B.Sc., Geology

Employability Entrepreneurship Skill development

Name of the Programme	Course Code	Title of the Course	Employability	Entrepreneurship	Skill development
B.Sc Geology	BGA	The Dynamic Earth	✓		
	BGBY	Structural Geology and Surveying - Practical		✓	
	BGC	Structural Geology		✓	
	BGD	Physical Geology		✓	
	BGEY	Palaeontology and Crystallography - Practical	✓		
	BGF	Palaeontology and Crystallography	✓		
	BGE1	Fundamentals of Geology		✓	
	BGS1	Climatology			✓
	BGE2	Introduction to Minerals, rocks and Fossils		✓	
	BGG	Stratigraphy		✓	
	BGH	Mineralogy	✓		
	BGIY	Mineralogy and Applied Geology	✓		
	BGE3	Environmental Geology and Hydrogeology	✓		
	BGE4	Remote sensing and Mining Geology	✓		
	BGS2	Water Quality Analysis			✓

	BGS3	Geostatistics and Computer Application			✓
	BGJ	Igneous Petrology	✓		
	BGK	Sedimentary Petrology and MetamorphicPetrology	✓		
	BGL	Economic Geology	✓		
	BGMY	Petrology and Economic Geology	✓		
	BGE5	Mineral Prospecting and Field Geology		✓	

Semester-I / Core Course-I	The Dynamic Earth	Course Code: BGA
Instruction Hours : 6	Credits: 6	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Introduction of the geological process that are dynamically involved in the formation of the planet Earth. • To study the evolution of solar system and age of the Earth. • Describe the Earth's interior, including the structure and composition. • Clearly describe plate tectonics in general term. • To learn about the endogenic process like earthquake, volcanoes and organic activity.	
Unit	**Content**	**Hours**
UNIT I	**DEFINITION OF GEOLOGY** Definition of Geology – Branches of Geology – Applied 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 – Tidal hypothesis – Von Weiszacker's hypothesis and Dust Cloud hypothesis. The age of the earth – sedimentation method - salinity method – Kelvin's rate of cooling method – Radiometric methods: Uranium – lead, Thorium – Lead and Potassium – Argon methods – A note on C14methods.	**(18 Hrs)**
UNIT II	**EARTHQUAKES** Definition – causes and effects – Focus and	**(18 Hrs)**

	Epicenter – Magnitude and Intensity – Properties and propagation of seismic waves – Seismograph and Seismogram – Distribution of Earthquakes – Prediction of Earthquakes – Tsunami – Earthquakes in India. Detailed study of the structure and composition of Earth's interior.	
UNIT III	**VOLCANOES** Definition – types – phases – solid, liquids and gaseous products, distribution – topographic forms. Causes of volcanism – effects of volcanic activity – prediction of volcanoes. Mass movements – definition – classification – slow movements: soil creep, rock creep and soliflucation. Rapid movements: earth flows, rock falls and landslides. Causes and remedial measures.	**(18 Hrs)**
UNIT IV	**OCEANS** Distribution of continents and oceans – Characters of continents and Oceans – Continental margin – Ocean basin – Continental drift: Wegner and Taylor 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 – Mid Oceanic Ridges – Submarine trenches and Transform faults.	**(18 Hrs)**
UNIT V	**MOUNTAINS** Classification – life cycle of mountains – origin of mountains – geosynclines – Stille's, Kay's Strahler's and Schuchert's classification of geosynclines – characters and distribution of geosynclines – types of pleateaus and plains. IsostasyPrat's and Airy's hypothesis – causes, effects and evidences of sea level changes.	**(18 Hrs)**

Text Books:

1. Radhakrishanan V., General Geology., V.V.P.Press,1996.
2. Mahapatra, G.B., A text book of Geology, CBS, Delhi,2015.
3. Arthur Holmes, Principles of Physical Geology, Thomas Nelson & sons,

London.1993.
4. Philip G. Worcester A textbook of geomorphology, D. Van Nostrand Co., London1948.

Reference Books:

1. W. D. Thornbury, A text book of geomorphology, D. Van Nostrand co.,London,2004.
2. A.L. Bloom, General Geology, V.V.P.Press,1978.
3. L.D. Leet& Judson Physical Geology, Prentice Hall, India,1958.
4.

Web resources:

1. www.uj.ac.za/library/bindery
2. https:llen.wikisource.org/wiki/portal:geology
3.

Course outcomes:

On completion of the course, students should be able to

CO 1: Gain a better understanding of the Planets, Moons and other objects of our solar system in addition to their distribution and dynamicalrelationships.

CO 2: Understanding the geological origins of especially important natural hazards including Earthquakes, Tsunami, Volcanic eruptions andLandslides.

CO 3: Understand platetectonics and its central role as the unifying theory ofgeology.

CO 4: Articulate the relationship between Volcanoes, Earthquakes, Mountain belts and Tectonic plate boundaries.

