



M.Sc.GEOLOGY Syllabus I semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
1MSGE01	MINERALOGY, MINERAL OPTICS	40	60	100
1MSGE02	STRUCTURAL GEOLOGY	40	60	100
1MSGE03	STRATIGRAPHY AND INDIAN GEOLOGY	40	60	100
1MSGE04	Palaeontology	40	60	100
1MSGE05	Geology practical	60	40	100
Total		220	280	500

SEMESTER I PAPER -I

MINERALOGY, MINERAL OPTICS AND CRYSTALLOGRAPHY

UNIT-I

Minerals–Definition and classification, Physical Properties of minerals.
Structures of Silicates, Electrical, Magnetic Properties of minerals.
Luminescence, Thermal & Radioactive Properties of minerals.
Polymorphism, Psuedomorphism.

UNIT -II

Study of the following rock forming silicate mineral groups covering
Structure, chemistry, physical properties, optical properties & Para genesis of

Feldspars, Feldspathoid,
Quartz & Garnet.
Pyroxenes, Amphiboles,
Micas, Olivines.

UNIT -III

Study of the following rock forming minerals groups covering structure, chemistry, Physical & optical properties & Paragenesis of

Epidote, chlorite, Alumino silicates .

Staurolite, Cordierite, Talc & chloritoides .

Study of common oxides, carbonates & Sulphate mineral groups.

Study of common phosphate, Sulphide & Halide mineral groups.

UNIT -IV

General principles of optics, Polarization of light, double refraction.

Interference phenomenon, Isotropic & Anisotropic minerals .

Petrological microscope, important optical properties of minerals .

Optical accessory & their use. Uniaxial & biaxial indicatrix & interference figures.

UNIT -V

Definition of Crystal, Crystal elements, Symmetry, laws of crystallography.

Common holohedral, hemihedral & hemimorphic form. Parameter & indices.

Symmetry characters & forms of normal classes of -Cubic, Tetragonal, hexagonal, Orthorhombic, monoclinic & triclinic systems .Twinning in crystals, Spherical, Gnomonic & stereographic projections.

M.Sc.GEOLOGY

SEMESTER –I
PAPER –II

STRUCTURAL GEOLOGY

UNIT -I

Rock deformation, concept of Stress & Strain, their relationship .
Factors controlling deformation Type of Stress & Strain, Stress & Strain ellipsoid.
Homogeneous & inhomogeneous strain, Finite & Infinitesimal Strain, Strain markers (Measurement of Strain in deformed rocks) Progressive deformation, Top & bottom Criteria .
Unconformity–types & recognition in field & on geological map .Outlier and Inlier.

UNIT -II

Fold: definition, elements, classification (Geometric & Genetic),
Mechanics of development of folds, Super imposed folds
Recognition of folds in field and on geological map.
Effects of folds on outcrops, causes of folding.

UNIT -III

Definition, elements, classification of faults,
Recognition of faults, causes & mechanism of faulting (with reference to principal stress orientation)
Effects of faulting on the outcrops, Nappe, klippe, and tectonic windows.
Difference between fault and unconformity.

UNIT -IV

Geometric & Genetic classification and importance of Joints,

Lineation:- definition, types, and their relation to major structures,

Foliation: - definition & types, and their relation to major structures

Rock cleavage and schistosity, their relation to major structures.

UNIT -V

Stereographic projection and their use in structural analysis.

Signification and limitation of pie and Beta diagram.

Tectonite:- definition and types. Concept of petrofabric analysis,

Types of fabric, fabric elements and interpretation of petrofabric data.

Lab Course (A)

- Megascopic and microscopic study of common rock forming minerals.
- Determination of paleochroic scheme, anorthite content of plagioclase feldspar, estimation of birefringence.
- Determination of order of interference colour and sign of elongation.
- Study of interference figures and determination of optic sign.
- Study of holohedral and hemihedral, hemimorphic and alitriomorphic forms of all crystal system.
- Stereographic projection .

