SYLLABUS

Session-2012-2013

B.Sc. (Hons.) Geology

DEPARTMENT OF GEOLOGY

ALIGARH MUSLIM UNIVERSITY
ALIGARH
SYLLABUS
FOR THE SESSION
2012-2013

B.SC. (HONS.) GEOLOGY

DEPARTMENT OF GEOLOGY
ALIGARH MUSLIM UNIVERSITY
ALIGARH
# Course Structure of B.Sc. (Hons.)

## Session 2012-2013

### FIRST YEAR

<table>
<thead>
<tr>
<th>Paper</th>
<th>Title</th>
<th>Max. Marks</th>
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<td><strong>Theory</strong></td>
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<tr>
<td>B 1</td>
<td>Introduction to Geology - I</td>
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<tr>
<td>B 2</td>
<td>Introduction to Geology - II</td>
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<td><strong>Lab. Work</strong></td>
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<tr>
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### SECOND YEAR

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<td>B 3</td>
<td>Earth’s processes and Resources</td>
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<td>B 4</td>
<td>Paleobiology and Stratigraphy</td>
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<tr>
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### THIRD YEAR

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<tr>
<td>B 5</td>
<td>Igneous Petrology and Dynamics of the Earth</td>
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<tr>
<td>B 6</td>
<td>Structural Geology</td>
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<tr>
<td>B 7</td>
<td>Natural Environment (including elements of Remote sensing, Hydrogeology and Engineering Geology)</td>
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<tr>
<td>B 8</td>
<td>Energy Resources and Mineral Exploration</td>
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<tr>
<td>B 9</td>
<td>Sedimentary and Metamorphic Petrology</td>
<td>10</td>
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<tr>
<td>B 10</td>
<td>Applied Geology</td>
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<tr>
<td><strong>Lab. Work</strong></td>
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<tr>
<td>BL 3</td>
<td>Lab work on papers V, VI and VII</td>
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<tr>
<td>BL 4</td>
<td>Lab work on papers VIII,IX and X</td>
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<td>BL 6</td>
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Grand Total (Marks of 1st Year + 2nd Year + 3rd Year) of Geology 150 +150+500 = 800
PART-I
Syllabus of B.Sc. (Hons.)
Session 2012-2013
Paper-I Introduction to Geology-I

Unit-I
Geology and its perspective.
Earth in the solar system: origin, size, shape, mass, density, rotational and revolution parameters.
Formation of core, mantle, crust, hydrosphere, atmosphere and biosphere and elemental abundance in each constituent.
Convection in the earth’s core and production of its magnetic field.
Radioactivity and age of the Earth.
Elementary ideas of various geotectonic units namely shield, craton, platform, orogenic belt, mid-oceanic ridge, ocean island arc, deep sea trenches and their examples.
Elementary ideas about seafloor spreading, plate tectonics, and continental drift.

Unit-II
Wilson cycle and origin of mountains.
Earthquake: seismic waves, measurement and causes of earthquakes, and earthquake belts.
Volcanoes: type and distribution.
Generation of oceanic currents, surface currents and global ocean conveyor system.
Wave erosion and beach processes. Coastal landforms.
Ocean as a thermostat for the earth’s surface heat balance.
Atmospheric circulation.

Unit-III
Earth’s heat budget weather and global climatic changes.
Rock weathering: type, controlling factors and products of weathering.
Soil formation, soil profile and soil types.
Important erosional and depositional landforms produced by running water: waterfalls, rapids, meanders, oxbow lakes, floodplains, levees, alluvial fans, stream terraces and deltas. Youth, mature and old stages of river systems. Stream patterns.
Sediments erosion, transport, deposition and resultant landforms produced by:
Wind-pedestal rocks, hamadas, bajadas, earth pillars, blow holes, dunes and loess.
Glaciers- cirque, U-shaped valley, hanging valleys, moraines, boulder terrains, drumlins, Kames, eskers, till and varves.
Glacial periods: cause of glacial ages and glacio-eustasy.