CO 5: Understand the nature of the oceanfloor.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	M	M	S	S	S	M	S	M
CO 2	S	S	M	M	S	M	S	M	S	M
CO 3	M	S	M	M	S	M	S	M	S	M
CO 4	S	S	M	M	S	M	S	M	S	M
CO 5	S	M	M	M	S	S	S	M	S	M

S – Strongly Correlated

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Semester-III & IV/ Core Practical-II	**Paleontology and Crystallography**	**Course Code: BGEY**
Instruction Hours: 6	**Credits: 4**	**Exam Hours: 3**
Internal Marks:40	**External Marks:60**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To identify the different types of fossils. • To know the evolutionary period of fossils. • To identify some of the morphological characteristics of fossils. • To understand the crystal structure. • To learn the twinning of crystals.	
Unit	**Content**	**Hours**
I	**PALEONTOLOGY** Megascopic identification and description of the following fossils:- Corals: Calceola, Zaphrentis, Favosites, Halysites,; Brachiopoda: Spirifer, Productus, Terebratula, Rhynconella, Atrypa, Athyris, Orthis, Echinodermata: Pentrimites, Cidaris, Hemicidaris, Micraster, Holaster, Hemiaster, Stygmatophygus, Mollusca: Pelecypoda: - Arca, Cardium, Meretrix, Cardita, Pecten, Trigonia, Megaladon, 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, Turrilites and Belemnites, Arthropoda: Trilobita:- Paradoxides, Calymene, Phacops. Trinucleus, Graptolites: -	**(18 Hrs)**

	Phyllograptus, Tetragraptus, Didymograptus, Diplograptus, Monograptus, Plant fossils:- Glossopteris, Gangamopteris, Ptillophyllum, Lepidodendron, Sigillaria andCalamites.	
II	**MICRO FOSSILS** Lagena, Nodosaria, Textularia, Operculina, Elphidium, Ammonia.	**(18 Hrs)**
III	**DIAGRAMS** Paradoxides, Pentremites, Trigonia, Arca, Meretrix, Murex, Turritella, Nautilus, Spirifer.	**(18 Hrs)**
IV	**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.	**(18 Hrs)**
V	**SIMPLE TWIN MODELS** Galena, Fluorite, Pyrite, Rutile, Calcite, Quartz, Staurolite, Gypsum, Augite, Orthoclase, Albite.	**(18 Hrs)**

Course Outcome:

On completion of the course students should be able to

CO 1: Find, collect, prepares, study and exhibitfossils.

CO 2: Collect and analyze geologic materials infield.

CO 3: Determine the environment of the earth during the geologicpast.

CO 4: Interpret the miller indices ofcrystals.

CO 5: Recognize crystallographic panes anddirections.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	S	S	S	S	S	S	S	M
CO 2	M	M	M	M	S	S	S	S	M	M
CO 3	M	M	S	M	S	S	S	S	M	M
CO 4	S	S	S	S	S	S	S	S	S	M
CO 5	S	S	S	M	S	S	S	S	S	M

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Semester-IV / Course Code – IV	**Paleontology and Crystallography**	**Course Code: BGF**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks: 25	**External Marks: 75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Understanding the age of the earth through the study of fossils. • To compare the evolution of life through geologic times. • To understand the paleo climate and paleo environment conditions. • To describe the morphology of crystals. • To understand the basic fundamentals of different types of crystal system.	
Unit	**Content**	**Hours**
UNIT I	Definition of Palaeontology – Definition of fossils – nature and modes of preservation of fossils: Body fossils and trace fossils; Body fossils – Petrifaction, permineralisation, carbonisation, recrystallisation, silicification; trace fossils – mould, casts, tracks, trails, borings. Uses of fossils in – stratigraphy – palaeoclimate – palaeogeography – palaeolife – evolution and migration of life forms – economic geology. Life through ages. Phylum Arthropoda:- Class – Trilobita – General morphology – classification – geological history and stratigraphic importance. Subphylum Hemichordata – class Graptozoa: order Graptoloidea – general morphology, classification, geological history and stratigraphic importance.	**(15 Hrs)**
UNIT II	Phylum Coelentrata – class Anthozoa – classification –- tabulate corals – Rugose corals. General morphology geological	**(15 Hrs)**

