

**DEPARTMENT OF GEOLOGY
UNIVERSITY COLLEGE OF SCIENCE
MAHATMA GANDHI UNIVERSITY, NALGONDA
Semester wise Blow up of Syllabi (2017-18)**

**Blow up of Syllabi
M.Sc Geology Course under CBCS
(w.e.f academic Year 2017-18)**

I - SEMESTER STARTS HERE

I-Semester
Paper-I (Crystallography, Optical Mineralogy & Mineralogy)

Unit	Topic	Hours
I	Introduction of Crystallography	1
	Symmetry operations and Symmetry Elements	1
	Derivation of 32 crystal classes or point groups	1
	Crystal Classes of Cubic System	1
	Crystal Classes of Tetragonal System	1
	Crystal Classes of Hexagonal System	1
	Crystal Classes of Trigonal System	1
	Crystal Classes of Orthorhombic System	1
	Crystal Classes of Monoclinic System	1
	Crystal Classes of Triclinic System	1
	Methods of projections	2
	Derivation of 230 space groups 14 Brauais lattices and space lattice	1
	Skrew axis and Glide planes	1
	Diffraction of crystals by X-rays, Braggs' law.	1
II	<i>Principles of optical mineralogy:</i> Optical mineralogy	1
	Polarized light	1
	Behavior of isotropic	1
	Anisotropic minerals	1
	Refraction index	1
	Double refraction	1
	Birefringence	1
	Sign of elongation	1
	Interference figures, (2V)	1
	Dispersion in minerals	1
	Optic sign	1
	Pleochroic scheme	1
	Determination of fast Vibration ray	1
	Slow vibrations	1
Accessory plates	1	
III	Introduction to Mineralogy	1
	Definition and Classification of Minerals	1
	Structural and chemical principles of minerals	1
	Chemical Bonds	1
	Ionic radii and coordination number	1
	Structure and chemistry of Olivine group	1
	physical and optical characters and paragenesis of Olivines	1
	Structure and chemistry of Pyroxene group	1
	physical and optical characters and paragenesis of Pyroxenes	1
	Structure and composition of Amphibole group	1
	physical and optical properties and paragenesis of Amphiboles	1
	Structure and composition of Mica group	1
	physical and optical properties and paragenesis of Mica minerals	1
	Spinel group	2

IV	Structure and composition of Feldspar group	1
	Physical & optical properties and paragenesis of Feldspars	1
	Structure and composition of Silica group	1
	Physical & optical properties and paragenesis of Silica Minerals	1
	Structure and composition of Feldspathoids	1
	Physical & optical properties and paragenesis of Feldspathoids	1
	Structure and composition of Aluminum silicates	1
	Physical & optical properties and paragenesis of Aluminum silicates	1
	Epidote group	1
	Structure and composition of Garnet group	1
	Physical & optical properties and paragenesis of garnet Minerals	1
	Accessory Minerals	1
	Apatite and Corundum	1
	Sphene and Zircon	1
	Calcite and scapolite	1
	Average mineralogical composition of crust and mantle	1
Phase (or) Mineral transformations in the mantle with depth	1	

I-Semester
Paper-II (Structural Geology and Geotectonics)

Unit	Topic	Hours
I	Concept of stress and strain	1
	Stress-strain relationship	1
	Elastic, plastic and viscous materials	2
	Measurement of strain in deformed rock	2
	Behavior of minerals under deformed condition	2
	Behavior of rocks under deformed condition	2
	Classification of folds - Geometrical	1
	Classification of folds - Genetical	1
	Causes of folding	1
	Diapirs	1
	Salt domes	1
		Shear zones: Recognition of shear zones in the field
Recognition of faults in the field		1
Mechanics of Shearing		2
Mechanics of Faulting		1
Geometry of thrust sheets		1
Block faulted and rifted regions		1
Wrench faults and associated structures. Tectonic mélanges		1
Dome and basin structures		1
Structural behavior of igneous rocks		2
Origin and classification of foliations and Lineations		2

II	Petrofabric analysis	1
	Data collection, plotting	1
	Symmetry and interpretation	1
	concept of symmetry of fabric of tectonites	2
III	Geotectonics: Introduction	1
	Tectonic framework of earth's crust	1
	Interior of earth	1
	Isostasy	1
	concept of Sir George Airy	1
	Theory of Archdeacon Pratt	1
	Theory of Hayford and Bowie	1
	convection currents	1
	Wilson Cycle	1
	Continental Drift	1
	Computer fitting geological and palaeontological evidences in support of continental drift and insitu theories	1
	Sea-floor spreading	1
	Hess's concept	1
	Evidences of sea-floor spreading	1
Vine-mathew's magnetic tape recorder	1	
IV	Plate tectonics	1
	Concept of plate and plate movements	1
	Plate model of Morgan	1
	Nature of convergent plate margins	1
	Nature of Divergent plate margins	1
	Nature of conservative plate margins	1
	Transpression and transtension	1
	Plate tectonics in relation to igneous processes and mineralization	1
	Plate tectonics in relation to sedimentary processes and mineralization	1
	Plate tectonics in relation to metamorphic processes and mineralization	1
	Triple junctions	1
	Aulocogens	1
	Plume theory	1
	Island arcs	1
	Earth's magnetism	1

