



Semester	Part	Course	Title	Inst. Hours/Week	Credit	Exam	Marks		Total	
						Hours	Internal	External		
I	I	Language Course-I (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100	
	II	English Language Course - I (ELC)		6	3	3	25	75	100	
	III	Core Course-I (CC)		General Geology	6	5	3	25	75	100
		Core Practical – I (CP)		Structural Geology and Surveying (P)	3	-	-	-	-	-
		First Allied Course-I (AC)		Any one from Group-I	4	4	3	25	75	100
	First Allied Course-II (AC) / (AP)		Any one from Group-I	3	-	-	-	-	-	
	IV	Value Education		Value Education	2	2	3	25	75	100
Total				30	17				500	
II	I	Language Course-II (LC)– Tamil*/Other Languages ** #		6	3	3	25	75	100	
	II	English Language Course-II (ELC)		6	3	3	25	75	100	
	III	Core Course-II (CC)		Structural Geology	6	6	3	25	75	100
		Core Practical – I (CP)		Practical I – Structural Geology and Surveying	3	4	3	40	60	100
		First Allied Course-II (AC) / (AP)		Any one from Group-I	3	3	3	25	75	100
	First Allied Course-III (AC)		Any one from Group-I	4	2	3	25	75	100	
	IV	Environmental Studies		Environmental Studies	2	2	3	25	75	100
Total				30	23				700	
III	I	Language Course – III (LC)– Tamil*/Other Languages ** #		6	3	3	25	75	100	
	II	English Language Course-III (ELC)		6	3	3	25	75	100	
	III	Core Course – III (CC)		Physical Geology	4	4	3	25	75	100
		Core Course – IV (CC)		Palaeontology	5	5	3	25	75	100
		Second Allied Course – I (AC)		Physics -I	4	4	3	25	75	100
	Second Allied Course-II (AP)		Physics Practicals	3	-	-	-	-	-	
	IV	Non Major Elective I - for those who studied Tamil under Part-I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme		Fundamentals of Geology	2	2	3	25	75	100
Total				30	21				600	

IV	I	Language Course –IV (LC) - Tamil*/Other Languages ** #		6	3	3	25	75	100	
	II	English Language Course – IV (ELC)		6	3	3	25	75	100	
	III	Core Course – V (CC)	Crystallography and Optical Mineralogy		4	4	3	25	75	100
		Core Practical – II (CP)	Palaeontology and Crystallography (P)		4	4	3	40	60	100
		Second Allied Course - II (AP)	Physics (P)		3	3	3	40	60	100
		Second Allied Course - III	Physics –II		3	2	3	25	75	100
	IV	Non Major Elective II-for those who studied Tamil under Part I a) Basic Tamil for other language students	Introduction to Minerals, Rocks and Fossils		2	2	3	25	75	100
		b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme								
		Skill Based Elective I			2	2	3	25	75	100
	Total				30	23				800
V	III	Core Course – VI (CC)	Mineralogy		6	6	3	25	75	100
		Core Course – VII (CC)	Stratigraphy		6	6	3	25	75	100
		Core Practical – III (CP)	Mineralogy (P)		6	4	3	40	60	100
		Major Based Elective – I	Engineering and Mining Geology		6	5	3	25	75	100
	IV	Skill Based Elective –II			2	2	3	25	75	100
		Skill Based Elective – III			2	2	3	25	75	100
		Soft Skills Development	Soft Skills Development		2	2	3	25	75	100
		Total				30	27			
VI	III	Core Course – VIII (CC)	Petrology		6	6	3	25	75	100
		Core Course – IX (CC)	Economic Geology		6	6	3	25	75	100
		Core Practical – IV (CP)	Petrology and Economic Geology (P)		6	4	3	40	60	100
		Major Based Elective II	Hydrogeology		6	6	3	25	75	100
		Major Based Elective III	Environmental Geology and Remote Sensing		5	5	3	25	75	100
	V	Extension Activities	Extension Activities		-	1	-	-	-	-
		Gender Studies	Gender Studies		1	1	3	25	75	100
		Total				30	29			
Grand Total				180	140				3900	

List of Allied Courses:

Group I

1. Mathematics
2. Chemistry

Group II (Any one)

Physics

Language Part – I	-	4	
English Part –II	-	4	
Core Paper	-	9	
Core Practical	-	4	
Allied Paper	-	5	
Allied Practical	-	1	
Non-Major Elective	-	2	
Skill Based Elective	-	3	
Major Based Elective	-	3	
Environmental Studies	-	1	
Value Education	-	1	
Soft Skill Development	-	1	
Gender Studies	-	1	
Extension Activities	-	1	(Credit only)

* for those who studied Tamil upto 10th +2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

those who studied Tamil upto 10th +2 but opt for other languages in degree level under Part I should study special Tamil in Part IV

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** Extension Activities shall be out side instruction hours

Non Major Elective I & II – for those who studied Tamil under Part I

- Basic Tamil I & II for other language students
- Special Tamil I & II for those who studied Tamil upto 10th or +2 but opt for other languages in degree programme

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60
3. Separate passing minimum is prescribed for Internal and External marks		

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for University Examinations **shall be 40% out of 60 marks** [i.e. 24 marks]

CORE COURSE I
GENERAL GEOLOGY

Objective:

To learn about the basic principles of Geology, Evolution of the Solar system, causes and effects of Earthquakes, Mass movements like Soil creep, Rock Creep and Solifluction, Earth's various exogenetic processes like weathering and action of geological agents and Endogenetic processes like earthquake, volcanoes, tectonic process and mountains.

Unit I

Definition of Geology – Branches of Geology – The Solar system:– The Planets – Meteorites – Asteroids – Satellites – Comets. Evolution of the Solar system – Nebular hypothesis – Planetesimal hypothesis – Tidal hypothesis – Von Weizsacker's hypothesis - Dust Cloud hypothesis - Big bang theory. The age of the earth – sedimentation method - salinity method – Kelvin's rate of cooling method – Dating Methods: Radiometric methods- Uranium-lead, Thorium – Lead, Potassium – Argon and C14 methods.

Unit II

Detailed study of the structure and composition of Earth's interior. Earthquakes: Definition – causes and effects – Focus and Epicenter – Magnitude and Intensity – Properties and propagation of seismic waves – Seismograph and Seismogram – Distribution of Earthquakes –Prediction of Earthquakes – Earthquakes in India – Tsunami.

Unit III

Volcanoes: Definition – Types, Phases – Solid, Liquids and Gaseous Products, Distribution of volcanoes, Causes of volcanism – Effects of Volcanic activity - Prediction of volcanoes. Mass movements – Definition – Classification –Slow movements: Soil creep, Rock creep and solifluction. Rapid movements: Earth flows, rock falls and landslides. Causes of landslides.