	distribution – stratigraphic importance. Phylum Mollusca: Class Pelecypoda - General characters – dentition, classification and geological history. Class Gasteropoda:- General morphology, shell forms – types of coiling – dextral and sinistral, perforate and imperforate-classification and geological history. Class Cephalopoda:- General morphology, suture line pattern, classification, geological history. Morphology of a Belemnite.	
UNIT III	Phylum Brachiopoda:- General morphology – brachial skeleton, classification, geological history. Phylum Echinodermata: Class Echinoidea: General morphology – regular and irregular echinoids, classification – geologicial history. Class Crinoidea:- General morphology and geological history. Class Blastoidea: General morphology and geological history. Phylum protozoa – Order: Foraminifera: General morphology – dimorphism – classification and stratigraphic importance. A brief account of the following plant fossils:- Glossopteris, Gangamopteris, Ptilophyllum, Calamites, Lepididendron and Sigillaria.	**(15 Hrs)**
UNIT IV	Definition of crystal – morphological characters of crystal – faces –forms – edges solid angles – Interfacial angle. Contact Goniometer and its uses. Symmetry elements – crystallographic axes – crystal notation – parameter system of Weiss and Miller indices – axial ratio – laws of crystallography – the law of constancy of symmetry, the law of constancy of interfacial angles and the law of rational indices. Study of the symmetry elements, and forms of the Normal, pyritohedral, tetrahedral and plagiohedral classes of cubic system. Study of symmetry elements and forms of Normal, Hemimorphic, Sphenoidal and Trapezphedral classes of Tetragonal system.	**(15 Hrs)**
UNIT V	Study of the symmetry elements and forms of Normal, Hemimorphic Trapezohedral, Rhombohedral, Rhombohedral Hemimorphic classes of Hexagonal system. Study of the symmetry elements and forms of the Normal, Hemimorphic	**(15 Hrs)**

	and Sphenoidal classes of Orthorhombic system. Study of the symmetry elements and forms of the Normal classes of the Monoclinic and Triclinic systems. Twin crystals – Definitions – simple and repeated (polysynthetic twins), contact and penetration twins: secondary twins.	

Text books:

1. Dana, F.S.(1955) : A text book of mineralogy - Asia Publishing House -Willey.
2. Jain, P.C., and Anatharaman, M.S. An Introduction to Palaeontology, Vishal Publications

Reference books:

1. Raup, D.M. and Stanely, M.S : Principles of Palaeontology, CBSPublishers.
2. Moore, R.C., Laliker, C.G.&Fishcher, A.G: Invertebrate Fossils, Harperbrothers.
3. Shrock. R.R and Twenhofel, W.H – 1953: Principles of invertebrate Palaeontology, Amold publication.
4. Phillips, W.R. Optical Minerlogy, Griffen,D.T.1986.
5. Walhstrom, E.F.1960 - Optical crystallography – Johnwiley.

Course outcomes:

On completion of the course students should be able to

CO 1: Demonstrate their understanding of how life has evolved through geologictime.

CO 2: Identify and explain the morphological characters offossils.

CO 3: Explain the evolutionary trends offossils.

CO 4: Understand the concepts origin ofcrystal.

CO 5: Know the forms and faces of crystals.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	S	S	S	S	M	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S

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Semester-V / Course Code VI	Mineralogy	Course Code: BGH
Instruction Hours: 5	Credits: 5	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• The first unit deals with the introduction to the rock forming minerals and other concepts related to mineralogy. • The second unit deals with the physical, chemical and optical properties of common rock forming minerals. • Recognize that minerals are chemical compounds made up of atoms linked together by a variety of chemical bond types. • Systematic mineralogy of common rock forming minerals.	
Unit	**Content**	**Hours**
UNIT I	**DESCRIPTIVE MINERALOGY** Definition of Mineral and Mineraloid – Scope and aim of Mineralogy. Chemical elements and periodic Table – Bonding of atoms – Metallic, Co-valent, Ionic and Van der Walls Bonding in Minerals, Structure and classification of silicates. Isomorphism, Polymorphism and Pseudomorphism in minerals. Physical properties of minerals depending upon cohesion and elasticity, specific gravity, light, heat, electricity, magnetism and the senses.	**(15 Hrs)**
UNIT II	Mineralogy, Structure, Chemistry, Optical and Physical properties, modes of occurrences and industrial uses of the following groups of minerals: Polymorph and varieties of	**(15 Hrs)**

	Quartz – Alkali and Plagioclase group of Feldspars – Nepheline and Sodalite group of Feldspathoides and Zeolites.	
UNIT III	Mineralogy, Structure, Chemistry, Optical and Physical properties, Modes of occurrences and industrial uses of the following groups of minerals: Pyroxenes, Amphiboles, Micas, Olivine and Garnet.	**(15 Hrs)**
UNIT IV	**OPTICAL MINERALOGY** 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 – Quartz wedge (Determination of order of Interference Colour) – Gypsum plate and Mica plate (Determination of Fast and Slow vibration directions), and Bereck Compensator (Determination of Birefringence)	**(15 Hrs)**
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.	**(15 Hrs)**

Text Books:

1. Dana, F.S. 1955 – A text book of mineralogy – Asia publishing House,Wiley
2. Read, H.H- 1974 – Rutley's elements of mineralogy – Thomas murby&Co
3. Mason., B and Berry, L.G – Elements of Mineralogy – W.H. Freeman &Co
4. Kerr.P.F: OpticalMineralogy

Reference Books:

1. Deer. W.A., Howoe. R.A and Zuessman, J. -1966. An introduction of the Rockforming minerals.Longmans.
2. Berry , Mason, Dietrich,2000 – Mineralogy, CBSPublication
3. CornelisKlen and Cornelius S. Hurlbut , 1985 – Manual of Mineralogy, John Wiley &Sons
4. Phillips, W.R. Optical Mineralogy, Griffen,D.T.1986.
5. Winchel, A.N. 1968 Elements of optical mineralogy, part 1 & 2 Wiley Eastern

Course Outcome

On completion of the course students should be able to

CO 1: Student thoroughly understands the various crystal structures and megascopic and optical characters of various minerals.

