

NAME OF THE PROGRAMME : M.Sc. GEOLOGY

PROGRAMME OUTCOME

1. Understanding development of landforms through Earth's external processes by various geological agents; marine processes and formation of marine landforms.
2. Study of tectonic processes and their effects in the formation and modifications of structures; their recognition in the field.
3. Study of evolution of vertebrate and invertebrate animals; Stratified rock types and their chronological distribution in India
4. Understanding the role of Geology in environmental issues and their remedies; Management measures of disasters.
5. Study of Crystal structure; properties of various group of minerals; Different rock types and their mode of origin and classification.
6. Study of various exploration methods for mineral wealth including coal and petroleum and exploiting them through mining; Application of GIS and remote sensing to various geological problems.

COURSE OUTCOME

COURSE : GEOMORPHOLOGY AND MARINE GEOLOGY

1. Understanding the concept of evolution of landforms. Characteristic and types of landforms produced by fluvial action.
2. Study of characteristics and types of landforms produced by fluvial, marine and volcanic action.
3. Study of landforms produced by ground water and geologic structures; Drainage patterns.
4. Study of origin and characteristics of ocean basin; Instruments used; Geological and Geophysical investigations; Circulation pattern of water; Mineral resources
5. Understanding topography and origin of submarine landforms and features.

COURSE : GEOTECTONICS AND STRUCTURAL GEOLOGY

1. Study of structure and composition of the earth; Tectonic features of the earth.
2. Understanding orogenic and epiorogenic processes and resultant effects.
3. Study of principles and stages of rock deformation and behaviour of rock material.
4. Study of description, classification and recognition of fold, fault and joint.
5. Describing origin and relation of major structures using petrofabric analysis.

COURSE : STRATIGRAPHY AND PALAEOONTOLOGY

1. Study of principles; correlation and classification of stratified rocks.
2. Stratigraphic study of Precambrian, Purana, Cambrian, Permo-carboniferous, Gondwana, Triassic, Jurassic and Cretaceous formations.
3. Stratigraphic study of Deccan traps, Siwaliks, Tertiary and Quaternary formations of India; Problems of age.
4. Studies on morphology, evolution and stratigraphic importance of Graptolites, Trilobites, Brachiopods and Ammonites.
5. Study of morphology, stratigraphic importance and ecological and palaeoecological significance of Foraminifera, Ostracoda and Spores and Pollens. Evolutionary histories of Horse, Elephant and Man.

COURSE: ENVIRONMENTAL GEOLOGY AND DISASTER MANAGEMENT

1. Study of definition, scope and basic concepts of environmental geology; Natural disasters and their energy sources; Climatic changes through geologic time.
2. Study of River flooding, Mass movements and Soil erosion; Understanding the hazards due to them and planning strategies for reduction.
3. Study of Earthquakes, volcanic activity and Coastal processes; Understanding the hazards due to them and planning strategies for reduction.
4. Understanding human intervention with environment and resultant problems.

5. Study of environmental impact of mining activities, urbanization, land use planning, human population; Environmental laws.

COURSE: PALAEOONTOLOGY AND STRUCTURAL GEOLOGY

1. Macroscopic study of corals, Graptolites, Trilobites, Brachiopods, Lamellibranches, Gasterpods, Ammonites and Echinoderms with special reference to their evolutionary characters.
2. Microscopic study of Foraminifera and Ostracods.
3. Interpretation of geological maps; Solving problems relating to depth and thickness of geological formations.
4. Solving structural geology problems through Stereographic projection.
5. Interpretation of lithological data from boreholes; preparation of latitudinal vertical sections.

COURSE: ADVANCED CRYSTALLOGRAPHY AND MINERALOGY

1. Study of crystal classes and their symmetry projections; space lattices; calculation of crystal elements.
2. Study of optical properties of light; optical properties of uniaxial minerals; optical accessories.
3. Study of optical properties of biaxial minerals; measurements of various optical properties.
4. Physical, chemical and optical properties and paragenesis of minerals belonging to ortho and ring silicates; their structural classification.
5. Physical, chemical and optical properties and paragenesis of minerals belonging to sheet silicates; their structural classification.

COURSE : IGNEOUS AND METAMORPHIC PETROLOGY

1. Nature and physical properties of Magmas; Forms and structures of intrusive and extrusive igneous rocks and their textural studies.
2. Classification and petrographic study of acid, basic and ultra basic igneous rocks.
3. Study of fractional and differential crystallization of magma.
4. Study of metamorphism - agents, types, grades, zones and facies.
5. Study of metamorphic differentiation, metasomatism, metamorphism in orogenic belts; Geochemical applications in metamorphic study.

COURSE : SEDIMENTOLOGY AND SEDIMENTARY PETROLOGY

1. Study of sedimentary rocks - composition, classification and textures and structures.
2. Study of siliceous, ferruginous, carbonaceous, phosphatic deposits; Heavy minerals and their provenance.
3. Study of sedimentary environments, Geosynclines and basin formation due to plate tectonics.
4. Learning sedimentological and microscopical techniques.