Unit IV

Distribution of continents and oceans –Characters of continents and Oceans – Continental margin – Ocean basin; Continental drift: Wegner's and Taylor's hypothesis; Sea floor spreading: Concept of plate tectonics – Different kinds of plate margins – Evidences in favor and against the concepts of Continental Drift and Plate Tectonics; Introduction to Mid Oceanic Ridges, Submarine trenches and Transform faults.

Unit V

Mountains: Classification – Life cycle of mountains – Origin of mountains. Geosynclines: Stille's, Kay's, Strahler's and Schuchert's Classifications; Types

of plateaus and plains. Causes, effects and evidences of Sea level changes.

Text Books:

1. Arthur Holmes(1992) Principles of Physical Geology: Thomas Nelson & sons London.
2. Philip G. Worcester(1939) A textbook of geomorphology: D. Van Nostrand co., London.
3. Radhakrishanan. V (1966).General Geology - V.V.P. Press.
4. Mahapatra, G.B.(2015) A text book of Geology(- CBS, Delhi
5. Patwardhan, A.M. (2012) The Dynamic Earth System - PHI Learning PVT. Ltd, NewDelhi

Reference Books:

1. William J. Miller(1949) -Principles of physical Geology - Thomas Nelson & sons , London.
2. W. D. Thornbury(1969) A text book of geomorphology - D. Van Nostrand co., London.
3. A.L. Bloom(1978) General Geology - V.V.P.Press.
4. L.D. Leet & Judson(1960) Physical Geology - Prentice Hall, India.
5. Edger W. SpencerEarth Science(2002) -Mc Graw Hill, New Delhi.

CORE PRACTICAL I

STRUCTURAL GEOLOGY AND SURVEYING (P)

Objective:

To know about the Exercises to predict the trends of the outcrop of horizontal, vertical and inclined beds with respect to topography, Reading of solid fold and fault , maps construction and problems relating to true dip and apparent dip. Fundamental and applications of surveying.

Structural Geology:

Contour maps and their interpretation. Exercises to predict trends of the outcrop of Horizontal, vertical anticline beds with respect to topography – reading of solid conformable maps – deciphering dip and strike of outcrops – construction of map with three points over a bedding plane are given construction of vertical sections-order of super position – vertical thickness of formations.

Reading of solid fold and fault maps construction of vertical sections – Determination of throw of vertical faults. Reading of unconformable solid maps – construction of sections. Reading of solid maps of areas when more than one structure is involved – determination of comparative ages of structures and intrusions – narrate geological history of an area.

Structural Problems – problems relating to true dip and apparent dip; Determination of vertical and true thickness.

Basic map components. Description of features in Survey of India's (SOI) toposheet: Extramarginal, marginal, intramarginal information, major conventional signs and symbols, physical and socio-cultural features.

Surveying:

Chain survey – prismatic compass survey – plane table survey – leveling. Clinometer Compass and Brunton Compass:-To find out dip and strike of the beds. GPS:-Fundamentals and applications.

CORE COURSE II
STRUCTURAL GEOLOGY

Objective:

To know about the Topographic , Geological maps and its applications, Primary and secondary structures, geometry and elements of fold, fault and joint surface recognition in the field, Foliation Mechanism and Uses of compass in field.

Unit I

Scope and aim of Structural Geology – Methods of representing physiographic features - Contours – Topographic and Geological maps, their preparation and uses. Physical properties of rocks: Deformation – brittleness, plastic and elastic properties. Beds and their attitudes – Dip and strike – Trends of outcrop – Rule of V of outcrops – Relation between true and apparent dips. Width of outcrops, True thickness, vertical thickness and their mutual relations.

Unit II

Primary and secondary structures – primary structures of extrusive and intrusive igneous rocks– primary structures of sedimentary rocks.

Plutons – concordant and discordant plutons – dyke, sill, phacolith, lopolith, batholiths, ring dykes and cone sheets – brief study of salt domes.

Unit III

Folds – geometry and elements of folded surface – classification – descriptive study of different types of folds – recognition of folds in the field and on map.

Unconformities – definition – types – significance – recognition in the field and on map – over lap and off lap; Inlier and Outlier.

Unit IV

Faults – definition – terminology – genetic and geometric classification and description – recognition of faults in the field and on the map – distinction between faults and unconformities – a short account of rift valleys. Joints – definition – geometric and genetic – classification – descriptive study – applications of joints.

Unit V

Foliation – Primary and secondary foliations; Cleavage and Schistosity – Types and Origin of Rock Cleavages. Lineation – Kinds and Origin of lineation; Mechanism and Uses of Clinometer and Brunton compass.

Text Books:

1. Billings, M. P.(1974), Structural Geology: Prentice Hall, Englewood Clifts, U.S.A.
2. Novin, C. M.(1953), Principles of structural Geology John Willey, New York.
3. Gokhale, N. W. (2013): Theory of Structural Geology. CBS Publishers.
4. Ghosh, S. K.(1993), Fundamentals and Modern developments. Pergamon Press.

Reference books:

1. V.V. Belousov(1962)- Structural Geology, Moscow
2. P.C. Bedgley(1965)- Structural and Tectonic, Principles: Harper & Row, New york.
3. E.W. Spencer(1977), An Introduction to structural Geology: Mc Graw, Hill, New York.
4. Park, P.G.(2011) Fundamentals of structural Geology, John Willey & sons,

CORE COURSE III
PHYSICAL GEOLOGY

Objective:

To know about the Weathering of rocks and its processes, Source of Running water erosion, transportation and deposition of landforms, Underground water sources its formation and process, Origin of Glaciers and its type of movement, characteristic of Seas and Oceans

Unit I

Weathering of Rocks – Environment of weathering – kinds of weathering processes- physical-chemical-biological weathering – Rates of weathering –products of weathering, – weather and climate – Role of weathering in Geologic cycle, Economic importance of weathering.

Atmosphere – Its composition and zones. Movement of atmosphere – wind – Geological actions of wind- formation of sand dunes and their types – loess – arid cycle of erosion – characteristics of deserts.

Unit II

Running water/River– Source and surface flow – erosion, transportation and deposition land forms– valley development – river meandering. Drainage patterns – fluvial cycle; youth- maturity-old stage – stream rejuvenation – river capture-river terraces-deltas.

Unit III

Underground water/Groundwater – sources – water table – zone of saturation – springs and wells – artesian wells – geysers – spring deposits – aquifer – geological work of ground water – solution – Karst topography – development of karst features – characteristics of Karst regions – origin of L.St. caverns – stalactite and stalagmite formations-artesian belts of Tamil Nadu.