I-Semester
Paper-III (Palaeontology and Stratigraphy)

Unit	Topic	Hours
I	<i>Micro-palaeontology: Origin of life</i>	1
	Evolution of life	2
	Classification of microfossils	1
	Uses of microfossils	1
	Study of Foraminifera	1
	Radiolaria	1
	Conodonta	1
	Ostracoda	1
	Bacteria	1
	Diatoms	1
	Dinoflagellata	1
	Charophyta	1
	<i>Plant fossils: Gondwana flora</i>	1
	Gondwana significance	1
II	<i>Vertebrate palaeontology: General characters</i>	1
	Classification of vertebrates	1
	evolution of <i>Fishes</i> including Agnaths	1
	Placoderms	1
	Chondrich thyes	1
	Osteichthyes	1
	General characters of <i>Amphibians</i>	1
	Age of <i>Amphibians</i>	1
	<i>Reptiles</i>	1
	<i>Mammals</i>	1
	General characters, classification, evolution, age and extinction of <i>Dinosaurs</i>	1
	<i>Horse</i>	1
	<i>Elephant</i>	1
	<i>Man</i>	2
III	Principles of stratigraphy	1
	Nomenclature and the modern stratigraphic code	1
	Litho-, bio stratigraphy	1
	chrono-stratigraphic units and their inter-relationships	1
	Geological time- scale	2
	Magnetostratigraphy	1
	Dating of rocks	1
	Modern methods of stratigraphic correlation. Precambrian stratigraphy	1
	Archaean stratigraphy	1
	Tectonic frame-work of Archaeans	2
	Geological history and evolution of Dharwar, and their equivalents	2
	Easternghats mobile belt	1
	Proterozoic Stratigraphy	1

	Tectonic framework of Proterozoic	1
	Geological history and evolution of Cuddapahs and their equivalents.	2
IV	Palaeozoic stratigraphy	1
	Palaeozoic formations of India with special reference to type localities	2
	History of sedimentation and fossil content	1
	Mesozoic Stratigraphy-Its introduction	1
	Mesozoic formations of India with special reference to type localities(3-localities)	1
	Triassic System	1
	Jurassic System	1
	Cretaceous System	1
	History of sedimentation and fossil content in mesozoic	1
	Palaeogeography and Gondwana system	1
	Cenozoic stratigraphy	1
	Cenozoic formations of India	1
	Rise of the Himalayas	1
	Evolution of Siwalik basin	1
	Deccan volcanics	1
	Stratigraphic boundary problems in Indian geology	1

I- Semester

Paper- IV (Geomorphology and Field Geology)

UNIT -I	Topic	Hours
I	Geomorphology: Introduction	1
	Fundamental concepts of geomorphology	1
	Geomorphic processes: Exogenetic processes -gradation	1
	Degradation and aggradation	1
	Endogenetic process -diastrophism	1
	Volcanism types and land forms	1
	Extraterrestrial process -fall of meteorites	1
	Weathering: physical weathering	1
	Chemical weathering and differential weathering	1
	Formation of soil and soil profile and types	1
	Mass wasting and its types	1
	Fluvial cycle: Streams and valleys, stream deposition	1
	Drainage patterns and their significance	1
	Penplain concept	1
	Topography on domal, folded and faulted structures.	1
	Groundwater cycle: Origin of limestone caverns	1
	Landforms of karst regions and karst topography	1
		Glacial cycle
Features resulting from Glaciers		
Development of landforms by glacial		1

II	Effects of Glaciation beyond ice caps and interglacial deposits	1
	Arid cycle	1
	Origin of deserts and its landforms	1
	topographic effects of wind erosion	1
	Volcanism: Landforms resulting from eruption	1
	deposition of volcanism	1
	Geomorphology of coasts	1
	Topographic features resulting from marine deposition	1
	Topography of ocean floors	1
	Landforms related to shelves, slopes and deep sea	1
	Applied geomorphology	1
	Application of geomorphology to various fields of earth sciences.	1
III	Field Geology: Introduction	1
	Toposheets: Definition	1
	Scale Definition	1
	Reading various components of a Toposheet	1
	Geological map - Definition	1
	Various components of a Geological Map including Scale Legend, Structures etc	1
	Field work and sampling	1
	Field work, geological items to be carried to the field	1
	Use of Clinometer compass	1
	Use of Brunton Compass	1
	Strike and Dip measurements	1
	Sampling and oriented sample and its significance	1
	And Sampling for Isotopic and Geochronological studies and its significance	1
	Geological mapping procedures	1
	Geological mapping of Igneous	1
Geological mapping of Sedimentary	1	
Geological mapping of Metamorphic	1	
IV	Geographic positioning system (GPS) Introduction, definition and scope	1
	Advantages and uses of GPS in different fields	1
	Principles of chain survey and survey equipment	1
	Methods of chain surveying	1
	Methods of representation of chain survey-data	1
	Principles of plane table survey and survey equipment	1
	Methods of plane table survey	1
	Methods of representation of plane table survey-data	1
	Principles of theodolite survey and survey equipment	1
	Methods of theodolite survey	1
	Methods of representation of theodolite survey-data	1
	Principles of Dumpy's level survey and survey equipment	1
	Methods of Dumpy's level survey	1
	Principles of Abney's level survey and survey equipment	1
	Methods of Abney's level survey	1
Methods of representation of survey-data.	1	