CO 2: Understand the basic crystal-chemical properties of minerals and how variability in these properties relates to physical and optical characteristics as well as the formation and stability of minerals in igneous, metamorphic, and sedimentary environments.

CO 3: Recognize and quantify the physical and optical properties of minerals.

CO 4: Microscopic thin section study and identity characterize common rock-forming minerals.

CO 5: Extract information about the conditions of formation and subsequent history of a mineral from its properties and its presence in a rock.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	S	S	S	S	S	S	S	M
CO 2	S	S	S	S	S	S	S	S	S	M
CO 3	S	S	S	S	S	S	S	S	S	M
CO 4	S	S	S	S	S	S	S	S	S	M
CO 5	S	S	S	S	S	S	S	S	S	M

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Semester-V / **Core Practical: CP – III**	**Mineralogy and Applied Geology**	**Course Code: BGIY**
Instruction Hours: 4	**Credits: 3**	**Exam Hours: 3**
Internal Marks: 40	**External Marks: 60**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create
Course Objectives	• To learn the megascopic and Microscopic identification of Quartz, Feldspar, Feldspathoid, Pyroxene, Amphibole groups. • Describe the characteristics physical properties that we use to identify minerals, including crystal shape, color, luster and hardness. • To discuss the cite examples of the important properties and characteristics of the silicate nonsilicate rock forming minerals. • To interpret the hydrogeological data. • To solve the calculation of ore reserves.
LIST OF PRACTICALS: **(12 Hrs)**	
MEGASCOPIC MINERALOGY Megascopic identification and description of the following: 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, Wolastonite, Anthopillite, 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

Microscopic identification and Description of the following:- Quartz, Orthoclase, Microcline, Albite, Oligoclase, Labradorite, Nepheline, Leucite, Enstatite, Hypersthene, Glaucophane, Biotite, Muscovite, Olivine, Epidote, Garnet, Apatite, Zircon, Sphene, Tourmaline, Calcite, Andalusite, Kyanite, Sillimanite, Staurolite, and Cordierite.

APPLIED GEOLOGY

Interpretation of maps – Calculation of ore reserves – Included area method. Simple problems relating to interpretation of hydrogeological data.

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 andWorlframite.

Course Outcomes

On completion of the course students should be able to

CO 1: Students can able to describe several common mineral crystal habits.

CO 2: Students will be trained in how to investigate the nature of things through observation and

using theirsenses.

CO 3: Compare samples of various kinds of rock, and identify similarities and differences

CO 4: Describe some common uses of rocks and minerals

CO 5: Student thoroughly understands the various crystal structures and megascopic and optical characters of various minerals.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	S	S	S	S	S	S	M	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S

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Semester-V / MBE - I	**Environmental Geology and Hydrogeology**	**Course Code: BGE3**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks: 25	**External Marks: 75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To study the environmental problems andhazards. • Understanding the Components of the hydrologiccycle • To estimate aquifer properties and welldesign • To study on ground waterexploration. • Derivation ground water chemistry andquality, application of ground waterproblem.	
UNIT	**CONTENT**	**HOURS**
UNIT I	**ENVIRONMENTAL GEOLOGY** 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 surface geological processes. Causes, hazards and remedial measures relating to landslides, floods, and soil erosion, Impact of wind on environment. Degradation of coastal environment and measures for coastal protection.	**(15 Hrs)**
UNIT II	Influence of deep seated geological processes – Earthquake hazards, Earthquake prediction control and warning; Reservoir – induces seismicity – hazards of volcanism;	**(15 Hrs)**

	Techniques of volcanic prediction and human adjustments to volcanic environments. Benefits of volcanism. Man as an agent of environmental modifications. Environmental degradation due to mining and mineral processing. – Effects of urbanization on surface water, causes for ground water pollution. Population explosion and their pressure on geological environments.	
UNIT III	**HYDROGEOLOGY** Ground water in Hydrologic cycle – origin of ground water meteroric water, connate water and Juvenile water – vertical distribution of ground water – zone of aeration, zone of saturation and water table. Springs – geological conditions favouring development of springs. Definition of aquifers, aquitards and aquicludes. Geologic formations as Aquifers. Types of Aquifers – unconfined, confined and perched aquifers – artesian wells, peizometric surface.	**(15 Hrs)**
UNIT IV	Rocks properties affecting ground water, openings in rocks. Types of openings – primary openings – secondary openings. Porosity, specific yield, specific retention and permeability. Ground water movement – forces causing ground water movement: seepage, capillary movement, laminar flow, turbulent flow, Darcy's law co-efficient of permeability and field measurement of permeability. Fluctuations in ground water levels – causes of fluctuations.	**(15 Hrs)**
UNIT V	Ground water quality – physical, Bacterial, and chemical qualities – drinking water standards – major ions affecting chemical quality of ground water. Ground water recharge – natural and artificial recharge. Ground water exploration – surface methods – electrical resistivity method. Water wells – types of wells – well construction and development – collector wells and infiltration galleries. Ground water inTamilnadu.	**(15 Hrs)**