(B)

- Concept on line & plane, altitude of line & plane, dip & strike their measurements.
- Stereographic projection: problems in angular relationship – True dip, apparent dip, Plunge & Rock of the intersection of plane, Beta and Pi diagrams.
- Study of minor structure in Hand specimens.
- Preparation and interpretation of Geological maps – for inclined strata, folds, faults & unconformity.
- Three point problems.
- Application of software– altimeter, Geocline, my GPS coordinate and other available.

M.Sc.GEOLOGY
SEMESTER –I
PAPER –III
STRATIGRAPHY AND INDIAN GEOLOGY

UNIT -I

Stratigraphic principles and Scales for Classification.
Units of Stratigraphy –Litho Bio and Chrono Stratigraphic units.
Correlation.
Correlation in Indian Subcontinent.
Correlation of rock units of Chhattisgarh with other units of Country

UNIT -II

Evolution of Lithosphere.
Chief Divisions of Indian Subcontinent and Their economic Character and Physiographic Character.
Correlation and Economic Importance of Archeans of Peninsular and Extra Peninsular India.
Geological Time Scale.

UNIT -III

Stratigraphy and Correlation of mobile belts and Proterozoic Sedimentary basins of India.
Classification, Correlation and economic importance of Dharwar Super Group.
Cuddapah Super Group and Correlation with its other equivalent.
Vindhayan Super Group and Correlation with other equivalents.
Chhattisgarh, Indravati and Khairagarh Group of rocks and Study of their Correlation and economic Importance.

UNIT -IV

Palaeozoic formation of extra peninsular region, its Correlation and Classification.

Detail Study of Mesozoic of India.

Gondwana Super group detail study on their Classification, Correlation and Economic Importance.

Jurassic rocks in extra peninsular India.

Detail Study of Deccan traps, Intratrappean and Infratrappeans.

UNIT -V

Evolution of Man, Plant and Animal Life.

Stratigraphic units in India and their Economic Importance.

Stratigraphic units of Chhattisgarh and their economic Importance.

Importance and other studies of Palaeoclimate and Palaeogeography in Stratigraphy.

Boundary Problem with Special reference to Indian Stratigraphy.

M.Sc.GEOLOGY

SEMESTER –I

PAPER –IV

PALAEONTOLOGY

UNIT -I

Definition of fossils and mode of preservation, their application in age determination, Correlation, Palaeoclimatology, Palaeobiogeography and Palaeoecology.

Modes and theories of organic evolution, concept of bathymetric distribution of animals, migration. Mass Extinction and their causes.

Outline classification of organisms.

Morphology, Classification, evolutionary trends and geologic and geographic distribution of Brachiopods.

UNIT -II

Morphology, Classification , evolutionary trends and geologic, geographic distribution of

Pelecypoda(Lamellibranchia)

Gastropoda

Cephalopoda.

Trilobites.

UNIT -III

Morphology, Classification, evolutionary trends and geologic history of Echinoids, Graptolite s and Rugose Corals.

Elementary idea about Vertebrates origin & evolution.

Evolutionary history of Horse & Elephant.

Evolutionary history of Man.

UNIT-IV

Siwalik mammalian fauna.

General idea about plant evolution through geologic ages.

Fossil flora of Gondwana Group and Tertiary formation of India.

Definition and Scope of micropalaeontology, types of microfossils.

UNIT-V

Techniques in micropalaentology.

Use of microfossils in Stratigraphic correlation and age determination.

Use of microfossils in interp retation of sea floor tectonism,hydro carbon exploration.

Oxygen and Carbon isotope Studies of microfossils and their use in palaeoenvironmental and palaeocenographic Studies.

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
2MSGEO1	IGNEOUS & METAMORPHIC PETROLOGY	40	60	100
2MSGEO2	SEDIMENTARY PETROLOGY	40	60	100
2MSGEO3	GEODYNAMICS AND GEOMORPHOLOGY	40	60	100
2MSGEO4	PHOTOGEOLOGY, REMOTE SENSING AND GIS	40	60	100
2MSGEO5	Geology practical	60	40	100
Total		220	280	500

M.Sc.GEOLOGY

SEMESTER -II

PAPER -I

IGNEOUS & METAMORPHIC PETROLOGY

UNIT -I

Principles and general concept of petrology, petrography & petrogenesis.