Unit-IV
Study of outcrops, identification of bedding, data measurement, effects of topography, outlier and inlier.
Unconformity-origin and types. Onlap and offlap.
Simple deformational structures: Folds-parts of folds, various types in vertical sections, block diagrams and in geological plans.
Faults-parts of faults and common types in vertical sections, in block diagrams and in geological plan.
Joints and their types.

Unit-V
Elementary ideas about crystal structure.
Concept of lattice: planar, space
Morphological characters of crystal: faces, edges, solid angle, interfacial angle, zone and forms.
Crystallographic axes and axial angles.
Parameters and indices: system of Weiss and Miller, crystal symmetry and operations, points group symmetry.
Herman-Maugin system of symmetry.
Laws of crystallography.
Classification of crystals into seven systems and description of symmetry elements of their normal classes

**Unit-VI**
Types of chemical bonding and compound formation.
Mineral: physical properties (form, colour, lusture, strak, cleavage, fracture, hardness, specific gravity) and chemical composition.
Silicate structure and their classification.
Petrological microscope: its parts and functioning.
Principles and optical mineralogy: reflection, refraction, refractive index, twinkling, birefringence, relief, pleochroism, interference colours, extinction angle, twinkling.
Introductory knowledge of conoscopy

**Books Recommended:**
4. Mineralogy, Concept Description and Determinations-L.G.Berry.
Paper-II Introduction to Geology-II

Unit-I
Magma: Definition, physical properties and chemical composition, origin.
Crystallization of magma: Bowen's reaction series, magmatic differentiation and assimilation.
Forms and structures of extrusive and intrusive igneous rocks.
Igneous textures: crystallinity, grain shape, size and mutual relationship of grains.
Bases of classification and types of igneous rocks.

Unit-II
Sediments: origin, transportation, deposition and lithification.
Statistical measure: basic ideas about grain size, sorting, skewness, kurtosis and roundness.
Basic concept of size and nomenclature of sediments. Fabric and texture of sedimentary rocks.
Roundness of particles and its geological significance.
Classification of sedimentary rocks: terrigenous and chemical sedimentary rocks.
Important primary sedimentary structure-bedding, ripple marks, cross bedding and mud cracks.

Unit-III
Introduction to Metamorphic rock and their significance.
Classification of Metamorphic rocks. Basic concepts of types of metamorphism.
Concepts of isograds and zones of metamorphism.
Relationship between metamorphism and deformation.

Unit-IV
Palaeobiology: definition, branches and scope.
Preservation potential of organisms, requirements of fossilization.
Fossils, processes of fossilization and different kinds of fossils.
Elementary idea about origin of life.
Brief account of life through geological time, major steps in evolution of life.
Classification of organism up to phylum level, their main characters and geological range.

Unit-V
Different methods of stratigraphic correlation.
Physiographic subdivisions of Indian subcontinent-their physical, structural and geological features.
Brief account of constituent cratons of Indian shield.
Brief account of geographical distribution of Palaeozoic, Mesozoic and Cenozoic rocks of India.

Unit-VI
Introduction to common rock forming, ore forming and industrial minerals.
Radioactive minerals, Fuel minerals. Formation and types of mineral deposits, rock association.
Basic ideas about the method of mineral exploration, mining, conservation and utilization of natural resources in ancient India.
Application of statistics, trigonometry, algebra and calculus to the study of geology.
Use of computer in geological studies: construction of travel time curve for two-layer system, determination of velocities, depth to bed rock from seismic surveys.
Derivation of the equation to find out age of rocks and minerals from radio-active decay principle.
Determination of altitude of a horizon from topographic map and from bore hole data.
Trigonometric solutions of faults problems.
Measures of central tendency (mean, median and mode), dispersion (mean deviation, standard deviation), correlation co-efficient, least square regression curve.
Computer hardware, software, acquaintance with package used in solving geological problems.
Books Recommended:
1. Magma and Magmatic Rocks-Middlemost.
2. Igneous and Metamorphic petrology-Best.
7. Fundamentals of Historical Geology and Stratigraphy of India-Ravindra Kumar.
8. Principles of Geomorphology - Thornbury
Practical

(a) Study of important geomorphological models. Reading topographical maps. Use of Clinometer and Brunton Compass. Laboratory exercise on structural geology problems: Completion of outcrops, drawing and interpretation of cross-sections through elementary representative geological structures. Study of elements of symmetry of at least one representative crystal from normal classes of seven crystal systems. Study of physical properties of minerals and rocks in hand specimen. Study of the optical characters of important minerals using polarizing microscope.