Text Books:

1. Tolman.G.F. 1937 Ground water McGraw Hill. NewYork.
2. Todd, D.K. 1959 Ground water Hydrology. John Wiley &Sons.
3. Davis, S.N. &Deweist. 1966 Hydrogeology, John Wiley &Sons.
4. Regunath, H.M. 1983 Ground water, WileyEastern.
5. Valdiya, K.S (1987). Environmental Geology – Indian Context. Tata McGraw-Hill.,New Delhi
6. Kellar, E.A. 1979 Environmental Geology, Charless. Merrill publishing Co.Ohio.
7. Lundgren, l. 1986 Environmental Geology, PrenticeHall.

Reference Books

1. Walton, W.C. 1970 Ground water Resources evaluation, McGrawHill.
2. Karanath, K.R. 1987 Ground water Assessment Development & management TataMcGraw Hill.
3. Howard, A.D. &Ramson. I.1978, Geology in environmental planning. McGraw Hill,New Delhi.

Course Outcomes

On completion of the course students should be able to

CO 1: Student would understand the hydrodynamics, quality of groundwater, ground water exploration and groundwater conservation

CO 2: Understand the components of hydrologic cycle.

CO 3: Understand measurement of ground water exploration techniques

CO 4: Understand the various artificial recharge techniques

CO 5: Understand the quality of ground water**.**

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	M	S	M	M	S	S	S	S	S	M
CO 2	M	S	M	M	S	S	S	S	S	M
CO 3	M	S	M	M	S	S	S	S	S	M
CO 4	M	S	M	M	S	S	S	S	S	M
CO 5	M	S	M	M	S	S	S	S	S	M

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Semester-V / MBE - II	**Remote sensing and Mining Geology**	**Course Code: BGE4**
Instruction Hours: 5	**Credits: 5**	**Exam Hours: 3**
Internal Marks: 25	**External Marks: 75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• The paper deals about the basics of remote sensing and imageprocessing. • Attain a foundational knowledge and comprehension of the physical, computational and perceptual basis for remote sensing. • Gain familiarity with a variety of earth science applications of remotesensing. • To study the sensor characteristics, satellite orbits and various current and future missions involving a range of sensors across the visible, radar and microwave components of the spectrum. • To study the surface and underground miningmethods.	
UNIT	**CONTENT**	**HOURS**
UNIT I	**INTRODUCTION TO REMOTE SENSING** Definition of Remote sensing – processes and elements involved in electromagnetic remote sensing of earth resources – Electromagnetic spectrum and its components – Atmospheric windows – Energy interaction in the atmosphere – Energy interactions with earth surface features – Spectral reflectance curves of water, vegetation and soil – Data acquisition and interpretation. An outline of remote sensing applications.	**(15 Hrs)**

UNIT II	**PHOTOGEOLOGY** Types of aerial photographs – Scale in aerial photographs and causes for its variation – Flight planning procedures – Mosaic and its types – Stereoscopy and stereoscopes – Outline of vertical exaggeration and parallax – Principles of photo interpretation – Annotation of aerial photographs.	**(15 Hrs)**
UNIT III	**SATELLITE REMOTE SENSING** Types of satellites – Scanning systems and detectors – Sensor resolutions:- spatial, spectral, radiometric and temporal; Sensor characteristics of Landsat, Spot and IRS and high resolution satellites; Satellite image interpretation: visual and digital interpretation techniques and an outline of digital image processing techniques.	**(15 Hrs)**
UNIT IV	Role of geology in mining industries – definition of mining terms, shaft, Hanging wall, Adit, roof, Drive crosscut, Tunnel, Raise, Winze, Stope – Types; Surface methods of mining, Alluvial mining – pan &betea, sluicing, Hydraulicking, Dredging. Opencast mining. Benches, Explosives, working slope, mining equipments – Dragline, power showels.	**(15 Hrs)**
UNIT V	**SUBSURFACE MINING (UNDERGROUND MINING)** Advantages and limitations. Stoping – open stopes, supported stopes, pillar supported stopes – square supported stoping – timber supported stopes- filled stopes – shrinkage stopes – shaft sinking. Caving; Top slicing. Sublevel caving and Block caving. Coal mining (surface mining) Strip mining and Augering. Underground mining. Room and pillar method – Longwall method – hydraulicking. Mineral Economics and its concept. Role of Minerals in National Economy. Problems peculiar to Mineral Industruy, strategic, critical and Essential Minerals. Mineral conservation and substitution.	**(15 Hrs)**

Text Books:

