Mahishadal Raj College
Department of Geology
Programme: B.Sc. Honours, Generic & General in Geology

***Programme Specific Outcomes (PSOs)* for B.Sc. Geology**

Sr. No.	On completing B.Sc. Geology, the student will be able to:
PSO 1	Understand the internal and external forces on our planet and how the various features, origin, evolution and preservation of life structures within rocks are formed due to Earth's various processes; identify physical properties of rocks, as well as the optical and physical properties of minerals in hand specimens as well as under the microscope.
PSO 2	Develop the knowledge regarding the basic concepts of stratigraphy in order to understand the Precambrian and Phanerozoic stratigraphy of India, along with an understanding of primary and secondary geological structures, recording and collecting data about these structures and reconstructing geological history.
PSO 3	Receive training in hydrogeology, basic meteorology and geological field techniques such as mapping and surveying required for collection, interpretation and application of the geological data.
PSO 4	Recognize the importance of remote sensing and geographic information system in data acquisition and interpretation of satellite images and aerial photographs.
PSO 5	Understand the process of formation of gem minerals and synthetic gemstones in order to develop means and ways to study, detect and identify gemstones using sophisticated instrumentation techniques.
PSO 6	Be professional geologist through exposure to theory and field exploration techniques in earth sciences.

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Course Outcomes (COs): B.Sc. Honours, Generic & General in Geology

Semester I

Course Title: Earth System Science
Course Code: C1T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know the formation and physical dimensions of our planet, understand its uniqueness in the solar system, considering its internal structure and position in the solar system.	1	U, An
CO 2	Understand the various surface and atmospheric phenomenon that occur on Earth, analyse their causes and effects.	1, 3	U, An, E
CO 3	Understand the cataloging of Indian topographical maps, their importance in geology and usage in geological fieldwork.	4, 6	U, R, An
CO 4	Analyse various structures that have formed in surface rocks due to the forces created within Earth's interior, identify them in the field and analyse their mode of formation.	2, 3, 6	Ap, An, E

Course Title: Mineral Science
Course Code: C2T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know the composition and basic chemistry of minerals that makeup Earth's materials.	1	U, R
CO 2	Understand how minerals are classified on the basis of their physical and chemical properties.	1, 6	U, R, Ap, An
CO 3	Applying the elementary ideas of crystal structure in understanding the external characteristics of crystals and classifying them.	1	U, Ap, An, E
CO 4	Identify important minerals that combine to form various rocks and their classification.	1, 6	U, R, Ap, An

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Course Title: Essentials of Geology
Course Code: GE1-T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know the formation and physical dimensions of our planet, understand its uniqueness in the solar system, considering its internal structure and position in the solar system.	1	U, An
CO 2	Understand the various surface and atmospheric phenomenon that occur on Earth, analyse their causes and effects.	1, 3	U, An, E
CO 3	Understand the different types of radioactivity and its application in determining the age of the Earth**.**	4, 6	U, R, An
CO 4	Understand concept of different types of rocks, minerals and fossil.	2, 3, 6	Ap, An, E

Course Title: Physical and Structural Geology
Course Code: DSC- 1AT

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the meaning and scope of Geology, Plate tectonics, Earthquake and volcanoes.	1	U, An
CO 2	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.	1, 3	U, An, E
CO 3	Know the formation and physical dimensions of our planet, understand its uniqueness in the solar system, considering its internal structure and position in the solar system.	1	U, An
CO 4	Understand the various surface and atmospheric phenomenon that occur on Earth, analyse their causes and effects.	1, 3	U, An, E

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Course Title: Earth System Science Lab Practical
Course Code: C1P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO1	Interpret data of seismogram	1
CO2	Plot the dip, strike and joints of rock beds using stereonet	1
CO3	Prepare models on Plate margins, mid-oceanic ridges and trenches	1
CO4	Delineate drannage pattern and also calculate basin area	1

Course Title: Mineral Science Lab Practical
Course Code: C2P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identify important minerals that combine to form various rocks and their classification.	1
CO 2	Apply the elementary ideas of crystal structure in understanding the external characteristics of crystals.	1
CO 3	Use basic instruments for locating themselves in the field, and understand the use of Indian topographical maps, their importance in geology and usage in geological fieldwork.	1, 2, 3, 6