Various forms, structures and textures of igneous rocks & their significance in petrogenesis.

Phase equilibria of unicomponent, Binary (mixed & Eutectic), Ternary (Ab-An-Dio, for Diopside-Silica) Silicate system.

Petrographic Province.

UNIT -II

Magma, Definition, Composition, Characteristics, Factors causing

diversity in igneous rocks –Differentiation, Assimilation .
Origin & evolution of magma, magmatism related to plate tectonics.
Classification of Igneous rocks important chemical, mineralogical,
textural CIPW & IUGS classification.
Reaction Principles and Bowen's reaction Series.

UNIT -III

Petrography, Petrogenesis & Indian occurrences of Granite, alkaline rocks.

Monominerlic rocks (Dunite, Aurthorite)

Basalt, Andesite, Spillite, Lamprophyre .

Ultramafic rocks, carbonatite, pegmatite, Kimberlite.

UNIT -IV

Metamorphism: Defition, Agents, Types of metamorphis .

Structure & texture of metamorphic rocks, metamorphic grades, Zones.

Metamorphic Facies, classification of metamorphic rocks .
Retrograde metamorphism. Metasomatism and their types.

UNIT -V

Regional and Thermal metamorphism of mafic, ultramafic rocks, pelitic sediments, and impure calcareous rocks .
Graphic representation of metamorphic mineral assemblages, ACF, AKF, and AFM, diagrams .
Paired metamorphic Belts .
Study of important metamorphic rocks – Granulite, Charnockite, Eclogite, migmatites, Khondalite, Gondites.

M.Sc.GEOLOGY

SEMESTER –II

PAPER –II

SEDIMENTARY PETROLOGY AND CRUSTAL EVOLUTION

UNIT -I

Sedimentary Rock, Processes of sedimentation. Mineral stability, Quartz, Felspar and heavy mineral as Province indicator.

Classification of Sedimentary Rocks; Rudaceous rocks Conglomerate and Breccia and their classification .

Arenaceous rock, Dot's Classification of Sandstone, Argillaceous Sedimentary rocks (lutaceous), their composition and environment of deposition.

Folks and Dunhams Classification of Limestone.

UNIT -II

Textural analysis of sediments, Grain size measurements Udden – Wentworth and Krumbin Phi scale .

rain Porosity and Permeability. Graphical representation statistical treatment and geological significance.

Petrogenesis of arkoses, greywacke and quartz arenites.

Evaporite and Volcanoclastic sediments. Dolomite and Process of Dolomitisation.

UNIT -III

Sedimentary structures: Mechanical, Chemical and Organosedimentary structures and their significance in top and bottom criteria.

Paleocurrents and basin analysis .

Diagenesis of sandstone and carbonate rocks changes in mineralogy, fabric and chemistry.

Application of Trace, REE and stable isotope geochemistry in sedimentological interpretations.

UNIT-IV

Sedimentary facies, Depositional environments, Marine, Transitional, Continental,
Types of delta, Recognition of ancient Delta. Stratigraphy and Sedimentation, Walther's law, Sequence stratigraphy, Basin analysis, sedimentary chemistry, Basin evolution and tectonics. Introduction to clay mineralogy. Classification, Origin and economic importance.

UNIT-V

Development of Proterozoic sedimentary basins of India within the Cratons.

Anatomy of Orogenic belts and formation of mountain roots .

Life in Pre Cambrians , Pre Cambrian – Cambrian boundary with special reference to India. Relation of sedimentary basins with Plate tectonic.

Greater Indian continental plate during Proterozoic and Palaeozoic.

Note : there will be three sections in each paper and each section will cover all the units. Section –A with 10 multiple choice/objective questions of 1 mark each without internal choice. Section –B with five short answer type questions of 4 marks each with internal choice and Section –C with five long answer type questions of 10 marks each with internal choice.