(b) Study of megascopic and microscopic characters of important rock-forming minerals. Study of morphological characters of phyla included in the theory syllabus. Preparation and study of stratigraphic maps.

Geological Field Training: Students will be required to carry out field work in a suitable geological area to study the elementary aspects of field geology and submit a report thereon.
PART - II
Paper-III: Earth’s Processes and Resources

Unit-I
Factors controlling mineral availability.
Global mineral reserves and resources.
Renewable and non-renewable energy resources.
Coal: origin, raw materials and end products, types of coal.
Oil and Gas: source material, geological environment of formation, migration and accumulation.
Nuclear fuels: the nuclear fuel cycle, sources of uranium.
Hydroelectric power. Energy from the sun, wind, hot springs and sea waves.
Distribution of mineral deposits in space and time.

Unit-II
Rock forming minerals: Systematic classification of minerals, Chemical composition and physical properties of the following classes of minerals.
Silicates, carbonates, oxides, sulfides, sulfates, halides.

Unit-III
Ore forming minerals: metallic and non-metallic minerals.
Processes of ore formation.
Ore deposits related to magmatic activity.
Hydrothermal and skarn deposits.
Ore deposits formed by sedimentation. Weathering products and Residual deposits.
Ore deposits formed by oxidation & supergene enrichment.
Ore deposits formed by replacement and biochemical activity, evaporation and metamorphism, colloidal deposition.

Unit-IV
Global tectonic and metallogeny through geological time.
Geological setting, mineralogical characteristics and Indian distribution of metallic mineral deposits of iron and manganese, chromium, copper, lead and zinc, gold, and aluminum.

Unit-V
Geological setting, mineralogical characteristics and Indian distribution of non-metallic mineral deposits related to and with examples from Indian stratigraphic records:
Materials for construction (building stones and cement), ceramics, refractories and fillers, organic chemicals and synthetics, precious and decorative stones, fertilizers.

Unit-VI
Methods of mineral exploration.
Physiographics, mineralogical, stratigraphic, lithologic and structural guides to ore.
Methods of mineral exploitation-open pit and underground mining.
Mineral processing and beneficiation: methods of size reduction, screening and separation.
Environmental implications of exploration of mineral resources.

Books Recommended:
2. Ore Deposits-Parks and Mc diarmid.
3. India’s Mineral Resources-Krishnaswami.
5. Ore Petrology-Evans.
7. Mining Geology-Arogyaswami.
Paper-IV: Palaeobiology and Stratigraphy

Unit-I
Methods of fossil identification, description and illustration.
Taxonomic categories and code of systematic nomenclature.
Variation in fossil assemblage and its causes.
Application of palaeontologic studies in organic evolution, biostratigraphy, palaeoecology, palaeogeography, and palaeoclimatology.
Microfossils: definition, significance and a brief account of important groups.

Unit-II
Brachiopoda: Morphology and geological distribution.
Echinoidea Morphology and geological distribution.
Trilobita: Morphology and geological distribution.
Pelecypoda: Morphology and geological distribution.
Gastropoda: Morphology and geological distribution.
Cephalopoda: Morphology and geological distribution.
Rugose Corals Morphology and geological distribution.

Unit-III
Origin of vertebrates and landmarks in vertebrate evolution.
Major groups of vertebrates: pisces, amphibians, reptiles, aves and mammals-their brief description of geological distribution. Evolutionary history of Equidae.
Palaeobotany: Broad classification of plant kingdom.
Morphology, classification and geological range of important Lr. Gondwana flora.
Morphology, classification and geological range of important Upp.Gondwana flora.