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II - SEMESTER STARTS HERE

II-Semester
Paper-I (Igneous petrology and Geochemistry)

Unit	Topic	Hours
I	Origin of Magmas: What is magma? Types of magmas and physico-chemicals properties of magmas	1
	State and composition of mantle and partial melting of mantle	1
	Mechanism of partial melting	1
	Types of partial melting	1
	Phase equilibria in igneous systems:	
	Crystallization behavior of natural magmas	1
	Phase equilibrium and the phase Rule	1
	Two Component System(binary system)	1
	Fo-Fa binary system	1
	An-Ab binary system	1
	Di-Ab-An Ternary System	1
	Fo- Di-An Ternary System	1
	Bowen's reaction principle	1
	Magmatic evolution and differentiation	1
	Structures of magmatic rocks	1
	Textures of magmatic rocks	1
	Classification of Igneous rocks	2
Magmatism and Tectonism	1	
II	What is an igneous rock suite?	1
	Forms, structure and texture of ultramafic rocks, modal mineralogy of ultramafic rocks	1
	Petrogenesis and distribution of ultramafic rocks	1
	Forms, Structure, texture and modal mineralogy of Basic (Mafic) igneous rocks	1
	Petrogenesis and distribution of Gabbro-norite-anorthosite-troctolite suite	1
	Petrogenesis and distribution of Dolerite-Basalts and related rocks	1
	Forms, Structure, Texture and modal mineraology of Intermediate igneous rocks	1
	Petrogenesis and distribution of Diorite – monzonite – syenite suite, and andesite and related rocks	1
	Forms, Structure, Texture and modal Mineralogy of Granite-granodiorite-Tonalite suite	1
	Petrogenesis and distribution of felsic igneous suite and Rhyolite and related rocks	1
	Forms, Structure, and Texture modal mineralogy of alkaline rocks	1
	Petrogenesis and distribution of alkaline rocks	1
	Forms, Structure, Texture modal mineralogy and Petrogenesis of Carbonatites	1

	Forms, Structure, Texture Petrogenesis and tectonic significance of ophiolite suite	2
III	Geochemistry: Introduction: Definition, scope and objectives.	1
	Elements: origin, abundance of elements in the solar system and earth, and its constituents;	1
	Average mineralogical, petrological and, major and trace elemental composition of crust.	1
	Classification, mineralogy, chemical composition, origin and age of meteorites	1
	Primary geochemical differentiation of earth:	1
	Original molten system, phases involved, chemical reactions and chemical affinity of elements	1
	Goldschmidt's geochemical classification of elements: Definition, theoretical basis and significance of the classification	1
	siderophiles, chalcophiles, lithophiles and atmophiles with examples.	1
	Periodic table: Definition and examples of transition elements, platinum group of elements, rare-earth elements, compatible elements, incompatible elements, high-field strength elements (HFSE), large ion lithophile elements (LILE).	1
	Magmatism as geochemical process	1
	Major elemental distribution in igneous rocks	1
	Geochemical trends of Mg, Fe, Mn, Ca, Al, Na, K and Si, Ti and P and, variation of Si/Al, (Na+K)/Al and Ca/Na ratios during differentiation by fractional crystallization of a basaltic magma	1
	Goldschmidt's rules governing distribution of major elements	1
	Trace element distribution in igneous rocks	1
	trace elements during magmatic crystallization including camouflage, capture and admittance with examples of these substitutions.	1
IV	<i>Sedimentation as a geochemical process:</i> Chemical breakdown and products of Sedimentation, Soil Geochemistry	2
	Major and Trace element composition of Sandstone, Shale	1
	Limestone, Positive and Negative colloids	1
	Eh-pH Relations during Sedimentation	1
	<i>Metamorphism as a geochemical process:</i>	1
	Chemical Composition of Metamorphic Rocks	1
	<i>Isotope geochemistry:</i> Definition	1
	Stable Isotopes	1
	Radiogenic Isotopes	1
	<i>Stable Isotopes:</i> Variations in abundance of O, S, C and H in minerals, rocks and water with respect to international Standards	2
	Significance of stable isotope study	1
	<i>Radiogenic isotopes:</i> Geochronology	1
	Radioactivity Decay schemes and growth of Daughter Isotopes.	2
	<i>Radiometric dating:</i>	1
	Brief outline of U-Th-Pb Methods of dating	1
K-Ar Methods of dating	1	

	Sm-Nd Methods of dating	1
	Rb-Sr Methods of dating	1
	<i>Atmospheric geochemistry</i> : Zonal structure of atmosphere	1
	Variable and Non-variable chemical constituents of atmosphere.	2

II-Semester

Paper-II (Metamorphic Petrology & Thermodynamics)