1. Lillesand, T.M and R.W. Kiefer (2000). Remote sensing and image interpretation.John Wiley & Sons, NewYork
2. Sabins, F.F (1987). Remote sensing principles and interpretation. Freeman Publishers,New York
3. Miller, V.C (1961). Photogeology. McGraw-Hill Publishers, NewYork
4. Allum, J.A.E (1978). Photogeology and regional mapping, Pergamon Press Ltd.,Oxford
5. Siegal, B.S and R. Gillespie (1980). Remote sensing in Geology, John Wiley & Sons, New York
6. Pandey, S.N (1987). Principles and applications of photogeology. Wiley Eastern Ltd.,New Delhi
7. Burrough, P.A.(1986)- Principles of Geographical information system for land resource assessment.
8. Arogyaswamy, R.N.P. Courses in Mining Geology – Oxford &IBH, NewDelhi.
9. Thamus, P.J. 1979 Anintroduction to mining,Methun.
10. McKinstry, H.E 1960 Mining Geology, New27rec.

Reference Books:

1. Anji Reddy, M (2001). Textbook of remote sensing and GIS, BSP PS Publications,New Delhi
2. Rampal, K.K (1999). Handbook of aerial photography and interpretation. ConceptPublishers Company, NewDelhi
3. Narayan, L.R.A (1999). Remote sensing and its application. Universities PressLtd., Hyderabad.

Course Outcomes

On completion of the course students should be able to

CO 1: Students will be able to recognize and explain at basic level fundamental physical principles of remote sensing, including the electromagnetic spectrum; the emission, scattering, reflection, and absorption of electromagnetic (EMR)radiation.

CO 2: Student would understand the remote sensing, image processing and application of Geographic Informationsystem.

CO 3:Students will be able to recognize and explain basic computational properties of remote sensing data acquisition, storage, and imageprocessing.

CO 4: Students will be able to discuss the surface and subsurface mining methods.

CO 5: Students will be able to analysis satellite images of mining by creating the topography and geological map.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	M	S	S	M	S	S	M	S	S	M
CO 2	M	S	S	M	S	S	M	S	S	M
CO 3	M	S	S	M	S	S	M	S	S	M
CO 4	M	S	S	M	S	S	M	S	S	M
CO 5	M	S	S	M	S	S	M	S	S	M

S – Strongly Correlated

M – Moderately Correlated

W – Weakly Correlated

N – No Correlation

Semester-VI / Course Code – VII	Igneous Petrology	Course Code: BGI
Instruction Hours: 6	Credits: 6	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To give a basic understanding of the mechanisms which control the diversity of igneous rocks • To emphasis the relationship between tectonic setting and igneous rock suites • To study the intrusive and extrusive igneous rocks • To study the various classification • To study the magmatic differentiation.	
UNIT	**CONTENT**	**HOURS**
UNIT I	Definition of Petrology – Earth zones. Composition and constitution of magmas – Primary and Parental Magmas. Forms of Intrusive igneous rocks. Concordant forms – Sill, Laccolith, Lopolith and Phacolith, Discordant forms – Dykes, Cone Sheets, Volcanic neck, Ring dyke, Batholiths, Stocks, Bosses and Psymaliths. Forms of Extrusive igneous rocks: Lava flows, Pyroclastic deposits – Agglomerate, Lapilli, volcanic ash and volcanic froth.	**(18 Hrs)**
UNIT II	Structures vesicular and Amygdaloidal structures – block lava – Ropy lava – pillow structure – flow structure – sheet joints- mural jointing – columnar jointing – rift and grain. Textures: Definition and description – crystallinity: crystallites and microlites – Devitrification – Granularity – shapes of	**(18 Hrs)**

	crystals, mutual relations – Equigranular textures: allotriomorphichypidimorphic, Panidiomorphic. Inequigranular Textures: porphyritic and Intergrowth texture – Trachytic texture – Intergrowth texture strctures orbicular structure Spherulitic structure – Perlitic fracture. Directive textures, Overgrowth textures, Reaction textures – MicroStructures	
UNIT III	Classification: bases of classification – megascopic classification – classification based on colour index – based on the proportion of Alkali to plagioclase feldspars. Based on silica saturation – based on alumina saturation – A short account of CIPW classification, Normative minerals, salic and femicgroups – mention of the main divisions, classes, orders, suborders, rangs and subrangs only. Merits and defects of CIPW classification – Tyrrels tabularclassification.	**(18 Hrs)**
UNIT IV	Texture, Mineralogy, Classification, and Modes of occurrence of: Granite, Granodiorite, Syenite, Diorite, Gabbro, their hypabyssal and volcanic equivalents. Petrographic characters, distribution in India and origin of Pegmatites, Lamprophyres, Alkaline rocks, Dunite, Peridotite and Anorthosites.	**(18 Hrs)**
UNIT V	Crystallization of Unicomponent magma – Crystallizations and petrogenetic significance of Binary magmas: Diopside – Anorthite, Eutectic system, Albite – Anorthitesoild – solution system, Forestrite – Silica incongruent melting system and Ternary system (Ab – An – Di). Reaction principle and Bowen's reaction series – Causes for the diversity of Igneous rocks – Magmatic Differentitation: Fractional crystallization, liquid immiscibility, Assimilation – short notes on: Consanguinity, Variation diagrams and petrographic provinces.	**(18 Hrs)**