Unit-IV
Stratigraphy and its various branches.

Unit-V
Classification, geographic distribution, lithologic characteristics, fossil content and economic importance of Various geological divisions of Peninsular Shield: Cratons – Dharwar, Baster, Singhbhum, Bundelkhand, Aravalli, and Marwar.
Mobile belts: Eastern Ghats, Pandyan and Satpura.
Archean Basement Complex: Peninsular Gneiss of Karanata, Banded Gneissic Complex of Rajasthan, Older Metamorphics of Eastern India.
Greenschist belts of Karnataka: Sargurs (enclaves), Nuggihalli, Holenarsipur and Chitradurga Belts.
Aravalli Supergroup, Dungargarah Supergroup, Iron Ore Group.
Delhi Supergroup, Vindhyan Supergroup, Cudappah Supergroup.

Unit-VI
Classification, geographic distribution, lithologic characteristics, fossil content and economic importance of Haimanta System, Muth Quartzite, Permo-Carboniferous System of Spiti. Gondwana Supergroup, Triassic of Spiti, Jurassic of Kutch, Cretaceous of south east coast of India and Deccan Traps.
Dharamshala, Dagshi and Kasauli Formations, Siwalik system. Karewa Group of Western Himalaya and Evolution of Himalayas.
Books Recommended:

1. Invertebrate Palaeontology-Woods.
2. The Elements of Palaeontology-Black
3. Introduction to Paleobotany-Arnold.
4. Essential of Paleobotany-Shukla and Misra.
5. Geology of India and Burma-Krishnan.
6. Fundamentals of Historicals Geology and Stratigraphy of India-Ravindra Kumar
7. Precambrian Geology of India-Naqvi and Rogers.
Practical

BL2

(a) Study of physical and optical properties of additional rock minerals (other than those covered under paper II). Study of physical properties of ore forming minerals in hand specimen. Preparation of maps showing distribution of important ores and other economic minerals in India. Study of metallogenic maps.

(b) Study of morphological characters of important fossil phyla designated in theory paper. Exercises in showing the major stratigraphic and litho tectonic units in hand drawn map of India.

**Geological Field Training:** Geological mapping and visit to economic mineral deposits in some appropriate area followed by laboratory processing of rock samples, ores and fossils collected during the field work and preparation of report thereon.
Paper-V- Igneous Petrology and Dynamics of the Earth

Unit-I
Mantle petrology: mineralogy and chemistry.
Physical properties of magma, volatile contents.
Magmatic processes: fractional crystallization, magma mixing, crystal setting, liquid immiscibility, assimilation, differentiation.
Trace elements and their significance in igneous petrology.
Classification of igneous rocks, basis of IUGS classification.

Unit-II
Basic principles of equilibrium thermodynamics.
Concept of system, phase and component.
Chemical potential and phase rule.
Phase equilibria of the following two and three component silicate systems:
Binary system-Albite-Anorthite, Diopside-Anorthite, Nepheline-silica.
Ternary systems-Albite-Anorthite-Diopside, Nepheline-Kalsilite-silica.

Unit-III
Rock association in time and space.
Concept of Rock Series.
General characteristics of the following Precambrian igneous rock assemblages:
(a) Komatiites (b) Anorthosites (c) Tonalite-trondhjemite-granodiorite (TTG)
Mineralogical characteristics and origin of the following rock types:
(I) Granite, granodiorite, diorite, rhyolite, (II) Basalt, dolerite, gabbro
(III)Syenite, nepheline-syenite, trachyte, (IV) Peridotites.

Unit-IV
Internal structure constitution and chemical composition of various layers of the earth.
Geochemical evolution of the earth.
Geophysical conditions of the earth: gravity, magnetism, heat flow.
Application of geophysics in understanding the dynamics of the earth.
Concept and theories of isostasy.
Movements of the earth’s crust: orogenic and epeirogenic phases.