Lab Course(A)

- Megascopic identification & description of Igneous & Metamorphic rocks.
- Study of textures & Structures of Igneous & Metamorphic rocks.

- Microscopic Identification of igneous & metamorphic rocks.
- Plotting the geographic distribution of igneous & metamorphic rock types in outline map of India.
- C.I.P.W. norm calculation.
- Construction of variation diagram.
- Construction of ACF & AKF diagram.
- Application of MVPM software

(B)

- Megascopy of clastic sedimentary rocks (conglomerates, breccias, sandstones and shales) and non clastic sedimentary rocks (limestones, fossiliferous limestones including stromatolitic limestones and dolomites).
- Microscopy of clastic and non – clastic rocks as given above.
- Estimation of sphericity and roundness of grains.
- Identification of sedimentary structures and interpretation of depositional environments.
- Construction and interpretation of rose diagrams using palaeocurrent data.
- Interpretation of texture, structures, based on line drawing.

(C)

- Study of geomorphological models
- Identifications of various types of drainage pattern
- Morphometric analysis : bifurcation ratio, number of stream, length of stream, stream frequency , drainage density, basin area etc.

- Earthquake belt of India and world
- Volcanic belt of world

(D)

- Study of aerial photograph (stereo pair) with the help of stereoscope
- Study of land set imageries, identification of forest, water bodies, lineament and other geological structure
- Various notation of imageries

Books Recommended:

1. Introduction to Sedimentology – S.M. Sengupta.
2. Origin of Sedimentary Rocks, Blatt, H., Middleton, G.V. and Murray, R.C.
3. Sedimentary Structures, Collins, J.D., and Thompson, D.B.

M.Sc.GEOLOGY

SEMESTER –II

PAPER –III

GEODYNAMICS AND GEOMORPHOLOGY

UNIT-I

Earth and Solar System, Origin of the earth.
Interior of the earth. Age of the earth.
Palaeomagnetism, Continental drift,
Polar wandering, sea floor spreading.

UNIT -II

Plate Tectonics– Characteristics of Boundaries – Concordant, Discordant.

Island Arc, Subduction Zone, oceanic Trenches.

Mid Oceanic Ridge, Triple Junction. Transform fault.

Convection current, continent –continent collision. Continent –ocean collision.

UNIT -III

Volcanoes– Their form & structure,Types,Volcanic products, volcanic belts of the world.

Earthquake – Types of earthquake waves,its measurement .

Richter and Marcali scale, eart hquake zones of India and Major Earthquake belts of theworld.

Geosynclines – Classification and evolution.

UNIT-IV

Principles of Geomorphology, Theories of Geomorphology.
Landforms in relation to climate, rock type, structure & tectonics.

Weathering & cycle of erosion, upliftment, mass movement.
Fluvial Geomorphology, drainage pattern, fluvial land forms, Karst topography.

UNIT-V

Glacial features, type of glacier & Land forms.
Major landforms of arid region, effect of wind erosion.
Morphometric analysis of drainage basins & its significance.
Applied Geomorphology– Application of mineral prospecting, Civil engineering, Hydrology & environmental studies.

M.Sc.GEOLOGY
SEMESTER –II
PAPER –IV
PHOTOGEOLOGY, REMOTE SENSING AND GIS

UNIT -I

Introduction to Photogeology and Remote Sensing, Types of Aerial photographs.

Vertical, Low –oblique, High –oblique with their geometry. Nadir Point, Photogrammetry.

Photo–Scale variation and its causes. Flight Procedure, Tip and Tilt, Mosaic.

Stereoscopic vision, Stereoscope types, Pocket and Mirror stereoscope and their uses, Parallax, Vertical Exaggeration.

UNIT -II

Satellite Remote sensing, Types of sensors, Electromagnetic radiation (EMR) Interaction of EMR with earth objects .

Types of Images, MSS, Thermal Image, Qualitative interpretation of thermal image.