Course Title: Essentials of Geology Lab Practical
Course Code: GE1P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identify important minerals, rocks and fossils.	1
CO 2	Delineate drannage pattern and also calculate basin area	1
CO 3	Study of distribution of major lithostratigraphic units on the map of India.	1, 2

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Course Title: Physical and Structural Geology Practical
Course Code: DSC 1AP

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Study of important geomorphological models; Reading topographical maps of the Survey of India; Identification of geomorphic features.	1
CO 2	Study of clinometers/Brunton compass	1
CO 3	Identification of different types of folds/faults from block models; Exercises on structural problems and preparation of cross section profile from a geological map.	1, 2

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Course Title: Elements of Geochemistry
Course Code: C3T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	To understand the application of chemistry in geological settings	1	U, R, Ap, An
CO 2	To produce a treatise on ore deposits focusing on their geochemistry.	1, 6	U, R, Ap, An, E
CO 3	To detail on the isotope and environmental geochemistry.	1	U, R, Ap, An
CO 4	Explain geochemical classification, primary and secondary dispersion and cosmic abundance of elements	1, 6	U, R, Ap, An

Course Title: Structural Geology
Course Code: C4T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Identify geological structures in the field and collect structural data	1	U, R
CO 2	Generate strain ellipsoid and infer past stress fields	1	U, An
CO 3	Know generation of deformation structures and describe them; identify and understand structures.	1, 6	U, R, Ap
CO 4	Understand relationship between tectonics, metamorphism and structures.	1	U, R, Ap, An
CO 5	Construct geological cross section using geological map	2, 1	U, R, Ap, An

Course Title: Physics and Chemistry of Earth
Course Code: GE2T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know the formation and physical dimensions of our planet, understand its uniqueness in the solar system, considering its internal structure and position in the solar system.	1, 6	U, R
CO 2	Explain the concept and importance of plate tectonics and evolution of theory of plate tectonics.	1, 2, 3	U, An
CO3	To understand the application of chemistry in geological settings.	1,4	U, R, Ap

CO4	To detail on the isotope and environmental geochemistry.	1,3	U, R, Ap, An

Core Course: Crystallography and Mineralogy
Course Code: DSC-1BT

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO1	Understand the basics of crystallograph;y build overall knowledge in mineralogy and optics leading to a better understanding of petrology and gemmology.	1, 5	U, An, Ap
CO2	Identify common rock-forming minerals in hand specimens as well as in thin sections.	1, 6	U, Ap, An,
CO3	Comprehend the role of minerals in understanding Earth's interior, geologic history and evolution. 1 Ap, An, E	1	U, R, Ap, An
CO4	Understand the macroscopic properties of minerals and their relationship to crystal system, internal structure and optical properties.	1, 2, 3	U, An
CO5	Realise the importance of minerals in society and their industrial applications.	6	U, R, Ap

Course Title: Elements of Geochemistry (Lab)
Course Code: C3P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Understand the variation diagram, Differentiation trends from bivariate and trivariate plots	1,2
CO 2	Understand chemical variation of rock types based on major elements	3

Course Title: Structural Geology (Lab)
Course Code: C4P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Use the basic skills acquired to interpret geological maps and cross sections in building the geological history;	1
CO 2	Use geological compass at the field, calculate true dip and apparent dip using geometrical method	3, 5
CO 3	Understand the interpretation of topographic maps, fold and fault problems and their solutions through stereographic projection methods.	4

Course Title: Physics and Chemistry of Earth (Lab)
Course Code: GE 2P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Understand the magma differentiation and geochemical variability	2
CO 2	Understand tectonic settings based on trace elements	4
CO 3	Understand the effects of Isostatic adjustment in the mountains and ocean basins	1, 6

Core Course: Crystallography and Mineralogy (Practical)
Course Code: DSC-1BP

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identify crystal symmetry and crystal classes of all crystal system	2
CO 2	Identify and describe the physical and optical properties of common rock-forming minerals.	1