Unit IV

Glaciers – origin and types of glaciers – movement of glaciers – transportation and deposition –glacio fluvial deposits – land forms produced by glaciers – Ice ages. Lakes – classification – types of lakes – lake deposits. Brief study of lakes in Tamil Nadu

Unit V

Seas and Oceans – waves, tides and currents– sea as a geologic agent – classification of shorelines – shoreline types – description of continental margin – continental shelf – continental slope –ocean basin. Submarine topographic- canyon-sea mounts- Guyot-mid oceanic ridge. Oceanic deposits. Coral reefs - origin and their types. Ocean natural resources

Text Books:

1. Philip G.Worcester(1939) : A text book of Geomorphology – D. Nostrandcomp Inc. New York.
1. Radhakrishnan.V, (1996) : General Geology, VVP, Tuticorin.
2. Mahapatra, G.b.(2015):A text book of Geology, CBS, Delhi
3. Arthur Holms (1993) : Principles physical Geology Thomos Nelson & sons, London
4. Chakranarayanan,A.B. et.al:Concepts of Geology, Scientifica Publication

Reference Books:

1. D.Leet & Shelton Judson(1960): Physical Geology – prentice Hall, Internation Inc. Englewood, Cliff, U.S.A.
2. William J, Miller(1949) : An introduction to physical Geology, D. Van Nostrand Company, Inc New York.

CORE COURSE IV

PALAEONTOLOGY

Objective:

To study about the Palaeo life in the world, habitats of animals, indicators of evolution and migration of life forms, General morphology and classification of fossil belonging to phylum Arthropoda, Mollusca, Brachiopoda, protozoa, plant fossils and Applications of Micro palaeontology

Unit I

Definition of fossils – nature and modes of preservation of fossils: Unaltered hard parts, Altered hard parts : Petrification , permineralisation , carbonisation, recrystallisation, silicification; trace fossils, - mould, casts, tracks , trails, borings; Uses of fossils – stratigraphic indicators, index fossils – climatic indicators. indicators of evolution and migration of life forms – indicators of new deposits of coal and petroleum.

Unit II

Phylum protozoa – Order: Foraminifera: General morphology – dimorphism – classification , geological history and stratigraphic importance. Class Crustacea: Sub class: Ostracoda – morphology. Applications of Micro palaeontology. Phylum Porifera – A short account of sponges

Unit III

Phylum coelentrata – class Anthozoa – General morphology : classification – tabulate corals – Rugose corals. Sub phylum Hemichordata – class Graptozoa: order Dendroidea and Graptoloidea. Phylum Echinodermata: Class Echinoidea: General morphology, corona (Ambulacra, inter ambulacra) – peristome – regular and irregular echinoids. Class Crinoidea:- General morphology. Class Blastoidea: General morphology. Phylum Brachiopoda:- General morphology – Brachial skeleton – morphometric details and ornamentation.

Unit IV

Phylum Mollusca: Class Pelecypoda - General characters – ornamentation. Class Gastropoda:- General morphology, shell forms – types of coiling – Dextral and sinistral – ornamentation. Class Cephalopoda: General morphology, (Nautilitic, Gonioatitic, Ceratitic and Ammonitic) – shell forms – ornamentation. morphology of a Belemnite shell. Phylum Arthropoda: Class – Trilobita- General morphology.

Unit V

Outline of the classification of vertebrates. Devonian fishes, Mesozoic Reptiles, Siwalik mammals. General classification of plant kingdom – plant fossils from

India –plant fossils :Glossopteris , Gangamopteris ,otozamites , Ptilophyllum , Calamites , Lepidodendron and Sigillaria.

Text books:

1. Henry woods(1961) : Invertebrate palaeontology – Cambridge.
2. Romer , A.S.(1966) : Vertebrate palaeontology, Chicago press.
3. Arnold, C.A.,(2008) : An introduction to Palaeobotany., MC-Graw Hill.
4. B.U. Hag and A. Boersma (1978) : Introduction to marine Micropalaeontology. Elsevier, Netherlands
5. Jain, P.C., and Anatharaman, M.S., (1983) (An introduction to Paleontology, Vishal Publications.

Reference books:

1. Raup, D.M. and Stanley, M.S.(2006) : Principles of Palaeontology, CBS Publishers.
2. Moore , R.C., Laliker , C.G.& Fisher, A.G.(1952): Invertebrate Fossils , Harper brothers
3. Shrock. R.R. and Twenhofel , W.H – (1953) : Principles of invertebrate Palaeontology, Arnold publication Easton - Invertebrate Paleontology

NON-MAJOR ELECTIVE I
FUNDAMENTALS OF GEOLOGY

Objective:

To Understand about the basic of Geology, Evolution of the Solar system, Causes and Effects of Earthquakes and volcanic activity, Mass movements and its Causes and remedial measures.

Unit I

Definition of Geology –Branches of Geology – Geology in the service of Man. The Solar system: – The Planets – Meteorites – Asteroids – Satellites – Comets; Evolution of the Solar system –Nebular hypothesis – Planetesimal hypothesis – Structure and composition of Earth's interior.

Unit II

Earthquakes: Definition – causes and effects – Focus and Epicenter – Magnitude and Intensity –Prediction of Earthquakes – Tsunami - Earthquakes in India. Volcanoes: Definition - Types –Causes of volcanism – Effects of Volcanic activity - Prediction of volcanoes.

Unit III

Mass movements – Definition – Classification –Causes and remedial measures. Concept of plate tectonics – Different kinds of plate margins – Evidences in favor and against the concepts of Continental Drift and Plate Tectonics.

Unit IV

Weathering of Rocks –weathering processes, chemical and mechanical weathering-Economic importance of weathering. Atmosphere – Its composition and zones. Wind – Geological action of wind- sand dunes and their types.

Unit V

Running water –erosion, transportation and deposition – brief study of land forms resulting from erosion and deposition. Underground water – sources – water table – zones of groundwater – springs and wells – artesian wells – geysers– aquifers. Glaciers – origin and types of glaciers. Seas and Oceans – waves, tides and currents– sea as a geological agent.

Text Books:

1. Arthur Holmes(1993),Principles of physical Geology: Thomas Nelson & sons London.
2. Philip G. Worcester(1939),A textbook of geomorphology: D. Van Nostrand co., London.
3. Radhakrishanan. V .(1996): General Geology - V.V.P. Press.
4. Mahapatra, G.B.(2005 : A text book of Geology, CBS, Delhi

Reference books:

1. William J. Miller(1949),Principles of physical Geology : Thomas Nelson & sons , London.
2. W. D. Thornbury(1969),A text book of geomorphology : D. Van Nostrand co., London.
3. A.L. Bloom(2004) General Geology V.V.P. Press.
4. L.D. Leet & Judson(1960) Physical Geology : Prentice Hall, India.
5. Todd, D.K and L.W. Mays (2004). Groundwater Hydrology. John Wiley & Sons, 656p.

CORE COURSE V

CRYSTALLOGRAPHY AND OPTICAL MINERALOGY

Objective:

To understand about the geometrical characters of crystals. Study of the symmetry elements, behavior of ordinary and polarized light in petrological microscope, Optical properties of isotropic and anisotropic minerals observed under parallel and crossed Nicols.