Text Books:

1. Tyrrel, G.W. 1978 The principles of petrology – Chapman and Hall Ltd.,London.
2. Bowen, N.L. The Evolution of the Igneous Rocks – Dover publication, Inc, NewYork.
3. Barth, FW. 1962 Theoritical petrology –Wiley.
4. Walstrom, E.E. 1961 Theoritical Igneous petrology,Wiley.
5. Turner.F.J and Verhoogen.J –1960.- Igneous and Metamorphic petrology – McGrawHill.
6. Hatch, F.H. Wells, A.K. Petrology of Igneous Rocks, Thomas Murby& Wells, M.K. – 1949
7. Johannesen, A – 1962 Descriptive petrography of Igneous Rocks, Vols. I to IV – Allied Pacific.

Course Outcomes

On completion of the course students should be able to

CO 1: Student would understand the paragenesis of minerals of the Igneous rocks.

CO 2: This course presents a broad review of igneous rocks, emphasizing their tectonic associations, interrelationships and petrogenesis.

CO 3: After successful completion of this course you will have an integrated understanding of the range, composition and petrogenesis of the major igneous rock groups and will

be able to identify them in thin section and deduce their tectonic association and mode oforigin.

CO 4: Students will become familiar with the key skills used to aid the interpretation of igneous rocks.

CO5: Students will become major igneous rock groups and will be able to identify megascopic and microscopic studies.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	S	S	S	S

S – Strongly Correlated

M – Moderately Correlated

W – Weakly Correlated

N – No Correlation

Semester-VI / Course Code – VIII	**Sedimentary Petrology and MetamorphicPetrology**	**Course Code: BGJ**
Instruction Hours: 6	**Credits: 6**	**Exam Hours: 3**
Internal Marks: 25	**External Marks: 75**	**Total Marks: 100**

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• Knowing the basic concepts in the classification of sedimentaryrocks. • Knowing the processes that erode, transport, and depositsediments. • Observing physical characteristics of sedimentary rocks, especially mineral composition and texture. • To become familiar with the petrographic nomenclature of sedimentaryrocks. • To learn about the occurrence, origin, classification and environments of sedimentaryrocks.	
Unit	**Content**	**Hours**
UNIT I	Sedimentary process – disintegration & decomposition of rocks – transportation – deposition – diagenesis. A broad classification of sedimentary rocks into residual mechanical, chemical and organic Groups. Structures of sedimentary rocks. Mechanical, chemical and organic structures. Textures of sedimentary rocks – clastic and non – clastic textures.	**(18 hrs)**
UNIT II	Residual deposits – terra rossa, clay, laterite and bauxite and soils. Mechanical deposits – rudaceous, arenaceous and argillaceous groups. Heavy minerals in sand and sandstones. A descriptive study of Conglomerate, Breccia, Sandstones and Shales.	**(18 hrs)**

UNIT III	Chemical deposits – siliceous, carbonaceous, ferruginous and salt deposits. Organic deposits – calcareous, siliceous, phosphatic, ferruginous and carbonaceous deposts. A breief study of Flinit, Chert, Siderite, Gypsum, Rock Salt, Caliche. Guano and Kiesellgher. Descriptive study of different types of calcareous and carbonaceousdeposits.	**(18 hrs)**
UNIT IV	Definition of metamorphism – Agents and kinds of metamorphism – facies, zones and grades of metamorphism – metamorphic structures and textures. Cataclastic metamorphism and its products. Retrograde metamorphism. Thermal metamorphism of breccia sediments, pure and impure calcareous rocks. A brief study of Breccia, Flaser, Mylonite, Hornfels, Marble, Ophicalcite.	**(18 hrs)**
UNIT V	Dynamorthermal metamorphism of breccia sediments. Plutonic metamorphism petrography and origin of charnockites – metamorphic differentiation – pnumatolitic and injection metamorphism – anataxis and palingenesis. Brief study of Slate, Phyllite, Quartzite, Schist. Gneiss, Granulite, Leptynite, Charnockite, Ecologite, Amphibolite, Schorl, Adinole, Lit- Par – Lite – gneiss and Migmatite.	**(18 hrs)**

Text books:

1. Tyrrel, G.W – Principles of petrology, Asia PublishingHouse.
2. Huang, W.T. –Petrology, MC GrawHill
3. Pettijhon, F.J. –Sedimentary Rocks, Harper &Bros.
4. Harker, A. –Petrology for Students,Cambridge,

Reference Books

1. Turner,F,J&Verhogen,J –Igneous and Metamorphic Petrology, MC GrawHill.
2. Williams, H, Turner, F.j. &Gillibert, C.M. – Petrography,Freeman.
3. Winkler, A. G.F. – Petrogenesis of Metamorphic Rocks, McGrawHill.