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Semester III

Course Title: Igneous Petrology Theory
Course Code: C5T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Possess a basic understanding of the interior of Earth and common igneous rock nomenclature.	1	R, U
CO 2	Assign names to igneous rocks based on their mineralogicaland textural characteristics, and infer the processes or environment of their formation and tectonic associations.	1	U, Ap, An
CO 3	Understand the phase diagrams and basic experimental petrological studies to understand the crystallization and melting behaviour of minerals under various conditions; compare this with the magma formation under various tectonic set up.	1	U, An, E
CO 4	Sketch a petrographic thin-section; prepare a petrologicalreport of a given igneous rock sample.	1, 6	An, C
CO 5	Use a petrological microscope; be familiar with the distribution of various igneous rocks in India.	1	U, Ap

Course Title: Sedimentary Petrology Theory
Course Code: C6T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Recall the concepts of weathering, erosion, sediment transport; and understand the effect of these processes in the formation of sedimentary rocks.	1	U, R, Ap
CO 2	Understand classification, nomenclature, importance and description of detrital, chemical and biogenic sedimentaryrocks in thin sections and in the field.	1	U, Ap, An, E, C
CO 3	Understand, analyze and interpret sedimentary structures and textures; collect data about these.	1, 3, 6	U, R, Ap, An, E, C
CO 4	Identify and apply sediment source indicators such as heavyminerals to understand geochemistry of sedimentary rocks.	1, 6	U, R, Ap, An, E, C
CO 5	Interpret sedimentary rock succession to determine environment of deposition and paleoclimate.	1, 3	U, R, Ap, An, E, C

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Course Title: Palaeontology Theory
Course Code: C7T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Identify and labeled important genera of phylum Brachiopods, Mollusca, trilobites, Cephalopoda, Gastropoda and Plant fossils	1	R, U
CO 2	Understand the fossilization and fossil record, taxonomy and systematics, evolution and history of life.	1, 6	U, Ap
CO 3	Understand the origin of vertebrates and major steps in vertebrate evolution, diversity and extinction of dinosaurs, evolution of horse and intercontinental migrations and human evolution.	1, 6	R, U, An
CO 4	Use basic concept of paleobotany, Gondwana Flora Introduction to Ichnology.	1	U, Ap, An
CO 5	Concept of application of fossils in Stratigraphy	1	U, An, E

Course Title: Fossils and Their Applications Theory
Course Code: GE 3T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Identify and labeled important genera of phylum Brachiopods, Mollusca, trilobites, Cephalopoda, Gastropoda and Plant fossils	1	R, U
CO 2	Understand the fossilization and fossil record, species, taxonomy and systematics, evolution and history of life.	1, 6	U, Ap
CO 3	Understand the economic importance of fossil record.	1, 6	R, U, An
CO 4	Use basic concept of paleobotany, Gondwana Flora Introduction to Ichnology.	1	U, Ap, An
CO 5	Concept of application of fossils in Stratigraphy	1	U, An, E

Course Title: Petrology Theory
Course Code: DSC 1C (CC-3) T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand classification, nomenclature, importance and description of detrital, chemical and biogenic sedimentaryrocks in thin sections and in the field.	1	R, U
CO 2	Understand, analyze and interpret sedimentary structures andtextures; collect data about these.	1, 6	U, Ap
CO 3	Identify various megascopic and microscopic textures and structures in laboratory as well as on the field, and understand their significance with regard to geological processes that have operated.	1, 6	R, U, An
CO 4	Assign names to igneous rocks based on their mineralogicaland textural characteristics, and infer the processes or environment of their formation and tectonic associations.	1	U, Ap, An
CO 5	Understand basic processes and types of metamorphism.	1	U, R
CO 6	Identify various types of metamorphic rocks based onmineralogy and structures.	1, 6	U, R, Ap

Course Title: Igneous Petrology– II Lab
Course Code: C5P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identify the common rock-forming minerals of igneous rocksin hand specimens and thin sections.	1
CO 2	Identify various megascopic and microscopic textures and structures in laboratory as well as on the field, and understand their significance with regard to geological processes that haveoperated.	1
CO 3	Use basic instruments for locating themselves in the field, and understand the use of Indian topographical maps, their importance in geology and usagein geological fieldwork.	1
CO 4	Plotting of mode in IUGS classification of plutonic rocks	1

Course Title: Sedimentary Petrology Lab Practical
Course Code: C6P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identification of sedimentary structures and particle size distribution and statistical analysis	1
CO 2	Understand the Paleocurrent analysis	1
CO 3	Identify the petrographic study of clastic and non-clastic rocks through hand specimens and thin sections	1