Unit I

Definition of crystal – morphological characters of crystal – faces –forms – edges solid angles – Interfacial angle. Contact Goniometer. Symmetry elements – crystallographic axes – crystal notation – parameter system of Weiss and Miller indices – axial ratio – laws of crystallography. Classification of crystals into systems and classes - Holohedral , Hemihedral, Hemimorphic and Enantiomorphic forms in crystals. Elementary knowledge of spherical and stereographic projections. Study of the symmetry elements, and forms of the Normal, pyritohedral , tetrahedral and plagiohedral classes of cubic system with type minerals.

Unit II

Study of symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Pyramidal Hemimorphic, Sphenoidal and Trapezohedral classes of Tetragonal system with type minerals. Study of the symmetry elements and forms of Normal, Hemimorphic Tripyramidal, pyramidal Hemimorphic, Trapezohedral, Rhombohedral , Rhombohedral Hemimorphic , Trirhomboidal and Trapezohedral classes of Hexagonal system with type minerals. Study of the symmetry elements and forms of the Normal , Hemimorphic and Sphenoidal classes of Orthorhombic system with type minerals.

Unit III

Study of the symmetry elements and forms of the Normal classes of the Monoclinic and Triclinic systems with type minerals. Twin crystals – Definitions – Effects of Twinning – laws of twinning – composition plane, twinning plane and twinning axis, indices of twins – simple and repeated (polysynthetic twins), contact and penetration twins: secondary twins. Twin laws.

Unit IV

Nature of light – Ordinary and polarized light – Refraction and reflection. Refractive index, Critical angle and Total internal reflection. Double refraction - Plane polarization by Reflection, Brewster's law - Plane polarization by Refraction, Nicol Prism - Plane polarization by absorption, Polaroid.

Petrological microscope and its parts – Optical accessories, their construction and uses.

Unit V

Optical classification of minerals. Optical properties of isotropic and anisotropic minerals observed under parallel and crossed Nicols. Differences between Isotropic and anisotropic minerals. Definition of extinction, Types of extinction, Extinction angles and their determination, and uses – Characters of Uniaxial and biaxial minerals – Optics axis and optic axial angle – Acute and Obtuse Bisectrix – Optic sign of Uniaxial and Biaxial minerals – Uniaxial and Biaxial Indicatrix - Sign of elongation - Optical anomalies.

Text Books:

1. Dana, F.S.(1955) : A text book of mineralogy - Asia Publishing House - Willey.
2. Wade., F.A. & Mattox, R.B. : Elements of crystallography and mineralogy, Harper Bros.(1960)
3. Phillips, P.C (1956) : An introduction to crystallography Longmans green & co.,
4. Kerr.P.F(1995): Optical Mineralogy.

Reference Books:

1. Phillips, W.R.(1986): Optical Minerology,Griffen, D.T.1986.
2. Walhstrom, E.F.(1960) : Optical crystallography – John wiley.
3. Winchel, A.n. (1968) : Elements of optical mineralogy, part 1 & 2 wiley Eastern.
4. Smith H.G.(2011): Minerals under microscopy – Murby.

CORE PRACTICAL II

PALAEONTOLOGY AND CRYSTALLOGRAPHY (P)

Objective:

To familiarize about various invertebrates, plant and microfossils and crystal models, Simple Twin Models.

Palaeontology

Megascopic identification and description of the following fossils:- Corals: Calceola, Zaphrentis, Favosites, Halysites,; Brachiopoda: Spirifer, Productus, Terebratula, Rhynchonella, Atrypa, Athyris, Orthis, Echinodermata: Pentremites, Cidaris, Hemicidaris, Micraster, Holaster, Hemiaster, Stygmaphygus, Mollusca: Pelecypoda: - Arca, Cardium, Meretrix, Cardita, Pecten, Trigonina, Megalodon, Pholodomya, Gryphea, Exogyra, Ostrea, Inoceramus, Alectryonia. Gasteropoda:- Natica, Turbo, Trochus, Turritella, Cerethium, Conus, Voluta, Murex, Fusus, Physa, Bellerophon. Cephalopoda:- Nautilus, Goniatites, Ceratites, Acanthoceras, Scholenbachia, Perisphinctes, Hamites, Scaphites, Baculites, Turritites and Belemnites, Arthropoda: Trilobita:- Paradoxides, Calymene, Phacops. Trinucleus, Graptolites: - Phyllograptus, Tetragraptus, Didymograptus, Diplograptus, Monograptus, Plant fossils:- Glossopteris, Gangamopteris, Ptillophyllum, Lepidodendron, Sigillaria and Calamites.

Micro Fossils:

Lagena, Nodosaria, Textularia, Operculina, Elphidium, Ammonia.

Diagrams:

Paradoxides, Pentremites, Trigonina, Arca, Meretrix, Murex, Turritella, Nautilus, Spirifer.

Crystal Models:

Identification and description of the following crystal models:

Galena, Garnet, Fluorite, Pyrite, Tetrahedrite, Boracite, Sphalerite, Cuprite, Zircon, Cassiterite, Rutile, Octahedrite, Apophyllite, Vesuvianite, Scheelite, Meonite, Wulfenite, Chalcopyrite, Beryl, Zincite, Apatite, Calcite, Haematite, Dolomite, Corundum, Tourmaline, Phenacite, Dioptase, Quartz, Olivine, Topaz, Barite, Andalusite, Cordierite, Sulphur, Staurolite, Hypersthene, Calamine, Struvite, Epsomite, Gypsum, Orthoclase, Augite, Hornblende, Epidote, Sphene, Axinite, Albite, Kyanite and Rhodonite.

Simple Twin Models:

Galena, Fluorite, Pyrite, Rutile, Calcite, Quartz, Staurolite, Gypsum, Augite, Orthoclase, Albite.

NON-MAJOR ELECTIVE II

INTRODUCTION TO MINERALS, ROCKS AND FOSSILS

Objective:

To create awareness and importance of Mineral, Crystals, Gemstone, Ore and Gangue minerals. Commercial significance of igneous, metamorphic and sedimentary rocks. Study about fossils and its application.

Minerals:

Unit I

Definitions of Mineral and Crystals, Ore and Gangue. Brief study of Physical Properties of Minerals; Nature, Streak, Cleavage, Hardness, Luster and fracture. Description of physical properties and chemical composition of the following mineral groups-Quartz group - Feldspars group-Pyroxenes group - Amphiboles group.

Unit II

Study of Physical properties, Chemical composition and origin of the mineral used in the following industries: Cement industry, Glass and Ceramic industry, Paint industry, Paper industry, Fertilizer industry, Atomic industry, physical chemical properties of gemstone. Classification of gemstone, occurrence of gemstone in Tamilnadu – Ruby, Sapphire, Emerald, Moonstone and Iolite.

Rocks:

Unit III

Brief study of common characters of igneous, metamorphic and sedimentary rocks. Structures and texture of igneous, metamorphic and sedimentary rocks. Engineering properties of building stone. Important ornamental and architecture properties of rocks.