Unit-V
Continental drift and its evidences.
Magnetic anomaly patterns in the ocean basins and sea-floor spreading.
Origin, significance and distribution of divergent margins, mid-oceanic ridges.
Island arcs and trenches.
Plate tectonics theory—the mechanism of plate tectonics.
Nature and types of plate margins.
Geometry and driving mechanism of plate motion.

Unit-VI
Evolution of continents and oceans.
Tectonics of continental rifts, continental margins, shelves, marginal basins and intracratonic basins.
Relationship of magmatism, metamorphism and metallogeny with orogeny.
Neotectonics: Active fault systems.
Indicators of recent tectonic activity.
Geomorphological indicators.
Drainage changes.
Recurrent seismicity.
Causes of natural and man-made geohazards and their prevention.

Books Recommended:
1. Principles of igneous and Metamorphic Petrology-Philpots
3. Igneous and metamorphic petrology-Best.
4. Plate Tectonics and Crustal evaluation-Condie.
5. Aspects of Tectonics-Valdiya.
Paper-VI-Structural Geology

Unit-I
Mechanical Principles: Definition of force, stress and strain, stages of rock deformation, stress-strain diagram. Effects of geological factors on mechanical behavior of rocks-confining pressures, temperature, time, solutions, pore pressure, anisotropy and inhomogeneity, mechanics of plastic deformation.

Unit-II
Unconformities, their types and recognition in the fields and on geological maps. Geological significance of unconformities. Criteria for distinguishing faults from unconformities. Evaporite (Salt domes) and serpentinite diapirs, sedimentary vents and mud lumps.

Unit-III

Unit-IV

Unit-V
Planar structures, their identification and description. Type of cleavage and schistosity and their origin, relation of cleavage and schistosity to major structures. Types of lineations, their origin and their relation to major structures.

Unit-VI

Books Recommended:
2. Structural Geology of Rocks and Regions-Davis
Paper-VII-Natural Environment (including Elements of Remote Sensing, Hydrogeology and Engineering Geology)

Unit-I
Definition of Environmental Geology. The interdisciplinary approach to environmental geology.
Fundamental Concept: The earth as closed system, limitation of earth resources, uniformitariasm,
understanding hazardous earth processes.
Environmental changes due to influence of human dominated activities over nature dominated system:
Concept of natural ecosystems on the earth and their mutual relations and interactions (atmosphere,
hydrosphere, lithosphere and biosphere): dynamic interaction among system cycling and recycling.
Cycles in earth system: carbon energy cycle, biogeochemical cycle, rock cycle,geochemical cycle

Unit-II
Soil: process of soil formation, classification of soil, soil degradation and mitigation.
Hazardous earth process: shifting of river courses and their impact on soil erosion.
Landslides: slope stability, causes of land slides, prevention and mitigation.
Floods: causes, impact and mitigation.
Earthquakes: causes, impact and mitigation.

Unit-III
Environmental and Geological consideration in site selection of dams, and tunnels.
Dams: foundation materials, structures causes of failure, siamsicity, hydrology.
Tunnels: geology, structures, seepage problem, role of water table and seismicity.

Unit-IV
Basics of remote sensing, EMR, platforms, sensors. Types of aerial photographs, Framing and scanning
systems.
Types of satellites and images. Spatial, spectral and temporal resolution. Sensors and their characteristics
on board IRS, Landsat and SPOT satellites
EMR interaction with atmosphere and earth surface spectral signatures of soil, water and vegetation

Unit-V
Elements of image interpretation (photographic and geotechnical). Basic drainage pattern and their
recognition on images/aerial photos. Identification and characteristics of common rock types on aerial
photographs.
Application of remote sensing techniques in natural hazards. Examples from India.
Application of remote sensing in geological and geomorphological mapping.