Course Title: Paleontology Lab Practical
Course Code: C7P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identification of hard part morphology and identification common Brachiopoda, Anthozoa, Trilobita, Echinoidea, Gastropoda. Identification of Gondwana flora	1
CO 2	Study of functional morphological characters of different groups (Bivalvia, Gastropods, Brachiopoda, Echinodermata, Ammonoidea, Gondwana flora, vertebrates)	1
CO 3	Study of fossils with various modes of preservation	1

Course Title: Fossils and Their Applications Practical
Course Code: GE 3P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identification of important fossils from India	1
CO 2	Study of functional morphological characters of different groups (Bivalvia, Gastropods, Brachiopoda, Echinodermata, Ammonoidea, Gondwana flora, vertebrates)	1
CO 3	Study of fossils with various modes of preservation	1

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Course Title: Petrology Practical
Course Code: DSC 1C P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identification of rocks: On the basis of their physical properties in hand specimen; and optical properties in thin sections	1
CO 2	Identification of sedimentary and metamorphic rocks both in hand specimen and thin sections.	1

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Semester IV

Course Title: Metamorphic Petrology
Course Code: C8T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand basic processes and types of metamorphism.	1	U, An,R
CO 2	To learn and identify various types of metamorphic rocks based on mineralogy and structures	3	U, R, Ap, An, E, C
CO 3	Evaluate and analyse the concepts of metamorphic facies and protoliths	3, 6	U, R,
CO 4	Understand and differentiate within various mineral assemblages; identify protoliths based on various textural and structural evidence	3, 6	U,R,C
CO5	To learn Understand basic reaction mechanisms and thermodynamics of metamorphic reactions and plate tectonic concept	3, 6	U, R,

Course Title: Principles of Stratigraphy and Precambrian Stratigraphy of India
Course Code: C9T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the concepts in stratigraphic classification and know nomenclature of the various stratigraphic units	2	U, R, AP
CO 2	To learn elementary idea of lithostratigraphy, biostratigraphy and chronostratigraphy, concepts of dynamic stratigraphy (chemostratigraphy, seismic stratigraphy, sequence stratigraphy), Relevance of Type section	3	U, R, Ap, An, E, C
CO 3	Know Walther's law of facies and its importance to application in the field.	3, 6	U, R,
CO 4	Explain definition, scope and principles of Stratigraphy Classify important Indian Precambrian and Proterozoic geologic horizons.	3, 6	U,R,C
CO5	Classify stratigraphic classification of Singhbhum, Dharwar, Rajasthan, Central India and Eastern Ghats,Vindhyan and Cudappah basins of India.	3, 6	U, R,

Course Title: Phanerozoic Stratigraphy of India
Course Code: C10T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand evolution of life in Phanerzoic era and its effect on rock sequences in India	1	U, R, An
CO 2	Understand the interpretation of sedimentary rock sequences in terms of depositional environments.	3	U, R, Ap, An, E, C
CO 3	Visualize sedimentary and volcanic sequences; understand large igneous provinces in India and their impact on life	3, 6	U, R,
CO 4	Understand structure and lithology of various sedimentary basins of India using Google earth and similar software.	3, 6	U,R,C

Course Title: Skill Enhancement Course (SEC Course)
Code: SEC-2

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know about field training in a sedimentary basin. Documentation of stratigraphic details in the field.	1	U, An
CO 2	Study and preparation of a Geological map of a small area with folded/faulted beds.	1,3	U.R
CO 3	Interrelation between different structural elements and their interpretations	3,4,6	U,R,C

Course Title: Generic
Course Code: GE-4T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Understand the various process of formation of ore minerals, Classification of mineral deposits and Ore minerals.	3
CO 2	Know basic knowledge of Hydrological and nuclear fuel	4
CO 3	Explain Principles and methods of important Geological exploration techniques, Basic ideas about Geophysical Exploration Techniques, Geochemical Exploration, Geochemical Sampling methods	2,3
CO4	Understand Geological Consideration required for the construction of and Photo interpretation and basic of Remote Sensing.	3,6