Unit IV

Descriptive study of structure, texture, mineralogy and origin of the following igneous rocks: Granite, Syenite, Gabbro, Dunite, Basalt, Pegmatite, Anorthosite and Dolerite. Description of texture, mineralogy and origin of the following sedimentary rocks: sandstone, conglomerate, Breccia, Shell-Limestone and Shale. Brief study of the following metamorphic rocks: Slate, Schist, Gneiss, Marble and Charnockites.

Fossils:

Unit V

Introduction of Palaeontology. Definition of fossils – mode of preservation of fossils. Types of fossils -Uses of fossils. Morphological identification and description of the following fossils: Corals: Calceola, zaphrentis; Brachiopoda: Sprifer, Productus, Terebratula; Pelecypoda: Arca, Cardium. Meretrix, Cardita, Pecten; Gastropoda: Natica, Turbo, Trochus, Turritella, Physa; Cephalopoda: Nautilus, Goniatites, Ceratites. Plant fossils: Glossopteris, Gangmopteris, Calamites, Lepidodendron, Sigillaria and Ptilophyllum.

Text Books:

1. Dana, F.S. (1955): A text book of mineralogy – Asia publishing House, Wiley.
2. Tyrrel, G.W. (1978) :The principles of petrology – Chapman and Hall Ltd., London.
3. Mahapatra, G.B(2008): A text book of Geology, CBS, Delhi
4. Lindgren W.(1993):Mineral Deposits, MCGraw Hill.
5. Henry Woods (1967) : Invertebrate Palaeontology – Cambridge University Press, London.

CORE COURSE VI

MINERALOGY

Objectives:

To learn about the physical and optical properties of rock forming minerals. It deals in detail about the structure, physical and chemical properties of Ortho, ring, sheet, chain and framework silicates

Unit I

Crystalline and amorphous substances, structure, form, cleavage, colour, luster, transparency, streak, hardness, sp.gravity, tenacity, feel, taste, odour. Electrical, Magnetic and Thermal Properties. Empirical and Structural formula of minerals. Isomorphism, polymorphism and pseudomorphism, Atomic substitution and solid solution in minerals. Non-crystalline minerals. Fluorescence in minerals - Metamict state.

Unit II

Physical properties, chemical composition, Classification, diagnostic properties and mode of occurrence of Ortho and Ring silicates: Olivine group, Garnet group, Alumino silicates-Epidote group, Zircon, Staurolite, Beryl, Cordierite and Tourmaline.

Unit III

Physical properties, chemical composition, Classification, Optical and diagnostic properties and mode of occurrence of Sheet silicates and Chain silicates: Mica group-Chlorite group -. Pyroxene group -Amphibole group.

Unit IV

Physical properties, chemical composition, Classification, Optical and diagnostic properties and mode of occurrence of Framework silicates: Quartz group-Feldspar group, Feldspathoid group, Zeolite group and Scapolite group.

Unit V

Physical properties, chemical composition, Classification, Optical and diagnostic properties and mode of occurrence of clay minerals-Non-silicate-Spinel group, Carbonates and Phosphates. Properties of precious and semi-precious minerals.

Text Books:

1. E.S.Dana, 1935, A Text Book of , Mineralogy, John Wiley & Sons.
2. L.G.Berry Mason, 1961, Mineralogy, W.H.Freeman & Co.,

References Books:

1. W.A.Deer, R.A.Howie and J.Zussman, 1966, An Introduction to the Rock Forming minerals, Longmans.
2. Alexander N.Winchell, 1968, Elements of Optional Mineralogy, Parts I and II, Wiley Eastern (P) Ltd.,
3. Ernest, E.Walstrom, 1960, Optional Crystallography, John Wiley & Sons,
4. Kerr, B.F., 1995, Optical Mineralogy 5th Ed. Mc Graw Hill, New York.
5. S.Mitra, 1994, Fundamentals of Optical, Spectroscopic and X-ray Mineralogy

CORE COURSE VII

STRATIGRAPHY

Objective:

To learn about the geological time scale, principles of stratigraphy and the description of strata and their relationship to tectonics, climate, fossils along with their distribution in different parts of India from Precambrian to recent and geological boundary problems and applications of stratigraphy.

Unit I

Principles of stratigraphy: law of order of superposition. law of uniformitarianism and law of faunal succession. Correlation. Standard stratigraphic scale- Indian Geologic Time scale. Imperfections in Geological record. Geological divisions. Stratigraphic classification -Nomenclature. Stratigraphic Units-Homotaxis. Physiographic divisions of India: Peninsular India-Indogangetic alluvial plains-Extra Peninsular India

Unit II

Precambrian Stratigraphy: Archaeans of Dharwar Province-Archaeans of Eastern Ghat - The Sausar and Sakoli Series-Archaeans of Singhbhum – Iron Ore Series-Gangpur Series -Archaeans of Tamilnadu-Mineral Wealth of Archaeans of India. The Eparchaeon Unconformity. Stratigraphy and Mineral Wealth of Cuddapahs. Stratigraphy and Mineral Wealth of Vindhyan. Kurnool group, Life during Precambrian

Unit III

Paleozoic Stratigraphy: Distribution of Paleozoic rocks in India-Cambrian of Salt Range-Age of Saline Series-Upper Carboniferous and Permian rocks of Salt Range-Paleozoic rocks of Kashmir Valley-Paleozoic rocks of Spiti Valley-Paleozoic rocks of Peninsular India.

Unit IV

Mesozoic Stratigraphy: The Depositional Environment-distribution and economic importance of Gondwana formations of India-Coastal Gondwana of India-Gondwana formations of Tamilnadu. Triassic of Spiti – The Lilang System-Jurassic of Kutch. Cretaceous of Tiruchirapalli – Pondicherry – Bagh Beds. Deccan traps : distribution-structure- Lameta beds – intratrappean and intertrappean beds-age of the Deccan traps.

Unit-V

Cenozoic Stratigraphy: Comprehensive account of the geological events took place during Cenozoic era in India. rise of Himalayas-stratigraphy of Siwalik system-fauna and flora of Siwaliks. Tertiary rocks of Assam-Karewa formation-Tertiary rocks of Tamilnadu, Tertiary rocks of Kerala.Pleistocene Glaciation - Mineral wealth of Tertiary rocks of India.

Text books:

1. Krishnan M.S. (2003) Geology of India and Burma, 6th Edition, CBS.
2. Wadia(1953). Geology of India, TATA McGraw – Hill.D.N.
3. Ravindrakumar K.R. (1958) - Stratigraphy of India.
4. Lemon R.Y (1990) - Principles of Stratigraphy, Merrill Publishing Co.

Reference Books:

1. Pascoe, E.H.(1968) A manual of the Geology India and Burma, Govt of India Publications.
2. Gregory , J.W. and Barret B.H(1931)- General stratigraphy Mathuen.

