

<b>DEPARTMENT OF GEOLOGY</b>		
<b>Course Code</b>	<b>Course name</b>	<b>Course Outcome</b>
GEOL/I/EC/01	General & Structural Geology and Mineralogy	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand the meaning and scope of Geology, Plate tectonics, Earthquake and volcanoes.</p> <p>CO2: understand the dip and strike of a rock bed, different structural features of rocks such as fold, faults, joints and unconformities, Use and understand the measuring instruments such as clinometer and Brunton compass. CO3: Understand the meaning and classification of minerals, study and identify common mineral groups such as Quartz, feldspar, Olivine, Pyroxene, Mica, Garnet.</p> <p>CO4: Understand the working principles of Petrological Microscope, isotropism, nature of light, optical properties of common rock forming minerals.</p> <p>CO5: Understand the fundamental laws of crystallography, elements of crystal symmetry, different crystal system and normal class of each crystal systems.</p>
GEOL/I/EC/02	General & Structural Geology and Mineralogy (Practical)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: differentiate Internal Structure of the Earth, determine the epicenter of earthquake,</p> <p>CO2: use geological compass at the field, calculate true dip and apparent dip using geometrical method, draw geological cross section and complete the outcrop.</p> <p>CO3: determine the elements of crystal symmetry of each crystal system.</p> <p>CO4: identify common rock forming minerals in hand specimen and identify common rock forming minerals under petrological microscope.</p>
GEOL/II/EC/03	Petrology & Geochemistry	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Explains definition and sub-divisions of Petrology, composition and types of magma, Bowens reaction series, texture, structure and classification of Igneous rocks and petrography of common igneous rocks</p> <p>CO2: Explains origin of sedimentary rocks, texture, composition, Primary sedimentary structures, classification and petrography of common sedimentary rocks.</p> <p>CO3: understand texture, structure, zones, types and agent of metamorphism and metamorphic facies. Identify common metamorphic rocks.</p> <p>CO4: explain geochemical classification, primary and secondary dispersion and cosmic abundance of elements, principles of diadochic replacement in minerals.</p> <p>CO5: Understand the concept and principle of analytical</p>

		instruments such as XRF, XRD, ICP-MS, SEM and EPMA
GEOL/II/EC/04	Petrology & Geochemistry (Practical)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify some common Igneous, Sedimentary and Metamorphic rocks in hand specimen and thin section under Petrological microscope.</p> <p>CO2: Prepare Isograd maps</p> <p>CO3: Determine enriched horizon through interpretation of geochemical field data.</p>
GEOL/III/EC/05	Stratigraphy & Paleontology-I	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand definition, subdivisions, scope and relation of geology to Paleontology, the mode of preservation of fossils and systematic classification of organisms.</p> <p>CO2: Explain morphology, geological distribution and paleoecology of Trilobites, Graptolites, Corals, Echinoids, Brachiopods and Molluscs.</p> <p>CO3: Explain definition, scope and principles of Stratigraphy</p> <p>CO4: Classify important Indian Precambrian and Proterozoic geologic horizons.</p> <p>CO5: Classify Gondwana Supergroup, Deccan Traps, Siwalik Groups and Tertiary of North East India.</p>
GEOL/III/EC/06	Stratigraphy & Paleontology-I (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify and labeled important genera of phylum Brachiopods and Mollusca</p> <p>CO2: Prepare lithostratigraphic maps of India showing important Indian Precambrian and Proterozoic geologic horizons.</p> <p>CO3: Prepare physiographic map of India showing important features.</p>
GEOL/IV/EC/07	Economic & Applied Geology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand the various process of formation of ore minerals, Classification of mineral deposits and Ore minerals in relation to plate tectonics.</p> <p>CO2: Understand the scope and Duties of a geologist in a mining enterprise and also the surface and underground mining methods.</p> <p>CO3: Explain Principles and methods of important Geological exploration techniques, Basic ideas about Geophysical Exploration Techniques, Geochemical Exploration, Geochemical Sampling methods</p> <p>CO4: Understand Geological Consideration required for the construction of Dam, Tunnel and Bridge, Elementary idea of Photo geology and Photo interpretation and basic of Remote Sensing.</p> <p>CO5: Know basic knowledge of Hydrological</p>