Multispectral Thermal data, Radar Image, Interaction between Radar and surface material.

Geological features on Radar Images.

UNIT -III

Interpretation of Aerial photographs, Tone, Texture and patterns, Landforms and Drainage, 3.2 Glacial landforms, Recognition of Rock Types Igneous, Extrusive and Intrusive rocks .

Sedimentary rock – coarse clastic sediments, fine clastic sediments and chemically precipitated sedimentary rocks .

Metamorphic rocks in Stereo pair, Structural and stratigraphic relationships, Dip and strike, Unconformity, Structural relations.

UNIT-IV

Introduction to Digital Image Processing, Image Histogram, Contrast stretching, spatial frequency filtering .

Principal component Analysis, Band Rationing, Pattern recognition, Change detection.

Global Positioning system, GIS, its principle, Significance of GIS in Geology. Handling digital Geographical Information System data .

Analysis and use of multiple data planes, and Topographic Data in raster format. Synergistic interpretation of Geographical Information System.

UNIT-V

Application and significance of Remote Sensing studies in identification of lineaments folds, faults .

Groundwater targeting, Drainage pattern and its relation to rock types and structural features.

Use of remote sensing data in Mineral Exploration, Groundwater targeting, Petroleum exploration .

Use of remote sensing data in Engineering geology and environmental geology, Urban Land use.

M.Sc.GEOLOGY

SEMESTER -III

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
BMSG01	HYDROGEOLOGY	40	60	100
BMSG02	ENGINEERING GEOLOGY & GEOTECHNICAL INVESTIGATIONS	40	60	100
BMSG03	MINING GEOLOGY & ENVIRONMENTAL GEOLOGY	40	60	100
BMSG04	MINERAL EXPLORATION	40	60	100
BMSG05	Geology practical	60	40	100
Total		220	280	500

PAPER –I

HYDROGEOLOGY

UNIT –I

Introduction to hydrogeology and its relation with hydrology, meteorology, water balance, significance of hydrometeorological data in ground water geology.

Hydrologic cycle, occurrence and distribution of sub surface water.

Water bearing formation – aquifers, aquitard, aquiclude & aquifer. Aquifer types–perched, unconfined, semi confined & confined. Isotropic, Anisotropic aquifer .

Hydrological properties of water bearing formations, porosity, types of opening in rocks(Primary &secondary)Darcy's law and its application, specific yield and specific retention, storativity and transmissivity and hydraulic conductivity.

UNIT -II

Water table, definition and location of water table free unconfined water, water table in porous, fractured and cavernous media, perched water table, lowering of water table due to pumping, area of influence upon pumping and drawdown and pressure surface.

Water table maps, construction and interpretations of fluctuations of water table and influencing factors .

Ground water mounds, trenches, divide , cascades, influent and effluent seepage artesianwells .

Ground water flow & permeability, steady & unsteady flow, G.W. flows near aquifer boundaries. Leaky aquifer.

Unit -III

Ground water wells, types of wells and methods of their construction – dug wells, driven wells and drilled W ells, Inverted wells, recharge wells, tube wells, dug cum tube wells, funct ion of well screen, gravel treatment.

Well development and completion, principle and various methods of developing wells, testing of wellsfor yield, specific capacity of wells .

Course of well failures, maintenance and well repair .

Methods of pumping test for aquifer analysis of test data.

Unit -IV

Geomorphic and geologic control of ground water, surface method (geological, hydrological and geophysical) of Exploration. Electrical resistivity method.

Sub surface methods of exploration – bore hole logging, geological, geophysical and other logging.

Application of remote sensing in ground water exploration, use of radioisotopes in hydrogeological studies.

Ground water provinces of India, Basin wise development of ground water with special reference toChhattisgarh region.

Unit -V

Quality of ground water– Chemical and Physical Characteristics of ground water for domestic, agricultural& industrial use.

Quality criteria for ground water use.

