO III: Dams	On completion of this unit student will be familiar with dams, their types, geological and environmental considerations in deciding the location, design/ type of dam and geological problems of reservoirs.
CO IV: Tunnels	On completion of this unit student will be familiar with basic concepts in tunneling, associated problems, tunnel supports, hazardous and favorable geological conditions for tunnel construction/site-selection, Role of water table and associated seepage problems in tunnels.
CO V: Landslides	On completion of this unit student will be familiar with classification, causes and prevention of landslides.
CO VI: Mineral Exploration	On completion of this unit student will be familiar with elementary idea of geological and geophysical prospecting for mineral exploration.

CO VII: Mining	On completion of this unit student will be familiar with elementary idea of mining.
CO VIII: Environmental Considerations	On completion of this unit student will be familiar with environmental considerations for mining.

B.Sc. VI Semester Applied Geology (LAB)

CO I: Mapping	On completion of this unit student will be familiar with surveying by Plane Table/ Theodolite and preparation of engineering geological maps.
CO II: Engineering Geology	On completion of this unit student will be familiar with soil profiles, engineering properties and identification of building stones, models of landslide, tunnel and dam.
CO III: Field Training	On completion of this unit student will be familiar with geological field observations in important engineering geology or geological hazard sites and report preparation thereon.

B.Sc. VI Semester Geochemistry (SEC)

CO I: Introduction	On completion of this unit student will be familiar with basics of crystal chemistry, chemical bonds, coordination number. Colloids, ion exchanges and Periodic Table.
CO II: Elemental Abundance	On completion of this unit student will be familiar with cosmic abundance of elements, composition of planets and meteorites, geochemical evolution of earth and geochemical cycle.
CO III: Elements' Classification and Distribution	On completion of this unit student will be familiar with Gold Schmidt's geochemical classification of elements and distribution of major, minor and trace elements in various categories of rocks.
CO IV: Thermodynamics and Isotope Geochemistry	On completion of this unit student will be familiar with Basics of geochemical thermodynamics, isomorphism and polymorphism and isotope geochemistry.