Unit-VI
Introduction to hydrogeology. Hydrologic cycle and its component.
Rock properties affecting groundwater. Vertical distribution of ground water.
Classification of aquifers.
Darcy’s Law and its validity. Permeability and methods of its measurement.
Ground water provinces of India. Concepts of watershed management.
Groundwater pollution, waste disposal, Impact of mining activity.

Books Recommended:
1. Environmental Geology-Keller
2. Groundwater Hydrogeology-Todd.
5. Remote Sensing-Principles and Interpretation-Sabins.
7. Groundwater Assessment, Development and Management – Karanth
8. Remote Sensing and image interpretation – Lillesand and Keifer

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Paper-VIII-Energy Resources and Mineral Exploration

Unit-I
Introduction to fossil fuels
Petrology of coal
Peat, lignite, bituminous and anthracite coal.
Origin of Coal.
Gondwana and Tertiary coalfields of India.
Geothermal energy provinces in India.

Unit-II
Origin, migration and entrapment of natural hydrocarbons.
Source and reservoir rocks.
Structural, stratigraphic and mixed oil traps.
Hydrocarbon exploration techniques-geological and geophysical methods.
Onshore and off-shore distribution of petroliferous basins in India.

Unit-III
Radioactive minerals: mineralogy, geochemistry, origin and distribution of uranium and thorium deposits in India.
Detection and measurement of radioactivity.
Methods of prospecting for radioactive minerals.
Radioactive well logging.
Nuclear waste disposal: problems and solutions.

Unit-IV
Surface and subsurface methods of mineral exploration.
Application of remote sensing techniques in mineral exploration.
Geophysical methods of mineral exploration-airborne versus ground surveys.
Gravity, electrical, magnetic and seismic methods.

Unit-V
Prospecting for economic minerals.
Methods of drilling, sampling, assaying and reserve estimation.
Fundamentals of geobotanical and Geochemical methods of exploration.
Bore-hole logging and deviation testing.

Unit-VI
Principles of mineral economics.
Strategic, critical and essential minerals.
Mineral production in India.
Changing pattern of mineral consumption.
National mineral policy of India including hydrocarbon
Mineral concession rules.
Mineral resources of the sea and law of sea.

Books Recommended:
2. Text Book of Coal-Chandra, Singh and Singh.
3. Petroleum formation and occurrence-Tisot and Welte.
4. Radioactivity in Geology-Principles and Application-Durrance.
5. Courses in Mining Geology-Arogyaswami.
8. Techniques in Mineral exploration-Readman.
Paper-IX-Sedimentary and Metamorphic Petrology

Unit-I
Significance of grain size distribution in relation to environments.
Particle size of detrital rocks-grade scale in mm and phi scales.
Shape and sphericity of clastic particles.
Zingg’s and Folk’s shape classes. Chemistry of weathering processes.
Concept of sedimentary facies. Basic principles of paleoenvironment and paleoclimate analysis.
Basic ideas about depositional environments and their classification.
Dynamics of eolian and fluvial environments: Laminar and turbulent flows and flow regimes.

Unit-II
Morphology and occurrence of bedding plane structures, internal structures, soft sediment deformational structures, biogenic structures and significance of ichno fossils.
Processes of sediment deposition: aqueous, Aeolian, glacial and gravitational (turbidity, mud flow and debris flow). Diagenesis of terrigenous and chemical sediments.
Heavy minerals and their geological significance.

Unit-III
Petrography and geological significance of diamicite and tillite.
Concept of maturity from mineralogy of sands and textural attributes.
Shale, types, their bedding characteristics and mineralogy.
Classification and origin of carbonates with special reference of Folk’s classification.
Tectonics and sedimentation. Cratonic and plateform basins and facies.
Geosyncline basins and facies. Krynine’s cycle.

Unit-IV
Metamorphic processes and a detailed account of agents and their role in metamorphism.
Nucleation. Chemical equilibrium in metamorphic rocks.
Types of metamorphism-contact, regional, cataclastic and metasomatism.
Textures and structures of metamorphic rocks and their significance.