Unit	Topic	Hours
I	Definition and scope of metamorphism	1
	Historical background of metamorphism	1
	Metamorphic processes	1
	Agents (or) Factors of metamorphism	1
	Types of metamorphism	1
	Classification and nomenclature of metamorphic rocks	1
	Structures of metamorphic rocks	1
	Textures of metamorphic rocks	1
	Concepts of metamorphic zone	1
	Grade of metamorphism	1
	Concepts of metamorphic facies	1
	Metamorphic facies classification	1
	Phase relations on ACF diagram	1
	Phase relations on AKF diagram	1
Phase relations on AFM diagram	1	
II	Definition, physical conditions, mineral assemblages and geological setting of Albite- Epidote- Hornfels facies	1
	Definition, physical conditions, mineral assemblages and geological setting of Hornblende Hornfels facies	1
	Definition, physical conditions, mineral assemblages and geological setting of sandinite facies	1
	Definition, physical conditions, mineral assemblages and geological setting of zeolite facies	1
	Definition, physical conditions, mineral assemblages and geological setting of Greenschist facies	1
	Sub- facies of Greenschist facies	1
	Definition, physical conditions, mineral assemblages and geological setting of Blue schist facies	1
	Definition, physical conditions, mineral assemblages and geological setting of Amphibolite facies	1
	Sub - facies of Amphibolite facies	1
	Granulite facies	2
	Eclogite facies	1
	Inter-relationship between metamorphism and tectonism	
	Metamorphism at subduction zones	1
	Metamorphism at Mid Oceanic Ridge	1
Metamorphism in continental interior	1	
	Definition of Phase Rule and its application in metamorphic mineral equilibria	1

III	phase relations in Al ₂ SiO ₅ system	1
	Goldschmidt's mineralogic phase rule	1
	pressure-temperature-depth relations of amphibolite facies metamorphism	1
	pressure-temperature-depth relations of Granulite facies metamorphism	1
	Ultra - Metamorphism	1
	P-T diagrams of various metamorphic facies	1
	Petrogenetic grids	1
	Important metamorphic reactions and their importance in the evolution of metamorphic rocks	1
	Geothermometry	1
	Geobarometry	1
	P-T-Time paths	1
	Paired metamorphic belts	2
	Baric Type metamorphism	1
	IV	Thermodynamics: Introduction
Definition, scope, and objectives of thermodynamics thermodynamics		1
Inter-Relationship between petrogenetic processes		1
And Role of Thermodynamics in Geochemistry		1
Chemical potential: Fugacity and Activity of a Solute		1
Activity Coefficient		1
Chemical processes: Reversible Processes		1
And Irreversible Processes		1
Internal energy: Definition and expression of internal energy of a system		1
First Law of Thermodynamics		1
Entropy: Definition and expression of entropy of a system,		1
Second Law of Thermodynamics		1
Enthalpy: Definition and expression of enthalpy of a system		1
Free energy: Gibb's free energy and		1
Helmotz free energy of a system		1
Clausius- Clapeyron Equation		1
And Calcution of Reaction Boundries	1	

II-Semester

Paper-III (Sedimentology and Petroleum Theory)

Unit	Topic	Hours
I	Sedimentary environments. Its definition & Introduction	1
	Classification of Sedimentary environments	1
	Fluvial environments	2
	Glacial environments	2
	Eolian environments	1
	Lacustrine environments	1
	Transitional environments	1
	Deltaic environments	1
	Beach environments	1
	Tidal flats	1
	Marine environments including shelf	2
	Deep sea sedimentary environment	1

II	Evolution of sedimentary basins	1
	Sedimentary basins	1
	Geosynclinal concept	1
	Plate tectonics	1
	Pre-flysch, flysch and turbidites	1
	Tectonic setting of sedimentary basins	2
	Sedimentary basins in various tectonic environments	2
	Divergent & Convergent	2
	Transform fault	1
	Hybrid- and intraplate-tectonic settings	2
	III	<i>Petroleum Geology: Definition</i>
Nature of Petroleum		1
Origin of Petroleum – Inorganic theory		1
Organic theory		1
Composition of petroleum		1
Composition of natural gas		1
<i>Origin: Genesis of hydrocarbons</i>		1
Conversion of organic matter into petroleum		1
Variety of petroleum hydrocarbons		1
Gas hydrates		1
<i>Reservoir rocks: Migration and accumulation of oil and gas</i>		1
<i>Oil traps</i>		1
Different types of traps: structural traps		1
Stratigraphic traps		1
Salt domes	1	
IV	<i>Exploration and exploitation of petroleum</i>	1
	Surface indications	1
	Direct detection of hydrocarbons including geological	1
	Geophysical -Electrical	1
	Seismic	1
	Geochemical	1
	Remote sensing methods	1
	<i>Distribution: Geographic</i>	2
	Stratigraphic	2
	Global distribution	2
	Petroliferous basins in India	2

II- Semester

Paper- IV (Ore genesis and Mineral deposits)