CORE PRACTICAL III

MINERALOGY (P)

Objective:

To know about the Megascopic and Microscopic properties and their identification of the various minerals, Identification of the mineral powders by simple blow pipe tests.

Megascopic Mineralogy:

Description of megascopic properties and their identification of the following minerals: Quartz, Rosy quartz, Amethyst, Chalcedony, Agate, Flint, Jasper, Chert, Opal, Orthoclase, Microcline, Albite, Oligoclase, Labradorite, Nepheline, Leucite, Sodalite, Enstatite, Bronzite, Hypersthene, Diopside, Augite, Spodumene, Acmite, Rhodonite, Wollastonite, Anthophyllite, Tremolite, Actinolite, Hornblende, Glaucophane, Olivine, Serpentine, Muscovite, Biotite, Vermiculite, Chlorite, Epidote, Garnet, Olivine, Natrolite, Stilbite, Apophyllite, Talc, Steatite, Andalusite, Kyanite, Sillimanite, Staurolite, Cordierite, Apatite, Beryl, Topaz, Calcite, Dolomite, Tourmaline, Zircon, Fluorite.

Microscopic Mineralogy:

Description of optical properties and their identification of the following minerals: Quartz, Orthoclase, Microcline, Albite, Labradorite, Nepheline, Leucite, Enstatite, Hypersthene, Augite, Diopside, Hornblende, Glaucophane, Biotite, Muscovite, Olivine, Epidote, Garnet, Apatite, Zircon, Sphene, Tourmaline, Calcite, Andalusite, Kyanite, Sillimanite, Staurolite, and Cordierite

Blow Pipe:

Identification of the following mineral powders by simple blow pipe tests:

Apatite, Barite, Calcite, Celestite, Cerusite, chalcopyrite, Galena, Gypsum, Chromite, Haematite, Magnesite, Magnetite, Psilomelane, Pyrolusite, Siderite, Sphalerite, Strontianite, Witherite, Stibnite, Ilmenite and Worftramite.

MAJOR BASED ELECTIVE COURSE I
ENGINEERING AND MINING GEOLOGY

Objective:

To know about the basic principles of engineering and mining geology like Engineering properties of rocks, geological investigation of engineering site selection and various mining methods.

Unit I

Introduction to Engineering Geology: Engineering properties of rocks, Rock discontinuities, Physical characters of building, ornamental stones and Concrete aggregates. Dams and Reservoirs – Types of dams – Dam sites. Relative suitability of different rocks – Geological investigation in dam sites.

Unit II

Tunneling – Types, Methods of geological investigation. Road – complicated regions for Roads. Geological problems after road construction – improvement of sites – soil stabilization. Geological investigation on landslides.

Unit III

Sampling – Principles – types – collection of sample – core samples and their preservation. Drilling – brief account of different types of drilling – Geological logging of borehole samples.

Unit IV

Methods of breaking rocks – A short note on explosives. Surface mining open cast. Alluvial mining: Panning – Sluicing – Hydraulicking – Dredging - mine support and stoping – shaft sinking.

Unit V

Subsurface mining: Criteria to choose subsurface mining, Definition of mining terms: Shaft, Level, Adit, Hanging wall, Footwall, Drive, Cross cut, Tunnel, Raise, Winze and Chute. Stopping – Open stopes – Supported stopes – pillar – Square set filled – Shrinkage stopes, Glory hole mining. Caving methods: Top slicing, Sub level caving, Block caving, Coal mining, Prospecting and Planning – Strip mining – Augering – Room and Pillar method – Long wall method.

Text Books:

1. Curran, P (1988). Principles of remote sensing. Corgman Publishers, London .
2. Lillesand, T.M and R.W. Kiefer (2000). Remote sensing and image interpretation. John Wiley Sons, New York .
3. Miller, V.C (1961). Photogeology. McGraw-Hill Publishers, New York

4. Pandey, S.N (1987). Principles and applications of photogeology. Wiley Eastern Ltd.,New Delhi.
5. Sabins, F.F (1987). Remote sensing principles and interpretation. Freeman Publishers, New York.
6. Siegal, B.S and R. Gillespie (1980). Remote sensing in Geology, John Wiley & Sons, New York
7. Arogyaswamy, R.N.P.(1996) Courses in Mining Geology – Oxford &IBH, New Delhi.
8. Thamus, P.J. (1979) An introduction to mining, Methun.
9. Mc Kinstry, H.E (1960) Mining Geology, New york.

Reference Books:

1. Allum, J.A.E (1978). Photogeology and regional mapping, Pergamon Press Ltd., Oxford
2. Anji Reddy, M (2001). Textbook of remote sensing and GIS, BSP PS Publications, New Delhi
3. Rampal, K.K (1999). Handbook of aerial photography and interpretation. Concept Publishers Company, New Delhi
4. Jean Yves Scanvic (1997). Aerspatial remote sensing in geology. Oxford & IBH Publishers Co. Pvt. Ltd.
5. Agarwal, C.S and Garg, P.K (2000). Textbook on remote sensing in natural resources monitoring and management, Wheeler Publishing Company Ltd., New Delhi
6. Narayan, L.R.A (1999). Remote sensing and its application. Universities Press Ltd., Hyderabad.

CORE COURSE VIII

PETROLOGY

Objective:

To learn about the formation of rock due to Igneous activity and magma types, Classification of Igneous Rocks, Petrography and Petrogenesis various rocks, behavior of major-oxide elements in rocks, Application of Harker Diagram and Triangular Diagram variation diagrams.

Unit I

Forms of Intrusive and Extrusive Igneous Rocks: Pyroclastic deposits – elaborate study of Structures and Textures of igneous rock. Classification of igneous rocks-: Bases of classification- Tyrrell's tabular classification- CIPW Normative Classification -IUGS Modal Classification for Plutonic and Volcanic rocks.

Unit II

Crystallization of Unicomponent magma-Binary magmas: Diopside – Anorthite Eutectic system, Albite – Anorthite Solid-Solution system, Forsterite – Silica incongruent melting system. Bowen's reaction series. Magmatic Differentiation-Fractional Crystallization-Liquid Immiscibility- Assimilation. Petrography, petrogenesis and mode of occurrence of the following rocks: Granite-Granodiorite-Syenite-Diorite-Gabbro- Pegmatite-Lamprophyre-Dunite and Anorthosite.

Unit III

Sedimentary process – Disintegration and decomposition of rocks – transportation – deposition – diagenesis. A broad classification of sedimentary rocks. mechanical, chemical and organic structures. Textures of sedimentary rocks – clastic and non – clastic textures. Residual deposits –Mechanical deposits. Heavy minerals in sand and sandstones. A descriptive study of Conglomerate-Breccia-Sandstones and Shales. Chemical deposits- Organic deposits. A brief study of Flint, Chert, Siderite, Gypsum, Rock Salt, Caliche. Guano and Kiesellgher.