5. Study of seismic and sequence stratigraphy.

COURSE: PETROLEUM AND COAL GEOLOGY

1. Study of fundamental concepts of origin and accumulation of oil; Integrated surface and subsurface stratigraphic units.
2. Exploration for hydrocarbon reservoirs based on seismic interpretation techniques; Well logging techniques
3. Study of well site geological investigations; Drilling methods; Oil product separation methods; Reservoir evaluation.
4. Study of Physical and chemical characteristics and classification of coal; Coal reserve estimation.
5. Study of occurrences, geological and geographical distribution of Gondwana and Tertiary coalfields in India.

COURSE : PRACTICAL – CRYSTALLOGRAPHY AND MINERALOGY

1. Sterographic and Gnomonic projections of natural crystals of normal classes.
2. Symmetry projections of 32 classes and calculation of crystal elements.
3. Use of contact Goniometer in measuring interfacial angles.
4. Megascopic study of important rock forming minerals.
5. Microscopic study of uniaxial and biaxial minerals.

COURSE : ECONOMIC GEOLOGY, MINERAL ECONOMICS AND ORE MICROSCOPY

1. Study of processes of formation of mineral deposits.
2. Origin, geological occurrence, uses and distribution of major economic minerals in India.
3. Origin, geological occurrence and distribution of industrial minerals in India.
4. Study of tenor, grade and specifications for minerals; Mineral policies; Mineral legislations; Mineral economics.
5. Study of physical and optical properties of ore minerals; Ore textures and paragenesis.

COURSE: ENGINEERING GEOLOGY, MINING GEOLOGY AND ORE DRESSING

1. Study of engineering properties of rocks pertaining to landslides; Geological investigations during the construction of bridges and highways.
2. Geological investigations with regard to the construction of dams, tunnels and harbours.
3. Knowing sampling techniques; Mining methods
4. Learning subsurface mining methods; Coal mining methods.
5. Understanding the principles and scope of ore dressing; Mineral beneficiation methods.

COURSE: REMOTE SENSING, GIS AND COMPUTATIONAL GEOLOGY

1. Learning fundamentals of remote sensing; Energy interaction with EM Spectrum.
2. Study of principles, types, techniques of aerial and satellite remote sensing.

3. Interpretation of aerial and satellite data; Digital image processing and classification.
4. Understanding the basic principles, elements, concepts and uses of Geographical Information System.
5. Application of software, freeware and statistical packages in geological, remote sensing and GIS tasks.

COURSE : PETROLOGY AND GEOLOGICAL MAPPING

1. Megascopic study of igneous, sedimentary and metamorphic rocks.
2. Microscopic study of igneous, sedimentary and metamorphic rocks.
3. Mechanical analysis of sediments and statistical studies of data.
4. Petrochemical calculations – C.I.P.W. Norm, Harker's diagram and Niggli variation diagram, ACF diagram.
5. Participating in 'residential geological mapping' for a period of at least 7 days; Collection of samples and preparing field report.

COURSE : ECONOMIC GEOLOGY, ORE MICROSCOPY AND GEOCHEMISTRY

1. Megascopic identification of important ore minerals.
2. Estimation of ore reserves.
3. Study of optical properties and identification of selected ores by reflected light.
4. Description and interpretation of ore textures.
5. Blow pipe tests; chemical and volumetric analysis of selected ores.

COURSE GEOLOGICAL, GEOPHYSICAL AND GEOCHEMICAL EXPLORATION

1. Study of toposheets; Field equipment; Field documentation; Guides for prospecting of ores.
2. Learning geophysical exploration methods for groundwater, mineral and petroleum resources.
3. Knowing the principles, procedures and interpretation techniques of gravity and seismic surveys at land and sea.
4. Study of principles and procedures of magnetic prospecting; Interpretation of magnetic data; Application of radiometric methods in mineral exploration.
5. Study of principles, techniques and application of geochemistry in mineral exploration

COURSE : HYDROGEOLOGY AND GROUND WATER MANAGEMENT

1. Study of hydrological cycle; Distribution and occurrence of groundwater;
2. Detection of ground water; Surface and subsurface methods.
3. Study of well design and well development.

4. Evaluation of aquifer parameters through pump test and estimation of water by hydraulic conductivity.
5. Assessment of water quality for domestic, industrial and irrigation use.

COURSE : PRACTICAL – GEOPHYSICS, HYDROGEOLOGY, REMOTE SENSING, GIS AND COMPUTATIONAL GEOLOGY)

1. Interpretation and study of geological and geophysical data and field maps.
2. Study of hydrological data and their interpretations.
3. Elementary exercises relating to photogrammetry; Use of pocket and mirror stereoscopes
4. Interpretation of lithology, geological structures, landforms, drainage network, landuse/land cover features using satellite imagery and GIS applications
5. Computation of basic statistical parameter; Computation of Probability, Correlation and Regression.

COURSE : DISSERTATION AND VIVA VOCE & FIELD WORK / GEOLOGICAL INSTRUCTIONAL TOUR)

1. Learn to identify the gap areas in geological research; To devise standard methodology to approach the problem identified; To interpret scientific data in a meaningful way; To prepare and document scientific report.
2. Participating in geological field work/instructional tour for a period of at least 7 days to geologically varied terrains and research laboratories; Collection of samples; Preparation of geological report.