UNIT	Topic	Hours
	Ore Genesis: Introduction	1
	Modern concept of ore genesis	1

I	Magmatic Segregation	1
	Hydrothermal Processes	1
	Metamorphic and Metasomatism Processes	1
	Sedimentary Precipitation and evaporative depositions	1
	Oxidation and Supergene Enrichment	1
	Submarine exhalative and Volcanic Exhalative Process	1
	Residual and Mechanical concentration	1
	Ore mineral groups	1
	Detailed study of all principal ore mineral groups	1
	plate tectonics and ore deposits	1
	Metallogeny: Metallogeny through geological time	1
	Ore textures: Advanced study of ore textures, scientific application of ore textures and ore genesis	1
	Paragenesis: Paragenetic sequences and zoning in metallic ore deposits	1
	Ore microscopy: Application of ore microscopy in mineral technology	1
	P-T estimation and Application of geothermobarometry,	1
	Fluid inclusion study: assumptions, limitations and applications of fluid inclusions in ores	1
	Isotopic ore genesis: Role and application of stable isotopes in ore genesis	1
II	<i>Ore associations</i> : Petrological ore associations with Indian examples (Cratons and Mobile belts)	1
	Ore mineral assemblages occurring with mafic/ultramafic rocks	1
	Ore mineral assemblages occurring with intermediate rocks	1
	Ore mineral assemblages occurring with silicic rocks	1
	Ore mineral assemblages occurring with sedimentary rocks	1
	Ore mineral assemblages occurring in volcanic rocks	1
	Ore associated with Metamorphosed rocks	1
	Orthomagmatic ores of mafic-ultramafic association,	1
	Diamonds in kimberlites	1
	REE in carbonatites	1
	Chromite in chromitites and basic rocks	1
	PGE in ultramafic and basic rocks	1
	Cyprus type Cu-Zn, ore of silicic igneous rocks	1
	Kiruna type Fe-P	1
	Kuroko type Zn-Pb-Cu	1
III	<i>Ores of sedimentary affiliation</i>	1
	Iron and Manganese ores in sedimentary environments	1
	Mineral Associations and Textures	1
	Chemical sedimentation	1
	Clastic sedimentation	1
	Stratiform ore deposits	1
	Stratabound ore deposits (Mn, Fe, non-ferrous ores)	1
	placer concentrations; Beach placers	1
	Fluvial placers and Aeolian Placers	1
	<i>Ores of metamorphic affiliation</i>	1
	Role of temperature and pressure	1
	Metamorphism of earlier deposits	1
	Formation of mineral deposits by metamorphism	1

	<i>Greisen deposits</i>	1
	<i>Skarn deposits</i>	1
IV	<i>Ore deposits:Iron Ore formations & deposits</i>	1
	Chromite deposits	1
	Manganese deposits	1
	Copper deposits	1
	Lead and Zinc deposits	1
	Bauxite deposits	1
	Magnesite deposits	1
	Barite deposits	1
	Mica deposits	1
	Asbestos deposits	1
	Dimension and decorative stones	1
	Mineral based Industries	1
	<i>Refractories: Ceramic</i>	1
	Electrical	1
	Insulators & Glass	1

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III - SEMESTER STARTS HERE

III- Semester Paper- I (Mineral Exploration)		
	<i>Topic</i>	hours
I	<i>Geological exploration:</i> Introduction	1
	Definition, Scope and Objective of Geological Exploration	2
	Controls of Mineralization	1
	<i>Guides to Ore Deposits:</i>	1
	Physiographic Guides	2
	Lithologic Guides	2
	Stratigraphic Guides	2
	Structural Guides	2
	And Mineralogical Guides	2
II	<i>Geologic Techniques and Procedures of Exploration:</i>	1
	Evaluation of Outcrop	2
	Trenching, Pitting, Channeling	1
	<i>Methods of Sampling</i>	1
	<i>Drilling and its application:</i>	1
	Types of Drills and Drill bits	1
	Core / Sludge Recovery	1
	Core Logging	1
	<i>Resources and Reserves:</i>	1
	Calculation of average Grade Classification of Ore Reserves	1
	UNFC Classification	1
III	<i>Geological exploration :Concept</i>	1
	Objectives	1
	Significance	1
	Geophysical exploration	1
	Simple types of measuring instruments	1
	<i>Methods of Geophysical prospecting:</i> Field procedures -I	1
	Interpretation of data from various methods of geophysical prospecting including gravimetric	2
	Magnetic	1
	Electrical	1
	Radiometric	1
	<i>Logging:</i>	1
	Well logging techniques	2
	Interpretation of data	1
IV	<i>Geochemical exploration: Introduction</i>	1
	Definition and scope	1
	Objectives	1
	Geochemical environments	1
	Dispersion	1
	Mobility	1
	Geochemical associations	1

	Pathfinders	1
	Application	1
	Primary environment: Primary dispersions	1
	Halos.	1
	Secondary environment: Chemical weathering	1
	Significance of Eh and pH	1
	Absorption, mobility of elements in secondary environment, geochemical anomalies	1
	Non-significant, significant and displaced anomalies	1

III-Semester
Paper-II (Precambrian Geology & Crustal Evolution)

Unit	Topic	Hours
I	Tectonic divisions of India	1
	Cratons: Stratigraphy of Dharwar	1
	Geochronology of Dharwar	1
	Evolution of Dharwar	1
	Stratigraphy of Singhbhum	1
	Geochronology of Singhbhum	1
	Evolution of Singhbhum	1
	Stratigraphy and geochronology of Bundelkhand	1
	Evolution of Bundelkhand	1
	Stratigraphy and geochronology of Aravalli cratons	1
	Evolution of Aravalli craton	1
	Granite-greenstone belts: : Lithological characteristics	1
	Geochemical characteristics of granite-greenstone belt	1
	Granite-greenstone belts of southern India	2
II	Mobile belts: Structure of the Eastern Ghats	2
	Metamorphism	1
	Zonation	1
	Evolution	1
	Structure of the Pandyan mobile belts	1
	metamorphism	1
	Zonation	1
	Evolution	1
	Structure of the Satpura mobile belts	1
	Metamorphism	1
	Zonation	1
	Evolution	1
	Precambrians of the Himalayas	2
	Proterozoic sedimentary basins	1
	Palaeoproterozoic basins	1
	Structure, lithology and evolution of Papaghani basin	1
	Structure, lithology and evolution of Bijawar basin	1
	Structure, lithology and evolution of Sonrai basin	1