		parameters, Vertical distribution of groundwater. Types of aquifers; Forms of pollution in Ground Water and Ground Water Exploration.
GEOL/IV/EC/08	Economic & Applied Geology (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify and describe some common ore minerals  CO2: Prepare maps showing distribution of important metallic and non-metallic deposits and important coal and oil fields of India.  CO3: Interpret geophysical field data,  CO4: Prepare isograd map, contour map, Assay map.  CO5: Determine enriched horizon through interpretation of geochemical field data.  CO6: Interpret Ariel Photographs using Stereoscopes  CO7: Configure topographical survey using chain and plane table  CO8: Prepare Maps using GIS Software.  CO9: Prepare water table contour map and their interpretation</p>
GEOL/V/EC/09	Applied & Engineering Geology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Explain the geological consideration for the construction of Dam, Reservoir and Tunnel, Building Materials and their Engineering properties and Specification of construction  CO2: Read Topographic sheets and Reconnaissance Geological Traverse. Understand methods of geological mapping, Use brunton compass for taking front and back bearing and measurement of pitch and plunge. Calculate true dip and apparent dip, determine throw/ heave/ stratigraphic separation. Understand strain analysis of deformed rocks and use of stereographic method  CO3. Know the concept of Remote sensing, radar image, orbit of satellite, LANDSAT, SPOT and IRS Series.  CO4: Describe the Principles and applications of Geographic Information System (GIS) in Earth Sciences.  CO5: Understand magnetic field of the Earth, Principles, methods and applications of Palaeomagnetism and basic idea about megnetostratigraphy.</p>
GEOL/V/EC/10	Applied & Engineering Geology (Practical)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Analyse Slope from Topographical Maps.  CO2: Interpret Ariel Photographs using Stereoscopes.  CO3: Configure topographical survey using chain and plane table  CO4: Prepare Maps using GIS Software  CO5: Calculate Intensity of magnetism and prepare lithologs for magnetostratigraphy.</p>
GEOL/V/EC/11	Sedimentology & Sequence stratigraphy	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand various processes of formation of sedimentary rocks, various stages of diagenesis and types of Fluids</p>

		<p>CO2: Explain texture and structure of sedimentary rocks and Classification of sedimentary rock</p> <p>CO3: Explain provenance of sedimentary rocks, Heavy minerals and their significance and depositional environment of sedimentary rocks</p> <p>CO4: Explain definition, composition, classification and petrogenesis of Sandstone, Shale, Limestone &amp; Dolomite</p> <p>CO5: Understand the concept of facies, relation of tectonics and sedimentation, Introduction to sequence stratigraphy.</p>
GEOL/V/EC/12	Sedimentology & Sequence stratigraphy (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify some common Sedimentary rock in hand specimen such as conglomerate, breccia, quartz arenite, arkose, lithic arenite, quartzwacke, feldspathicwacke, lithicwacke (grewacke), mudrocks/shale and limestone.</p> <p>CO2: Identify some common Sedimentary rock in thin section under Petrological microscope such as conglomerate, breccia, quartz arenite, arkose, lithic arenite, quartzwacke, feldspathicwacke, lithicwacke (grewacke), mudrocks/shale and limestone.</p> <p>CO3: Plott grain-size parameter on triangular graph.</p>
GEOL/V/EC/13	Igneous & Metamorphic Petrology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Explain different classification scheme, texture, occurrence and distribution of Igneous rocks,</p> <p>CO2: Understand Bowen's reaction series, Magmatic differentiation and assimilation; Concepts of rock series and rock association and Phase rule</p> <p>CO3: Understand Binary and Ternary Systems and their Petrogenesis, descriptive petrography and petrogenesis of following rocks/rock families; (i) Granite-Rhyolite Family; (ii) Syenite-Trachyte Family(iii) Gabbros-Basalt Family; (iv) Ultra basic rocks</p> <p>CO4: Explain Metamorphic zones and isograds; Progressive, regional and thermal metamorphism of pelitic, calcareous and basic igneous rocks, Metamorphic phases and understand common metamorphic rocks</p> <p>CO5: Study Graphical representation of mineral assemblages in ACF, AKF, AFM diagrams, Petrography and petrogenesis of following rocks:-Eclogite, Granulite, Khondalites, Gondites and Migmatites.</p>
GEOL/V/EC/14	Igneous & Metamorphic Petrology (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify some common Metamorphic rock in hand specimen such as Slate, phyllite, schist, gneiss, hornfels, marble, quartzite.</p> <p>CO2: Identify some common Metamorphic rock in thin section under petrological microscope such as Slate, phyllite, schist, gneiss, hornfels, marble, quartzite.</p>