Unit IV

Definition of metamorphism –Agents and types of metamorphism – cataclastic metamorphism and its products. Thermal metamorphism of pelitic sediments, pure and impure calcareous rocks. Regional (Dynamothermal) metamorphism of pelitic sediments. Plutonic metamorphism. Metamorphic reactions – Dehydration Reaction, Decarbonation reaction, Solid-solid, Oxidation-reduction reaction, anatexis and palingenesis.

Unit V

A brief study of metamorphic structures and textures. Definition of facies, zones and grades of metamorphism. Brief study and petrography of Slate, Phyllite, Quartzite, Schist, Gneiss, Granulite, Leptynite, Charnockite, Eclogite, Amphibolite, , Lit- Par- Lit – gneiss and Migmatite, Flaser, Mylonite, Hornfels, Marble, Ophicalcite.

Text Books:

1. Tyrrell, G.W. (1978): The principles of petrology – Chapman and Hall Ltd., London.
2. Bowen, N.L.(1954): The Evolution of the Igneous Rocks – Dover publication, Inc, New York.
3. Barth, FW. (1962): Theoretical petrology - Wiley.
4. Walstrom, E.E. (1961): Theoretical Igneous petrology, Wiley.
5. Hatch, F.H. Wells, AK (1949): Petrology of Igneous Rocks, Thomas Murby & Wells, M.K.
6. Johannesen, A (1962): Descriptive petrography of Igneous Rocks, Vols. I to IV - Allied Publishers
7. Turner.F.J and Verhoogen.J –1960: Igneous and Metamorphic petrology – McGraw Hill.

Reference Books:

1. Tyrrell. G.W.(1963)- Principles of Petrology – Asia Publishing House.
2. Turner.F.J and Verhoogen.J –(1960).- Igneous & Metamorphic petrology – McGraw Hill.
3. MacKenzie.W.S. et.al.,-(1982); Atlas of Igneous rocks and their textures – Longman.
4. McBirney.A.R.(1994) – Igneous Petrology – CBS Publishers and Distributors.
5. Raymond.L.A.-2002- Petrology – McGraw Hill.
6. Hall- A (1992) – Igneous Petrology – ELBS.
7. Morse.S.A – (1980)- Basalts and Phase diagrams –Springer – Verlag.
8. Winter. J.D.- (2001) – Igneous and Metamorphic Petrology –Prentice Hall.
9. Winkler, H.G.F. – 1967 – Petrogenesis of Metamorphic Rocks, Springer and Verlog
10. Phillipots. R. Anthony (1994) – Principles of igneous and metamorphic petrology, Prentice-Hall of India, New Delhi.

CORE COURSE IX
ECONOMIC GEOLOGY

Objective:

To study about the Materials of mineral deposits its Magmatic processes , Sedimentary and metamorphic processes of economic minerals, Fossils fuels uses, origin and distribution in India and important oil fields of India.

Unit I

Historical development of economic Geology. Materials of mineral deposits – ore minerals, gangue minerals, tenor and grade or ores. classification of mineral deposits. Outline of Lindgren's and Bateman's classification. Controls of ore localization – structural controls, stratigraphic physical and chemical – brief study of metallogenetic epochs and provinces – geologic thermometers.

Unit II

Process of mineral formation - primary and secondary process: brief outline of magmatic- sublimate-contact metasomatic- hydrothermal- metasomatic replacement, sedimentary-evaporates-placer deposits-residual oxidation and supergene enrichment and metamorphic deposits.

Unit III

Diagnostic physical properties, chemical composition, uses, modes of occurrence and distribution in India of the following economic minerals. Graphite, Realgar, Orpiment, Stibinite, Molybdenite, Cinnabar, Anglesite, Barite, Gypsum, Celestite, Corundum, Ochre, Ilmenite, Chromite, Franklinite, Cassiterite, Magnesite, Cerussite, Halite, Fluorite, Phosphatic Nodule, Monazite, Wollastonite, Colembite, Tantalite, Samarskite, Asbestos, Steatite and Vermiculite. Mineralogy, mode of occurrence, uses and distribution in India of the following precious metals and minerals. Gold deposits – Gemstones. Character, distribution and mode of occurrence of structures and building materials.

Unit IV

Mineralogy, mode of occurrences, uses and distribution in India of the following metalliferous deposits – Iron, Manganese, Aluminium, Copper, Lead, Zinc, Chromium. Fossils fuels:- Coal – uses, classification, constitution, origin and distribution in India. Petroleum- composition, uses, theories of origin, oil traps, and important oil fields of India. Outline of Gas Hydrates.

Unit V

Introduction to Strategic, Critical and essential minerals. National mineral policy, and their role in National economy. Mineral based Industries in India. Geology, Mode of Occurrence and Origin of the raw materials of the following Industries: Refractory- Abrasives-paint and pigments-fertilizer glass, ceramic and cement industries,.

Text Books:

1. Bateman Allan, (1962)M. -Economic Mineral Deposits, Asian Publishing House, 2nd Edition.
2. Lindgren, W(1933). -Mineral Deposits, MCGraw Hill,.

Reference Books:

1. Coggin, B. and Dey, A.K.(1955) - India's Mineral Wealth, oup.
2. Park, C.F. and Macdiarmid,(1970) R.A- Ore deposits, Freeman,
3. Krishnaswamy ,S.(1979) - India's Mineral Resources, oxford and IBH.
4. Deb.S. (1980)- Industrial Minerals and Rocis of India, Allied,
5. Gokhale, K.V.G.K. and Rao,(1978.) T.C- Ore deposits of India, their distribution and processing, Thosmson press.

CORE PRACTICAL IV

PETROLOGY AND ECONOMIC GEOLOGY (P)

Petrology:

Megascope identification of the following rocks:

Granite, Graphic granite, Pegmatite, Aplite, Schorl Rock, Granite Porphyry, Syenite, Syenite porphyry, Diorite, Gabbro, Anorthosite, Dunite, Pyroxenite, Dolerite, Dolerite Porphyry, Basalt, Trachyte, Rhyolite, Obsidian, Pumice, Scoria. Conglomerate, Breccia, Sandstone, Arkose, Shale, Limestone, Laterite, Peat, Lignite, Slate, Phyllite, Schists, Gneisses, Quartzite, Marble, Amphibolite, Eclogite, Leptynite, Charnockite, Khondalite, and Basic Granulite.

Microscopic identification and description of the following rocks:

Mica Granite, Hornblende Granite, Tourmaline Granite, Schorl Rock, Aplite, Graphic Granite, Mica Syenite, Hornblende Syenite, Nepheline Syenite, Diorite, Gabbro, Norite, Dunite, Peridotite, Granite – porphyry. Syenite – porphyry, Diorite – porphyry, dolerite, minette, Vogasite, Anorthosite, Trachyte, Andesite, Basalt, Phonolite, Volcanic Breccia, Vitrophyre, Conglomerate, Breccia, Sandstone, Arkose, Shale Limestone, Slate, Chlorite Schist, Mica Schist, Kyanite Schist, Staurolite Schist, Garnetiferous Schist, Glaucophane Schist, Granulite, Charnockite, Eclogite Amphibolite, Leptynite, Khondalite, Cordierite, Gneiss, Garnet – Sillimanite Gneiss, Calc Granulite.