III	Structure, lithology and evolution of Gwalior basin	1
	Structure, lithology and evolution of Abujmar basin	1
	Meso-Neoproterozoic basins	
	Structure, lithology and evolution of Cuddapahs	1
	Structure, lithology and evolution of Vindhyan	1
	Structure, lithology and evolution of Pranhita-Godavari,	1
	Structure, lithology and evolution of Pakhals	1
	Structure, lithology and evolution of Kaladgi basin	1
	Structure, lithology and evolution of Chattishgarh basin	1
	Structure, lithology and evolution of Khariar basin	1
	Structure, lithology and evolution of Indravati basin	1
	Structure, lithology and evolution of Sabari basin	1
	Precambrian-cambrian boundary problems with special reference to India	2
	IV	Precambrian igneous intrusions
Locations, associated rock types and ages of anorthosites		2
Locations, associated rock types and ages of alkaline rocks		2
Carbonatites		1
Coastal- and southern granulite terrains		1
Precambrian igneous intrusions in Purana basins		1
Locations, associated rock types and ages of igneous rocks in Vindhyan		1
Locations, associated rock types and ages of igneous rocks in Khariar		1
Locations, associated rock types and ages of igneous rocks in Indravathi basins		1
Locations, associated rock types and ages of igneous rocks in Cuddapah basins		1
Evolution of lithosphere, hydrosphere		1
Evolution of atmosphere, biosphere and cryosphere		2
Life in Precambrian		1

III-Semester
Paper-III (Mining Geology & Engineering Geology)

Unit	Topic	Hours
	Mining Geology: Introduction	1
	Definition, Basic Concepts, Terminology	1

I	Broad Classification of Mining Methods	1
	Planning,	1
	Exploration and Exploratory Mining of Surface	1
	Underground Mineral Deposits	1
	Geological factors considered for the selection of mining method viz:	1
	Alluvial	1
	Quarrying	1
	Surface Mining	1
	Open-cast Mining	1
	Underground Mining Methods	1
	Geological conditions: for-Types of Openings their position	1
	Shape and Size	1
	Adits, Inclines, Shafts	1
	Levels, Cross-Cuts	1
	Winzes and Raises	1
Types of drilling methods:	2	
II	Alluvial Mining / placer Mining Methods:	1
	Panning, Batea	1
	Sluicing	1
	Longtom	1
	Hydraulicking	1
	Dredging and fore poling	1
	Quarrying: – controls of Topography	1
	Structural Features	1
	Methods of Working	1
	Opencast / open pit / pit Mining – Methods:	1
	Bench cut	1
	Glory hole	1
	Strip Mining	1
	Factors Considered for Mechanization	1
	And Transportation	1
	Advantages and Disadvantages	1
	Underground Mining Methods for epigenetic and bedded deposits:	2
	Advance and Retreat Mining	1
	Shaft Sinking, Drifting	1
	Crosscutting, Stopping	1
	Winzing, Top-Slicing	1
	Sub-Level Caving and Block Caving	1
	Production and Retreat Stages	1
	Bord and Pillar, Room and Pillar	1
	Long wall Mining	1
	High wall Mining	1
	Mine Supports	1
	Factors considered for types of Supports Used.	1
	Mine Ventilation- Planning, its Significance and Effects	1
	Drainage- planning: Significance and its effect.	1
	Mining hazards: Mine Inundation, Fire and Rock Burst;	1
	Procedure for Grant of Mining Leases, Mining Plan Preparation, Mine	2

	Closure Plans.	
III	Definition and historical background of Engineering Geology	1
	Engineering properties of rocks-Unit weight, Specific gravity, porosity and sorption	1
	Abrasive hardness	1
	Compressive strength	1
	Tensile and shear strength (Mohr test)	1
	Modulus of elasticity	1
	Rock Mass Classification	2
	Classification based on strength and Modulus	1
	Rock Structure Rating and Rock Mass rating System(RMRS)	1
	Rock quality Index System(Q-System)	1
	Soil Strength	1
	Physical characters of building and decorative stones	1
	Concrete and Road aggregates	1
	Groundwater implications on civil engineering constructions	2
IV	Geological considerations for the selection of dam sites	1
	Types of dams	1
	Gravity dam	1
	Case histories of some major dams	1
	Case histories of Nagarjunasagar dam	1
	Case histories of Srishailam dam	1
	Case histories of Bakra – Nangal dam	1
	Geological considerations and investigations in reservoir site selection	1
	leakage problems	1
	silting of reservoirs	1
	Geological considerations in the selection of tunnels	1
	Geological considerations in the selection of their alignment	1
	Soil and rock slope failures	1
	Soil and rock slope failures Causes and effects	1
	stabilization techniques	1

III-Semester
Paper-IV (Mineral Economics and Fuels)