		<p>CO3: Identify some common Igneous rock in hand specimen such as Granite, Syenite, Diorite, Gabbro, Dunite, Pegmatite, Dolerite, Rhyotlite, Pumice, Basalt, Trachyte, Andesite.</p> <p>CO4: Identify some common Igneous rock in thin section under petrological microscope such as Granite, Syenite, Diorite, Gabbro, Dunite, Pegmatite, Dolerite, Rhyotlite, Pumice, Basalt, Trachyte, Andesite.</p>
GEOL/V/EC/15 (A)	Hydrogeology, Oceanography & Environmental Geology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand hydrological parameters, water bearing properties of rocks and types of aquifer</p> <p>CO2: To learn elementary idea of Ground Water Exploration, application of Remote Sensing in Ground Water resources, instrumentation in Hydrology and forms of pollution in Ground Water</p> <p>CO3: To learn ISI and WHO standards for drinking and treatment method and concept of rain water harvesting and artificial recharge.</p> <p>CO4: Explain Hypsography of the continents and ocean floor, Physical and chemical properties of sea water, Ocean currents, waves and tides, Thermohaline circulation and the oceanic conveyor belt.</p> <p>CO5: Understand degradation of our environment, Natural hazards – earthquake, volcanic eruption, landslides, floods, and droughts, coastal erosion and their impact on environment, water and soil pollution and impact of mining on environment.</p>
GEOL/V/EC/16 (A)	Hydrogeology, Oceanography & Environmental Geology (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: plot Ocean Currents on the world outline map</p> <p>CO2: Locate epicenter of an earthquake from three seismic station records</p> <p>CO3: Interpret Environmental impact from field data provided</p> <p>CO4: Demarcate Earthquake prone areas of India</p> <p>CO5: write a report of landslide affected area visited at the field</p>
GEOL/V/EC/17	Paleontology & Stratigraphy-II	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand Binomial nomenclature and procedures in taxonomy; Species concept; Types of fossils, Collection and preparation of macro- and micro- fossils; Identification of fossils: describe a fossil specimen.</p> <p>CO2: Explain Evolution of Horse, Man &amp; Elephant, Evolution and extinction of Dinosaurs, understand Gondwana flora &amp; Siwalik vertebrate fauna.</p> <p>CO3: Explain a detailed study of succession, lithology, age, economic importance and fossil content of the following Indian Stratigraphic horizons.</p>

GEOL/V/EC/18	Paleontology & Stratigraphy-II (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Identify and labeled important genera of phylum Brachiopods, Mollusca, Cephalopoda, Gastropoda and Plant fossils</p> <p>CO2: Locate Distribution of following geological formations on sedimentary basin map of India - Marine Lower Permian, Gondwana Supergroup, Marine Mesozoics, Deccan Traps and equivalents, Marine Cenozoic and Siwalik Group</p>
GEOL/V/EC/19	Economic Geology and Mineral Resources of India	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Know the processes of formation, mode of occurrence of ore deposits, Ore forming minerals-metallic and non-metallic, Common forms and structures of ore deposits and Classification of mineral deposits</p> <p>CO2: Study origin, Mineralogy, geological occurrences, and Indian distribution and uses of: Iron, Manganese, Chromium, copper, Lead, zinc, Gold and Aluminum; conventional &amp; non-conventional energy resources.</p> <p>CO3: Explain metallic mineral deposits of: Iron of Chattisgarh-Orissa, Copper of Singhbhum and Malanjkhanda, Lead-Zinc of Zawar, Uranium of Jaduguda&amp;Meghalaya, Gold of Hutti, Koderma-Hazaribagh Mica Belt</p> <p>CO4: Study Non-metallic mineral deposits of India.</p> <p>CO5: Explain important Gondwana and Tertiary Coal fields of India: Jharia, Important off shore and on shore Oil fields of India: Digboi and Bombay High</p>
GEOL/V/EC/20	Economic Geology and Mineral Resources of India (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: identify important ore and economic minerals in hand specimen such as Asbestos, Barytes, Gypsum, Mica, Graphite, Talc, Magnesite, Kyanite, Sillimanite, Monazite, Pyrite and Diamond.</p> <p>CO2: Prepare maps showing distribution of important metallic and non-metallic deposits and important coal and oil fields of India..</p>
GEOL/V/EC/21	Dynamics of the Earth and Structural Geology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Study the shape, mass, density, rotational and revolution parameters of the earth, Magnetic field; Radioactivity and Geo-chronology of the Earth; Internal structure of the Earth; Geochemical Evolution of the Earth; Geophysical conditions of the Earth: Gravity, magnetism and heat flow.</p> <p>CO2: Study Earth's movement and Paleogeographic distribution and evolution of continents and Plate tectonic theories</p> <p>CO3: Explain agents of weathering and erosion, geological work of natural agencies - rivers, glaciers,</p>