Unit-V
Barrovian zones of regional metamorphism and principles of isograd mapping.
Rosenbusch’s zones of thermal metamorphism, contact aureole.
Concept of metamorphic facies and facies series.
Low pressure and medium to high pressure facies (field relation and mineralogy).
Metamorphism in relation to plate tectonics. Paired metamorphic belts.

Unit-VI
Cataclastic metamorphism and its products. Contact metamorphism of mafic, pelitic and carbonate rocks. Regional metamorphism of mafic, pelitic rocks.
Metasomatism: types mass transfer and products, anatexis and granitisation.
P-T-t diagrams and projective analysis.
Petrology, origin and distribution (in India) of charnockites, khondalites, granulites and eclogites.

Books Recommended:
1. Sedimentary Rocks-Pettijohn
2. Palaeo current and Basin Analysis-Potter and Pettijohn.
5. Petrology of Metamorphic Rocks-Mason.
Paper-X-Applied Geology

Unit-I
Introduction of Urban geology: role of geology in urban planning, Geological hazards, geological and hydrogeological constrains, Foundation problem.Collection of urban geodata (borehole logs, geophysical records, soil and rock properties), their interpretation, storage, retrieval and presentation. Landuse by urbanization.Use of geodata in land use and urban planning, impact of urbanization on landuse. Impact of urban waste disposal, liquid waste disposal their management and control.Environmental policy and law, environmental legislation in India

Unit-II

Unit-III

Unit-IV

Unit-V

Unit-VI
Description and identification of gem material: Apatite, bery (aquamarine, emerald etc.), corundum (ruby, sapphire), chrysoberyl (alexandrite), Calcite, diamond, diopside, epidote, feldspar (moonstone, labradorite etc.), garnet (almandine, pyrope, spessaritite, grossular, andradite etc.), opal, quartz (crystalline, chalcedony), spinel, kyanite, sillimanite, topaz, tourmaline, turquoise, malachite, lapis lazuli, zoisite, zircon, amber, coral, jet and pearl. Gemstone cuts: basic and simple style of cut.

Books Recommended:
2. Environmental Sciences-Miller.
5. Geochemical Exploration-Bjorklund.
6. Practical Gammology-Webster.
8. Fundamentals of GIS- M. Demers
9. Datum Map Projection and Coordinate System – Survey of India (lecture notes)
10. Lecture notes on remote sensing GIS and map protection (reference Copy)
11. Remote sensing and Geographic Information System by A.M. Chandra
Practical

BL3

(a) Microscopic study of major igneous rocks. Model mineralogy of some Plutonic and hypabassal rocks and their nomenclature using Streckeisen’s approach. Study of sections across continental margins, island arcs and plate tectonics models. Study of geohazard maps and introduction to basic geophysical instruments used for understanding the dynamics of the Earth.

(b) Exercises on structural geology problems. Stereographic projections of structural data. Geometrical problems on folds and faults. Drawing and the interpretation of profile sections across the geological maps.


(d) Hydrogeology: drawing of hydrogeological cycle, depth to water table map, measurement and presentation of rainfall data-arithmetic mean, isohyetal map, isocones and other methods of representation of chemical data. Preparation and interpretation of water table maps. Identification and uses of water on the basis of quality (drinking, irrigation and industrial purpose).

BL4

a) Hand specimen study of different types of coals, selected radioactive minerals and their host rocks. Exercises in showing distribution of various mineral deposits, fuel resources and hydrocarbon resources on map of India. Laboratory exercises in solving exploration related problems. Data representation & analysis of field resources.

b) Study of important primary sedimentary structures in hand specimens. Microscope study of sedimentary textures, mineralogy and diagenetic features in sedimentary rocks. Microscopic study textures and mineralogy of metamorphic rocks. Laboratory exercises in graphic plots for petrochemistry and interpretation of paragenetic diagrams.


BL5

Geological Field Training: Field work including geological mapping of structurally complex area. The field report should be based on the mapping as well as laboratory work on the rock samples collected during the fieldwork.

BL 6

Comprehensive Viva