Unit	Topic	Hours
I	<i>Mineral Economics: Introduction</i> Definition	1
	Mining Lease and Regulations in Brief	2
	National Mineral Policy (NMP)	2
	Conservation of Minerals	1
	Renewable and Non-Renewable Resources	2
	Recoverable Reserves.	1
	Mines and Minerals Regulation & Development Act	2
	Mineral Concession Rules Status of India in Mineral Resources	2
	Coal: Origin of Coal-drift theory	1
	Insitu theory	1

II	Brief sedimentology of coal bearing strata	1
	Rank, grade and type of coal	1
	Indian and international classifications of Coal	1
	Chemical characterization: Proximate analysis	1
	Ultimate analysis	1
	Concept of 'maceral	1
	Microlithotypes	1
	Coal forming epochs in the geological past	1
	Geological distribution	1
	Geographical distribution	1
	Detailed geology of Sone-Damuda	1
	Mahanadi- Godavari coalfields	2
III	Methods of coal prospecting	1
	Estimation of coal reserves	1
	Coal production	1
	Problems of coal industry in India	1
	Coal bed methane: a new energy resource.	1
	Maturation of coal	1
	Generation of methane in coal beds.	1
	Coal as reservoir	1
	Fundamentals of coal bed methane exploration	1
	Coal bed methane production	1
	Principles of Coal petrology.	1
	Preparation of coal for industrial purposes	1
	Coal carbonization	1
	Coal gasification	1
	Coal hydrogenation	1
IV	Atomic Fuel: Mode of occurrence	1
	Association of atomic minerals in nature.	2
	Atomic minerals as source of energy,	2
	Methods of prospecting	2
	Productive geological horizons in India.	2
	Beach sand deposits of India;.	2
	Nuclear power plants of the country	2
	Future prospects	1
	Atomic fuels and environment	1

**DEPARTMENT OF GEOLOGY
UNIVERSITY COLLEGE OF SCIENCE
MAHATMA GANDHI UNIVERSITY, NALGONDA
Semester wise Blow up of Syllabi (2017-18)**

**Blow up of Syllabi
M.Sc Geology Course under CBCS
(w.e.f academic Year 2017-18)**

IV - SEMESTER STARTS HERE

**IV-Semester
Paper-I (Environmental Geology)**

Unit	Topic	Hours
I	Fundamental concept of Environment Geology	1
	Environment Geosciences-Its Scope	1
	Environmental objectives & aims	1
	Earth's thermal environment	1
	Earths climates	1
	Global warming	1
	Green house effect	1
	Ozone depletion- Ice sheets and fluctuation in sea levels	1
	Concept of ecosystem	1
	Terrestrial and aquatic ecosystem	1
	Meteorology as Environmental Science	1
	Earth-resources-Air pollution, ambient workplace	1
	Pollution due to dust, waste disposal	1
	National and international standards for pollution	1
	Environmental health hazards	1
II	Minig: opencast & underground	1
	Solid waste generation	1
	Dumping, stacking, rehandling management	1
	Mineral processing, tailing ponds	1
	Acid mine drainage, siltation	1
	Case studies mining below water table, mine water discharges	1
	Regional effects on water regime	1
	Noise levels- National standards	1
	Minig machinery, ill effects	1
	Air sampling techniques	1
	Personal sampling pumps	1
	Weather monitoring equipments	1
	Automatic recorders	1
	Fundamental concepts of geological hazards	1
	Crisis management	1
III	Elements of Environmental impact Assessment	1
	Primary and secondary predictions, assessment	1
	Base-line data generation	1
	Physical, Biological, cultural, socio-economic aspects	1
	Carrying capacity based developmental planning	1
	Assimilative Capacity	1
	Supportive Capacity	1
	Resource based planning	1
	Institutional strategies	1
	Concept of EHIA	1
	Concept of REA	1
	Strategic Environmental assessments(SEA)	1
	SEA relevance to Indian minig Industry	1

	Sustainable development planning	1
	Applications of GIS in Environmental Management	1
IV	Environmental Legislation: Air act	2
	Water act	1
	Environmental protection act	1
	Environmental protection rules	1
	Hazardous waste management rules	1
	Forest act	1
	Factories act	1
	Mines act	1
	Mineral conservation and development rules	2
	Metalliferous mines regulations	2
	Coal act etc	2

**IV-Semester
Paper-II (Hydrogeology)**

Unit	Topic	Hours
I	Hydrology- Its introduction & applications of hydrology & Hydrogeology	1
	Origin, type, age and importance of groundwater	1
	Hydrographs, water table contour maps	2
	Hydrological Cycle	1
	Precipitation & Evaporation	1
	Transpirations & Evapo transpirations	1
	Run-off & Infiltrations	1
	Rock properties affecting groundwater	1
	Porosity and permeability	1
	Specific yield and specific retention	2
	Hydraulic conductivity	1
Transmissivity, storage coefficient	2	
II	Well hydraulics	1
	General flow equations	1
	Steady unidirectional flow	1
	Steady radial flow to a well	1
	Unsteady radial flow in a confined aquifer	1
	Unsteady radial flow in a unconfined aquifer	1
	Water level fluctuation: Causative factors	1
	Pumping tests: Methods of pumping tests	2
	Analysis of test data	2
	Evaluation of aquifer parameters	1