Course Title: Stratigraphy and Paleontology
Course Code: DSC-1D T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the concepts in stratigraphic classification and know nomenclature of the various stratigraphic units.	2	U, R,Ap
CO 2	Know Walther's law of facies and its importance to application in the field.	2	U, Ap
CO 3	Understand them and concept of origin of life, evolution, and mass extinctions.	1,2	U, Ap
CO 4	Analyse and evaluate the preservation,types and applications of fossils and its scope.	1	U,R, Ap, An
CO 5	Describe functional morphology and evolutionary trends of major invertebrate fossils and a few type vertebrate fossils such as horse and elephant with special emphasis on dinosaur fossils in India.	1	U,R, Ap, An

Course Title: Metamorphic Petrology
Course Code: C8P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identify metamorphic rocks in hand specimens	3
CO 2	Learn Graphical plots of metamorphic mineral assemblages using chemographic diagrams	3,4
CO 3	Study and identify rocks under petrological microscope	3,5

Course Title: Principles of Stratigraphy and Precambrian Stratigraphy of India
Course Code: C9P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Prepare lithostratigraphic maps of India showing important Indian Precambrian and Proterozoic geologic horizons.	2
CO 2	Prepare physiographic map of India showing important features\ Major features of paleogeographic maps	3

Course Title: Phanerozoic Stratigraphy of India
Course Code: C10P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Prepare lithostratigraphic maps of India showing important Indian Phanerozoic stratigraphic basins	4
CO 2	Demarcate the distribution of Petroleum and Coal Deposits of India on Map of India	3

Course Title: Generic
Course Code: GE-4P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Understand the various process of formation of ore minerals, Classification of mineral deposits and Ore minerals.	3
CO 2	Know basic knowledge of Hydrological; Explain Principles and methods of important Geological exploration techniques, Basic ideas about Geophysical Exploration Techniques, Geochemical Exploration, Geochemical Sampling methods	4
CO 3	Section correlation and identification of hydrocarbon prospect	2,3
CO4	Demarcate the distribution of Petroleum and Coal Deposits of India on Map of India.	3,6

Course Title: Stratigraphy and Paleontology
Course Code: DSC-1D P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO1	Identify and study (morphology and classification) of macro and microfossils along with their geological distribution.	1, 2
CO2	Apply crystallography in various fields with special emphasis on mineralogy.	1
CO3	Utilize the knowledge of cartographic techniques, their applications and interpretations on topographical maps.	1,2, 6

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Semester V

Course Title: Hydrogeology
Course Code: C11T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand hydrological parameters, water bearing properties of rocks and types of aquifer	1	U, An
CO 2	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	3	U, R, Ap, An, E, C
CO 3	Evaluate and analyse various methods of groundwater recharge.	3, 6	U, R,
CO 4	Acquire the necessary skills in the investigations and interpretation of surface and subsurface groundwater.	3, 6	U,R,C
CO5	To learn ISI and WHO standards for drinking and treatment method and concept of rain water harvesting and artificial recharge.	3, 6	U, R,

Course Title: Economic geology
Course Code: C12T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	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	1	U, An
CO 2	Study origin, Mineralogy, geological occurrences, and Indian distribution and uses of: Iron, Manganese, Chromium, copper, Lead, zinc.	3	U, R, Ap, An, E, C
CO 3	Explain metallic mineral deposits of: Iron of Chattisgarh-Orissa, Copper of Singhbhum and Malanjkhand, Lead-Zinc of Zawar, Uranium of Jaduguda&Meghalaya, Gold of Hutti, Koderma-Hazaribagh Mica Belt	3, 6	U, R,
CO 4	Study Non-metallic mineral deposits of India.	3, 6	U,R,C

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Course Title: Geophysics
Course Code: DSE 1T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Know about geophysics and interrelationship with geology and geophysics.	1	U, An
CO 2	Study different types of geophysical method and there application, interpretation of geophysical data and well logging processes and data monitoring.	1,3	U.R
CO 3	Study of different types of surveys, grid and route surveys, profiling and sounding techniques, Scales of survey, Presentation of geophysical data, data acquisition and Processing. Data reduction. Signal and noise.	3,4,6	U,R,C