Ground water pollution, ground water recharge – natural and artificial. Ground water development & management, conjunctive use of surface & ground water resources. Waterlogging, safe yield, overdraft and spacing of wells.

Note : there will be three section in each paper and each section will cover all the units. Section –A with 10 multiple choice/objective question of 1 mark each without internal choice. Section –B with five short answer type question of 4 marks each with internal choice and Section –C with five long answer type question of 10 marks each with internal choice.

M.Sc.GEOLOGY

SEMESTER –III

PAPER –II

ENGINEERING GEOLOGY & GEOTECHNICAL INVESTIGATIONS

UNIT -I

Importance of Engineering Geology in Civil Engineering.

Work activities of engineering geologist.

Guidelines for writing an engineering Geology report.

Engineering properties of rock material : specific gravity, density, porosity, permeability, absorption, compressive strength, tensile strength, shear strength, deformation moduli –Poisson's ratio.

UNIT -II

Engineering behavior of rock mass, description of rock mass. Rock mass classification of Terzaghi and NGI, RQD.

Metal & concrete aggregate, desirable properties for aggregate.

Important properties and test for rocks used as foundation sites, test and important properties desirable for building stone.

Grouting: Ground improvement techniques for rocks, Geotechnical consideration, and different types of grouting. Grouting for various

engineering structures, efficacy of grouting .Rock bolting and anchoring, dental filling.

UNIT -III

Dam: Terminology & appurtenance, types of dam, types of spill ways with their parts.

SunRise University

Forces acting on dam, foundation and abutment problem, dam failure.

Geotechnical consideration for selection of dam sites.

Reservoirs: consideration for successful reservoirs, erosion of catchments area and siltation, reservoir capacity & life, environmental impact of creation of a reservoir.

UNIT-IV

Tunnels: components and types of tunnels, different stages of geotechnical investigation for tunnel.

Tunneling through rocks and soft ground: geological consideration.

Geological hazards in tunneling, effect of tunneling on the ground.

Methods of tunneling and support system.

UNIT-V

Bridge: Major types and acting force, supports and foundations of bridges.

Geological investigation of a bridge site, some case studies on bridges including Collapse Bridge.

Earthquakes magnitude & scale, Seismic zoning map of India and code for earthquake resistance. Seismotectonic frame work of India, geological consideration in seismic design.

Landslides: Types, description, causes, landslide hazard zonation mapping, landslide hazard mitigation & Prevention.

Lab Course (A)

- Water table contour maps: study and construction, analysis of hydrographs and estimation of infiltration capacity.
- Chemical analysis of water in practical and study.
- Pumping test, time-draw down test and evolution of aquifer parameters.
- Study of electrical resistivity sampling data.
- Exercise on ground water exploration.

(B)

- Study of engineering properties of rocks.
- Study of maps and models of important engineering structures on dam sites tunnels etc.
- Study of the important ongoing engineering projects (Dams, Tunnels, building constructions, town planning (special reference to Naya Raipur and river front projects).

M.Sc.GEOLOGY

**SEMESTER –III
PAPER –III**

MINING GEOLOGY & ENVIRONMENTAL GEOLOGY

UNIT -I

Introduction to mining terminologies like open cast mining, underground mining, pit, audit, tunnel, stoss, raise, etc.

Mining methods: Surface mining – alluvial, mineral sand, open pit, quarrying and open cast mining.

Mining methods: Sub surface mining – classification of stopping, underground development, different types of stopping.

Mining equipments: Drilling, shovel, dumpers, excavators etc.

UNIT -II

Mine supports, Ventilation, Drainage, Roofing.

Methods of breaking of rocks .

Role of geologist before the commencement of mining and during the mining activity.

Choice of mining methods depending upon

(a) Geological structures (b) Deposits

UNIT -III

Mine valuation methods, Use of computers in mining.

Coal mining methods.

Study of important mining methods and operations at Malanjkhand Copper mine, Ironore mining at Bailadila and Kirandul.

Tin ore mining in Bastar, Limestone mining in Chhattisgarh.

UNIT -IV

Concept of environmental geology.