Economic Geology:

Megascope identification and description, Indian occurrences and uses of the following ore and industrial Minerals:

Realgar, Orpiment, Stibnite, Molybdenite, Galena, Sphalerite, Cinnabar, Covelite, Bornite, Chalcophyrite, Pyrite, Arsenopyrite, Marcasite, Barite, Celestite, Gypsum, Cuprite, Zincite, Corundum, Hematite, Ilmenite, Magnetite, Chromite, Franklinite, Cassiterite, Rutile,

Pyrolusite, Psilomelane, Goethite, Limonite, Bauxite, Calcite, Dolomite, Magnesite, Siderite, Aragonite, Witherite, Strontionite, Cerussite, Azurite, Malachite, Chrysocolla, Columbite, Halite, Fluorite, Phosphatic Nodule, Monazite, Graphite, Coal and its varieties.

MAJOR BASED ELECTIVE II

HYDROGEOLOGY

Objective:

To learn about the origin ,occurrence and movements of groundwater in various geological formations, evaluation of aquifer parameters. Groundwater quality assessment and augmentation of groundwater storage strategy in various geological settings.

Unit I

Definition of hydrogeology and groundwater – Types of groundwater based origin - Hydrological cycle - Vertical distribution of ground water – Springs: types, geological conditions favouring development of springs - Definition of aquifers, aquitards and aquicludes - Types of Aquifers: unconfined, semi-confined, confined and perched – Artesian wells.

Unit II

Rock properties affecting groundwater: types of openings, porosity, specific yield, specific retention and permeability – Groundwater movement – Darcy's law and its applications – Determination of permeability in field and lab – Groundwater occurrence in igneous, sedimentary and metamorphic rocks.

Unit III

Groundwater exploration by electrical resistivity method – Outline of dug wells, tube wells, jetted wells, infiltration galleries and collector wells – Well design and development – Fluctuations of groundwater – Groundwater recharge methods

Unit IV

Pump tests and evaluation of various aquifer parameters through pump tests – Conjunctive and consumptive use of groundwater – Sea water intrusion: causes, consequences and, preventive and control measures – Groundwater provinces of India – Groundwater resources of Tamil Nadu including its quality.

Unit V

Groundwater quality in various rock types – Parameters considered for assessing groundwater quality, suitability for drinking and irrigation purposes – The latest drinking and irrigation water standards of WHO and BIS – Waterborne diseases – Rainwater harvesting methods

Reference Books:

1. Todd, D.K and L.W. Mays (2004). Groundwater Hydrology. John Wiley & Sons, 656p..
2. Davis, S.N. & Deweist., R.J.M (1966). Hydrogeology , John Wiley & Sons, New York, 463p.
3. Ragnath, H.M (2007). Groundwater, New Age International Publishers, New Delhi, 520p..
4. Karanath, K.R (1987). Groundwater Assessment, Development & Management, Tata McGraw Hill, 720p.
5. Ramakrishnan, S (1998). Groundwater. K.G. Graph Arts, Chennai, 471p.

MAJOR BASED ELECTIVE III

ENVIRONMENTAL GEOLOGY AND REMOTE SENSING

Objective:

To know about the basic concepts of environmental Geology, Causes, effects, strategies for their mitigation, Remote Sensing Processes and the elements involved in earth resources , Satellite Image interpretation and its Sensor characteristics.

Unit I

Definition of ecology and environmental geology. Different Ecosystems. Classification of Natural resources. A short account of renewable and non renewable resources. Environmental problems due to exogenic processes, causes, hazards and remedial measures relating to landslides, floods and soil erosion. Impact of wind on environment and Global warming.

Unit II

Influence of endogenetic processes – Earthquake hazards- Earthquake prediction control and warning; Reservoir induced seismicity -origin and impact of tsunami – hazards of volcanism- Techniques of volcanic prediction and human adjustments to volcanic environments. Benefits of volcanism.

Unit III

Man as an agent of environmental modification. Environmental degradation due to mining and mineral processing – effects of urbanization on surface water, causes of groundwater pollution. Degradation of coastal environment and measures for coastal protection. Population explosion and their pressure on geological environments.

Unit IV

Introduction to remote sensing - Basic concepts of EMR. Electro Magnetic Radiation interaction with atmosphere-scattering - absorption - atmospheric windows; EMR interaction with Earth surface features - spectral response factors with different objects-Black body radiation. Sensors active and passive: platforms - scanning mechanism, orbiting mechanics. Resolutions - Spectral, Spatial, radiometric and temporal. Microwave.

Unit V

Thermal remote sensing fundamentals. Space images and data products - IRS. Landsat, SPOT. ERS - other geostationary satellite - Space shuttle data products. Analog and digital image data product details. Spectral behavior of different soils. Mapping of soil - eroded and non eroded soil and degraded lands. Land use / Land cover interpretation. Land use planning for urban and rural areas. Role of Remote sensing in mineral exploration - Geodynamic applications.

Reference Books:

1. Keller, E.A (2010). Environmental Geology (9th Edition), Pearson Publishers, New Delhi, 624p.
2. Lundgren, L (1986). Environmental Geology, Prentice Hall Publishers, New Jersey, 528p.
3. Montgomery (2013). Environmental Geology (10th Edition), McGraw Hill Publishers, New Delhi, 576p.
4. Valdiya, K.S (2013). Environmental Geology: Ecology, Resource and Hazard Management (2nd Edition), McGraw Hill Publishers, New Delhi, 432p.
5. Lillesand, T.M and R.W. Kiefer (2000). Remote Sensing & Image Interpretation. J. Wiley & Sons, New York, 750p.
6. Sabins, F.F (1987). Remote Sensing: Principles and Interpretation. W.H. Freeman & Co., New York, 449p.
7. Pandey, S.N (1987). Principles and Applications of Photogeology. Wiley Eastern Ltd., New Delhi, 140p.
8. Anji Reddy, M (2001). Textbook of Remote Sensing and GIS, BSP PS Publications, New Delhi, 246p.

FIELD TRAINING PROGRAMME

As an essential part of the course, students should be taken for a field-training programme during an academic year.

First Year

Students should be taken on a local field trip to study the elementary aspects of geomorphology, structural geology, for about a week and submit a report thereon.

Second Year

Study of Palaeontological and Stratigraphically interested areas and collection of fossils. Student should submit a field report along with collections at the time of practical examinations: Duration of visit about 10 days.

Third Year

Visit to geologically interested and mineralized zones of India. Mine visit and collection of minerals and rocks. Duration of visit is 15 days.