Course Title: Fuel Geology
Course Code: DSE 2T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the definition, Composition, Origin, Migration and Entrapment, source- reservoir and trap rocks of petroleum and important oil fields in India	1	U, An
CO 2	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	1,3	U.R
CO 3	Study of clean coal technology, coal bed methane processes and underground coal gasification processes.	1,2	U, R, An

Course Title: Economic Geology and Hydrology
Course Code: DSE-1AT

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	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	1	U, An
CO 2	Study origin, Mineralogy, geological occurrences, and Indian distribution and uses of: Iron, Manganese, Chromium, copper, Lead, zinc.	3	U, R, Ap, An, E, C
CO 3	Distribution of coal petroleum in India.	3	U, R,
CO 4	Understand hydrological parameters, water bearing properties of rocks and types of aquifer	3, 6	U,R,C
CO5	To learn surface and subsurface geophysical and geological methods of ground water exploration; Ground water provinces of India.	3,4	U, R,

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Course Title: Environmental Geology
Course Code: SEC 3T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Study of earth and its spheres: atmosphere, hydrosphere, lithosphere, biosphere and Man; Earth Material	4	U, R
CO 2	Geoloigcal hazards: Earthquakes, volcanism, landslides, avalanches, floods, droughts; Hazard mitigation	3, 4, 6	R, Ap
CO 3	Resource Management: Energy resources (Conventional and non-conventional), watershed management, land use planning, management of water resources, land reclamation.	4	U, Ap, E

Course Title: Hydrogeology Practical
Course Code: 11P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO1	Preparation and interpretation of depth to water level maps and water level contour maps. Study, preparation and analysis of hydrographs for differing groundwater conditions	3
CO2	Water potential zones of India (map study)	3
CO3	Graphical representation of chemical quality data and water classification (C-S and Trilinear diagrams). Simple numerical problems related to: determination of permeability in field and laboratory and Groundwater flow.	3,4

Course Title: Economic Geology Practical
Course Code: 12P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO1	Hand sample identification of important ores and non-metallic minerals	1
CO2	Study of microscopic properties of ore forming minerals (Oxides and sulphides)	1
CO3	Prepare maps showing distribution of important metallic and non-metallic deposits and important coal and oil fields of India.	3

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Course Title: Geophysics Practical
Course Code: DSE 1P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Anomaly and background- Graphical method.	3
CO 2	Study and interpretation of seismic reflector geometry.	3,4
CO 3	Gravity anomaly: Problems on gravity anomaly.	3

Course Title: Fuel Geology Practical
Course Code: DSE 2P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Study of hand specimens of coal	1
CO 2	Reserve estimation of coal	3
CO 3	Section correlation and identification of hydrocarbon prospect	2,3
CO4	Demarcate the distribution of Petroleum and Coal Deposits of India on Map of India.	3,6

Course Title: Economic Geology and Hydrology practical
Course Code: DSE1AP

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Study of 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.	4
CO 2	Study of hydro-geological models, Estimation of porosity and permeability from the given data; Preparation and interpretation of water table maps.	3

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Semester VI

Course Title: Geomorphology, Remote Sensing and GIS
Course Code: C13T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Understand the basic principles of remote sensing, the physics and optics of the data gathering, mechanisms, their evolution through history, their capabilities; know the development of Indian remote sensing satellites and systems.	4	U, R
CO 2	Utilise the basic principles of image interpretation for visually understanding and interpreting satellite imagery and topographical maps.	3, 4, 6	R, Ap
CO 3	Understand satellite data formats, their characteristics, their mode of acquisition; detect errors in satellite data and methods of correcting them.	4	U, Ap, E
CO 4	Understand and evaluate the various algorithms commonly used in computer processing of satellite data.	4	U, Ap, E
CO 5	Understand the application of image classification algorithms; create classified images for mapping of geological structures, Earth's surface features like vegetation, water bodies.	4, 6	U, Ap, An, C
CO 6	Understand the basic development of landform and various micro- and macro- processes that operate on them.	1, 3	U, R, Ap, An
CO 7	Identify various types of landforms and classify them according to agents of their formation.	1, 3	U, R, Ap, An
CO 8	Understand the basic concepts of toposheet/topographic reading and slope analysis.	1, 3	U, R, Ap, An
CO 9	Acquire knowledge about various techniques used for drainage basins and its analysis for various parameters.	1, 3, 6	U, R, Ap, An