Necessity and application of studying environmental geology.

Role of geologist in environmental studies in mining activities, preventive and curative measures.

Deforestation, land degradation and calamities, afforestation, pollution due to mining and other geological activities.

UNIT -V

Impact assessment of anthropogenic activities such as urbanization, open cast mining and quarrying, river valley projects, disposal of industrial and radioactive waste.

Concept of EIA and EMP.

Preliminary rules for environmental clearance.

Environmental Impact of mining and role of geologist in preventive and curative measures.

M.Sc.GEOLOGY

SEMESTER –III

PAPER –IV

MINERAL EXPLORATION

UNIT -I

Meaning and scope of prospecting and exploration.

Planning a prospecting program.

Different stages of prospecting activities.

Methods of prospecting: surface and sub surface.

UNIT -II

Opting a proper prospecting method depending upon the type of ore search.

Enlisting general prospecting methods depending upon type of ore search.

Concept of geochemical, geophysical, geological, stratigraphic, lithological prospecting methods.

Geophysical methods of prospecting ; their principles, applications and limitation in general.

UNIT -III

Gravity, magnetic, seismic and electrical methods of geophysical prospecting.

Sub surface methods of prospecting.

Subsurface geophysical methods of prospecting, different types of logging etc.

Prospecting plans and use of computers and modern computer based software in prospecting.

UNIT-IV

Sampling: Methods of sampling, choice of sampling method depending upon type of ore, precaution during the sampling and reduction of bulk samples.

Ore reserve estimation: Principle of ore reserve estimation in general, choosing the reserve estimation method depending upon type of ore.

Calculation & interpretation of assay, average assay, grade, tonnage factor and reserve calculations there from.

Use of computers and computer based software's in reserve estimation.

UNIT-V

Drilling in exploration activities.

Types of drilling, various components.

Coring and lithological logging.

Holistic approach for prospecting (conjunctive approach of aerial survey, satellite mageries, geochemical analysis, lithological studies, geophysical surveys).

Lab Course (A)

- Calculation of ore reserves and assay values.
- Diagrammatic representation of opencast and underground mining.
- Study of approved or otherwise mine planning.

(B)

- Viva voce on exploration plans for different types of ores.
- Exercise on various types of exploration strategies like geochemical and geophysical.
- Exercise on exploratory drilling and techniques of borehole logging.
- Exercise on geological mapping.

M.Sc. IV semester

PAPER CODE	PAPER NAME	INTERNAL	EXTERNAL	TOTAL
4MSGE01	ECONOMIC GEOLOGY - I	40	60	100
4MSGE02	ECONOMIC GEOLOGY - II	40	60	100
4MSGE03	Mining Legislation and mineral resource development	40	60	100
Total		120	180	300

M.Sc.GEOLOGY

SEMESTER -IV

PAPER -I

ECONOMIC GEOLOGY - I (ORE FORMING PROCESSES)

UNIT - I

Modern concepts of ore genesis.

Classification of ore forming processes in general, genetically associated with igneous, sedimentary and metamorphic activities.

Ore bearing fluids, their origin and migration.

Textures, paragenesis and zoning in ores.

UNIT -II

Ore localization: structural, physico-chemical and stratigraphic controls of ore localization.

Wall rock alteration and Skarn deposits.

Sedimentary processes: precipitation, residual and mechanical concentration, placer, evaporates.

Oxidation and supergene enrichment processes.

UNIT - III

Magmatic deposits: Early and late magmatic processes, assimilation, filter pressing, gravity accumulation, dissemination.

Pegmatites and migmatitic processes of pneumatolitic deposits.

Hydrothermal processes of ore formation.

Introductory study and applications of fluid inclusion studies.

UNIT – IV

Metamorphic and metasomatic processes of ore deposition.

Study of geothermobarometry.

Stratiform and stratabound deposits.

UNIT – V

Plate tectonics and mineral deposition – global and Indian perspective.

Basic concepts of origin of coal.

Origin of petroleum .