	Artificial recharge of groundwater	2
	Groundwater legislation	1
	Darcy Law	1
III	<i>Water Well Technology:</i>	1
	Well Types	2
	Drilling Methods	1
	Construction, Design	2
	Development and Maintenance of Wells	1
	<i>Exploration:</i> Surface and Subsurface Geophysical	1
	Surface and Subsurface Geologic	1
	Methods of Groundwater Exploration	1
	Ground Water Modeling	1
IV	<i>Groundwater quality:</i>	1
	Sources of Salinity	1
	Estimation of Major Elements	2
	Reporting of Chemical Analysis	2
	Quality Criteria for Groundwater use	2
	Salt Water Intrusion in Coastal Aquifers And Remedial Measures	2
		1
	<i>Groundwater pollution:</i>	1

IV- Semester

Paper- III (Remote Sensing & GIS),

UNIT	Topic	Hours
I	Aerial photography: Introduction:	1
	Definition, scope and objectives,	1
	Photogrammetry definition,	1
	Cameras	1
	Lenses	1
	Flight planning	1
	Scale of photographs	1
	Overlap and sidelaps	1

	Types of aerial photographs	1
	Geometry	1
	Stereopairs and mosaics	1
	Study and interpretation of aerial photographs	1
	Identification of different landforms	1
	Terrain evaluation for strategic purpose	1
	Recent advancements and application	1
II	Remote Sensing: Definition, methods, scope and limitations,	1
	Energy source and its interaction with atmosphere	1
	Energy source and its interaction with earth features	1
	Electromagnetic spectrum	1
	Laws of radiation	1
	black body radiation	1
	Remote sensing platforms	1
	Active and passive systems	1
	Satellites: High level and low level satellites	1
	Geosynchronous and sunsynchronous satellites	1
	Types of sensors and scanners	1
	Space missions: Gobar space missions	1
	Indian space missions	1
	Resolutions: Spectral and spatial	1
	Radiometric and temporal resolutions	1
III	Geographic Information System (GIS):	1
	Introduction, Definition and Scope	1
	Principles and Application of Geographic Information System	1
	Components of GIS (Hardware and Software requirement for GIS Application)	2
	GIS Software in use, both proprietary and Open Source Software	1
	GIS processes: Digitization, Topology	1
	Attribution, Attribute based query	1
	Spatial query, Overlay Analysis	1
	Map Generation and Composition	1
	Maps: Maps and their different Features / Themes / Layers	2
	Map Projections-Different types and their Properties	2
	Database: Definition and types of Database	1
	Data management: Data Quality, Data Manipulation and Analysis	1
	Advantages and Vector and Raster data Models and their relative merits	1
	Application of GIS	1
	Application of GPS	1
	GIS and GPS Advantages, uses in different fields	1
	IV	Extraction of features from Satellite Imagery
And Integrating with other themes in GIS		2
GIS Project:		2
Planning		2
Implementation		2
High wall Mining		1
Mine Supports		1

	Factors considered for types of Supports Used.	1
	Mine Ventilation- Planning, its Significance and Effects	1
	Drainage- planning: Significance and its effect.	1
	Mining hazards: Mine Inundation, Fire and Rock Burst;	1
	Procedure for Grant of Mining Leases, Mining Plan Preparation, Mine closure plans.	2

IV-Semester
Paper-IV (Medical Geology)

Unit	Topic	Hours
I	Introduction, Definition and Scope	1
	Historical background	1
	Essential minerals	1
	Toxic elements	1
	Deficiencies of trace elements	2
	Excesses of trace elements	1
	Elements in atmosphere	1
	Elements in Hydrosphere	1
	Elements in Lithosphere	1
	Elements in Biosphere	1
	RSWPH	
	Rocks relations	1
	Water relations	1
	Plant relations	1
Human relations	1	
II	Tropical Environment	1
	Arid zone	1
	Humid tropics and Sub-tropics	1
	Weathering profiles	2
	Weathering of mineralized terrains	2
	Soil-formation, soil profile	2
	Formation of secondary elements	1
	Weathering of ultrabasic rocks	2
	Hydro geochemistry	1
	Water hardness	2
III	Geochemistry of Iodine	1
	Iodine in drinking water	1
	Iodine in food	1
	Iodine deficiency disorders	1
	Goitrogens	1
	Geochemistry of Fluoride	1
	Fluoride of soils	1
	Fluoride of Sediments	1
Fluoride of Plants	1	

	Fluoride of health: Dental fluorosis	1
	Skeletal Fluorosis	1
	Selected defluoridation of high fluoride ground water	1
	Defluoridation Methods: Adsorption and ion exchange	1
	Precipitation, Electrochemical methods	1
	Membrane techniques	1
IV	Geochemistry of Nitrates: Nitrogen cycle, Nitrates	1
	Fertilizers and Environment	1
	Human and animal wastes	1
	Methanoglobinaemia and cancer	1
	Geochemistry of Arsenic	1
	Arsenic in rocks and minerals	1
	Arsenic in soils natural water	1
	Arsenic in Micro organism	1
	Arsenic health effects	1
	Water hardness: Calcium stone formations	1
	Magnesium stone formations	1
	Selenium: Environment	1
	Reduction of oxidation	1
	Human effects	1
	Animal effects	1