Course Title: Engineering Geology
Course Code: C14T

Sr. No.	**On completing the course, the student will be able to:**	**PSOs addressed**	**Cognitive levels**
CO 1	Understand various geological and engineering properties of rocks for its possible use in construction projects.	1	U, R
CO 2	Be familiar with various sources of rock materials and their geological properties; distinguish and select the type of material to be chosen for civil engineering projects.	1, 3	U, R, Ap
CO 3	Acquire the knowledge about various suitable and unsuitable geological conditions for different types of construction purposes.	1, 3, 6	U, R, Ap, An

CO 4	Analyse various known, well-studied failure cases of dams and bridges resulting due to problems arising from underestimation of structural-geological conditions.	1, 6	U, R, Ap, An

Course Title: Exploration
Course Code: DSE 3T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Study of resource: definitions, mineral resources in industries – historical perspective and present scenario, classification of mineral deposits with respect to processes of formation; exploration strategies.	1	U, R
CO 2	Principles of mineral exploration, outline of exploration techniques for ferrous and non-ferrous metals, limestone and coal and petroleum, core and non-core drilling technic.	1, 3	U, R, Ap
CO 3	Evaluation of sampling data - Mean, mode, median, standard deviation and variance, Reserve estimation, and geometrical models (square, rectangular, triangular and polygon blocks).	1, 3, 6	U, R, Ap, An

Course Title: Oceanography & Marine science
Course Code: DSE 4T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	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.	1	U, R
CO 2	Life in the Ocean: Marine life and the environment, biologic productivity and in ocean, animals of the pelagic environment and life, animals of the benthic environment and life.	1, 3	U, R, Ap

Course Title: Fossils and Their Applications
Course Code: DSE 2BT

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Identify and labeled important genera of phylum Brachiopods, Mollusca, trilobites, Cephalopoda, Gastropoda and Plant fossils	1	R, U
CO 2	Understand the fossilization and fossil record, species, taxonomy and systematics, evolution and history of life.	1, 6	U, Ap
CO 3	Understand the economic importance of fossil record.	1, 6	R, U, An
CO 4	Use basic concept of paleobotany, Gondwana Flora Introduction to Ichnology.	1	U, Ap, An
CO 5	Concept of application of fossils in Stratigraphy	1	U, An, E

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Course Title: Geochemistry
Course Code: SEC4T

Sr. No.	On completing the course, the student will be able to:	PSOs addressed	Cognitive levels
CO 1	Introduction to geochemistry, types of chemical bonds, coordination number; colloids in geological, Elementary idea of Periodic Table	1	U, An, Ap
CO 2	Cosmic abundance of elements, geochemical evolution of the earth and geochemical cycles; Gold Schmidt's rules, distribution of major, minor and trace elements in igneous, metamorphic and sedimentary rocks.	1	U, An, E

Course Title: Geomorphology, Remote Sensing and GIS Practical
Course Code: C13P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Develop skills in understanding how the satellite image data are acquired and interpreted.	4
CO 2	Understand the application of image enhancement, manipulation and image classification algorithms to create classified images for mapping of geological structures, earth's surface features such as vegetation, water bodies, etc.	3, 4
CO3	Preparation of longitudinal profile of a river, calculating Stream length gradient index,	3
CO4	Introduction to DIP and GIS software, DEM analysis: generating slope map, aspect map and drainage network map and its applications	3

Course Title: Engineering Geology Practical
Course Code: C14P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Computation of reservoir area, catchment area, reservoir capacity and reservoir life. Merits, demerits & remedial measures based upon geological cross sections of project sites	3
CO 2	Computation of Index properties of rocks. Computation of RQD, RSR, RMR and 'Q	3,6

Course Title: Exploration Geology Practical
Course Code: DSE 3P

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Identification of anomaly: Gravity and Magnetic. Concept of weighted average in anomaly detection.	1,3
CO 2	Geological cross-section, reserve estimation, reserve estimation method and application.	3,4

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Course Title: Fossils and Their Applications practical
Course Code: DSE 2BP

Sr. No.	On completing the course, the student will be able to:	PSOs addressed
CO 1	Study of fossils showing various modes of fossilization.	1,3
CO 2	Study of important fossils from India (list may be prepared by the department concern).	3,4