Metallogenetic epoch and provinces in global as well as Indian context.

M.Sc.GEOLOGY

SEMESTER –IV

PAPER –II

ECONOMIC GEOLOGY – II
(INDIAN MINERAL DEPOSITS: METALLIC, NON -METALLIC
AND FOSSIL FUEL)

UNIT – I

Mineralogical characteristics, geological setting, genesis (in short), distribution and uses of following ore deposits in India:

Iron and Manganese
Lead and Zinc
Chromium and Nickel
Alluminium

UNIT – II

Mineralogical characteristics, geological setting, genesis (in short), distribution and uses of following ore deposits in India:

Platinum and Cobalt
Gold and Silver
Tin, Tungsten and Molybdenum
Copper

UNIT – III

Characteristics, geological setting, genesis (in short), distribution and application of following non-metallic deposits of India:

Limestone and Dolomite

Gypsum and various Clays

Phosphorite and Feldspars

Sillimanite, kyanite, Andalusite

UNIT – IV

Characteristics, geological setting, genesis (in short), distribution and application of following non-metallic deposits of india:

Baryte (heavy spar), Micas

Asbestos, Graphite, Talc

Diamond, Garnet, Corundum

Gem mineral deposits

UNIT – V

Petroleum system: Concepts and definitions

Migration and accumulation of Petroleum. Structural, stratigraphic and Mixed Traps.

Petroleum deposits of India

Characteristics, grades, origin, geological setting, distribution and uses of Indian coal deposits with special reference to Chhattisgarh.

Study of coal and petroleum economics in global perspective.

Lab Course

- Megascopic study of ore minerals in hand specimens.
- Identification of ore minerals in polished sections.
- Study of ore textures and structures.
- Practical related to application of ores in various industries.
- Plotting of famous ore deposits of world as well India on the maps.
- Mineral map of Chhattisgarh (metallic and non metallic)
- Mineral based industry of Chhattisgarh(location map)
- Coal deposit & gem minerals of Chhattisgarh
- List of major and minor minerals of Chhattisgarh
- Royalty rate of minor minerals of Chhattisgarh
- Make a chart of minerals used in :1 Cement industry
2 ferroallowa industry 3 alluminium based industry 4 ceramic and fertilizer industry 5 paints and pigments
6 refractory 7 building and decorative stone 8 road metal

M.Sc.GEOLOGY

SEMESTER –IV

PAPER –III

MINING LAGISLATION AND MINERAL RESOURCES DEVELOPMENT

UNIT -I

Concept of act, rules & restriction of rules.

General concepts of RP (Reconnaissance Permit), PL (Prospecting License) and ML (Mining Lease)

MMDR –Mines & Minerals (Development &Regulation) act–1957 and amendments therein.

General restriction on undertaking prospecting and mining operations.

UNIT -II

Definition and scope of “ mineral development” as per act

Procedure of obtaining prospecting license or mining lease in which the mineral vest in the government and other than government.

Section 5 to 13 of the above act for central government jurisdiction for mineral concession, power of state government under section 15 of the act for minor minerals, minor minerals as per list of government of Chhattisgarh.

Understanding of royalty, dead rent and others fees.

UNIT -III

Salient features of Mineral concession & Development Rule 1988 and amendments therein.

Understanding of reconnaissance, prospecting and mining operations in context of a geologist in them.

Salient features of mineral concession rule – 1960 and amendments therein.

Chhattisgarh minor mineral Rules, 2015.

UNIT-IV

Mining Plan, understanding the components of mining plans, understanding about its approval by appropriate authorities.

Progressive and final mine closure plans.

Mine planning for major and minor minerals, studies on geologists aspects therein.

Study of measures indicated in MCDR about protection of environment.

UNIT-V

Guidelines under MCDR for united nation framework classification (UNFC classification) of mineral resource/reserve.

Understanding of economic axis, feasibility axis and geological axis of classification.

Detailed account of mining plan in context of different ore reserves & geological conditions.

Study of any of the approved mining plan.

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