		<p>ocean and wind. Concept of Isostasy and Orogeny.</p> <p>CO4: Understand seismic waves, seismograms, travel-time curves for seismic waves, seismic discontinuities, location and size of earthquake, Earthquake belts, effects of earthquakes and seismic zones of India.</p> <p>CO5: To study Cleavage and Schistosity, Secondary Lamination, Stereographic projection, Beta &amp; Pi Diagrams, Concept of stress &amp; strain and Brittle failure &amp; ductile deformation.</p>
GEOL/V/EC/22	Dynamics of the Earth and Structural Geology (Practicals)	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Interpret data of seismogram</p> <p>CO2: Plot the dip, strike and joints of rock beds using stereonet</p> <p>CO3: Prepare models on Plate margins, mid-oceanic ridges and trenches</p> <p>CO4: delineate drainage pattern and also calculate basin area</p>
GEOL/V/EC/ 23 (a)	Fuel Geology	<p><b>At the end of this course, Students will be able to</b></p> <p>CO1: Understand the definition, Composition, Origin, Migration and Entrapment, source- reservoir and trap rocks of petroleum and important oil fields in India</p> <p>CO2: Understand definition, Chemical, Petrographic Constituents, origin and Classification of coal, Coal reserves of India. Distribution of Coal with special reference to important Indian Coal fields</p> <p>CO3: Described the principles and stages of geological exploration, methods of geological mapping and sampling, classification of ore reserves and determination of Average grades, brief idea about drilling and Coring.</p> <p>CO4: Describe the principles and detailed methods of Geochemical Exploration and sampling, Geochemical profile generation. Geobotanical and Geozoological indicators applicable in mineral exploration.</p> <p>CO5: Understand geophysical exploration techniques: Electrical (Self Potential, Resistivity and Conductivity methods), Seismic Reflection &amp; Refraction Methods. Gravity, Magnetic and Radioactivity Methods. Geophysical Well Logging: Spontaneous Potential, Gamma Ray, Resistivity Logs and their response with Lithology encountered through a borehole and different applications</p>
GEOL/V/EC/ 24 (a)	Fuel Geology (Practical)	<p><b>Project work based on Electronics to be assigned/ supervised by teachers.</b></p> <p>CO1: Interpret seismic data recorded by geophones for geological profile generations.</p> <p>CO2: Interpret geological logs data</p> <p>CO3: Prepare Assay maps and Isograde maps</p>

		CO4: Demarcate the distribution of Petroleum and Coal deposits of India on Map of India.
Programme Outcome		<p><b>The following program outcomes have been identified for B.Sc Electronic.</b></p> <p><b>PO1:</b>To impart knowledge in fundamental aspects of all branches of Geology</p> <p><b>PO2:</b>To teach students the principles of Geology</p> <p><b>PO3:</b>To create geological map preparation skills</p> <p><b>PO4:</b>To prepare students for higher education and career in Electronics</p> <p><b>PO5:</b>To develop skills in the proper handling of apparatus and components</p> <p><b>PO6:</b>To make students apply Geology in their day to day life especially during Natural Disasters</p> <p><b>PO7:</b>To create the students a responsible citizen.</p>