Course Outcomes

On completion of the course students should be able to

CO 1: Student would understand the weathering, provenance, depositional environments,
climate and tectonics of the sedimentaryrocks.

CO 2: Demonstrate proficiency in common practical skills in SedimentaryGeology.

CO 3: Interpret the processes responsible for the deposition of the sediment from the nature
of the sediment and sedimentary structures present within the sedimentaryrock.

CO 4: Understand the depositional environment of a sedimentary rock package based on
recognition of faciesassociations.

CO5: Student would understand the petrological studies in megascopic and microscopic

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	S	S	S	S	S	S	S	S	S	S
CO 2	S	S	S	S	S	S	S	S	S	S
CO 3	S	S	S	S	S	S	S	S	S	S
CO 4	S	S	S	S	S	S	S	S	S	S
CO 5	S	S	S	S	S	S	S	S	S	S

S – Strongly Correlated

M – Moderately Correlated

W – Weakly Correlated

N – No Correlation

Semester-VI / Course Code – IX	Economic Geology	Course Code: BGK
Instruction Hours: 6	Credits: 6	Exam Hours: 3
Internal Marks: 25	External Marks: 75	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create	
Course Objectives	• To study the basic terminology and classification of orelocalization. • To study the magmatic processes. • Geochemical properties of earth's crust, mantle and core and the fundamentals of geochemical measurements for the exploration and energy resources. • To study the physical properties of oreminerals. • To study the occurrence and distribution of oreminerals.	
Unit	**Content**	**Hours**
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 – geologicthermometers.	**(18 Hrs)**
UNIT II	Magmatic processes. – Mode of formation – Early magmatic processes and deposits, disseminations. Segregations and injections – Late magmatic processes and deposits – Residual liquid segregation and injection – immiscible liquid	**(18 Hrs)**

	segregation and injection – sublimation. Contact Metasomatic processes – the process and effects – resulting mineral deposits. Hydrothermal processes – principles – Factors affecting deposition – wall rock alteration – minerals sequence – cavity filling deposits Fissure veins, shear – zone, stock- work, saddle reef, ladder vein, fold cracks, Breccias filling, solution cavities, pore space and vesicular filling – replacement deposits, the process and deposits – criteria of replacement.	
UNIT III	Sedimentary processes and cycles – principles involved in sedimentation – cycles of Iron and manganese, weathering processes – principles- Residual concentration process and deposits – mechanical concentration principles – evluvial, alluvial, beach and eolian placers – paystreak and bonanza. Oxidation and supergene sulphide enrichment – solution and deposition in the zone of oxidation – secondary sulphide enrichments – Gossans and capping. Metamorphic processes – Formation of Graphite, Asbestos, Talc, Soapstone and Sillimanite group ofminerals.	**(18 Hrs)**
UNIT IV	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, Cassiterrite, 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 – Gem stones. Character, distribution and mode of occurrence of structural and building materials.	**(18 Hrs)**
UNIT V	Mineralogy, mode of occurrences, uses and distribution in India of the following metalliferous deposits –	**(18 Hrs)**

	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.	

Text Books:

1. Bateman Allan .M. –Economic Mineral Deposits, Asian Publishing House, 2nd Edition1962.
2. Lindgren W. –Mineral Deposits, MCGrawHill,1933.

Reference Books:

1. Coggin, B. and Dey, A.K. – India's Mineral Wealth, Oup1955.
2. Park, C.F. and Macdiarmid, R.A- Ore deposits, Freeman,1970
3. Krishnaswamy, S. – India's Mineral Resources, oxford andIBH.
4. Deb.S. – Industrial Minerals and Rocis of India, Allied,1980.
5. Gokhale, K.V.G.K. and Rao , T.C- Ore deposits of India, their distribution andprocessing, Thosmson press, 1978.

Course Outcomes

On completion of the course students should be able to

CO 1: An understanding of the socio-economic drivers for mining and exploration activities.

CO 2: Detailed knowledge and the ability to interpret the strength, of the various genetic models associated with each class of mineralization; with emphasis on the mineralogy, geology and geochemical controls on mineralization of oredeposits.

CO 3: An understanding of the roles of a geologist in the mining and explorationindustries.

CO 4: Students able to understand the ore minerals in the field.

CO5: An understanding of the megascopic and microscopic identified minerals.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO 1	M	S	S	S	S	S	S	S	S	S
CO 2	M	S	S	S	S	S	S	S	S	S
CO 3	M	S	S	S	S	S	S	S	S	S
CO 4	M	S	S	S	S	S	S	S	S	S
CO 5	M	S	S	S	S	S	S	S	S	S

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Semester-VI / Core Practical – IV	Petrology and Economic Geology	Course Code: BGY
Instruction Hours: 6	Credits: 5	Exam Hours: 3
Internal Marks: 40	External Marks: 60	Total Marks: 100

Cognitive Level	K1-Acquire / Remember K2-Understanding K3-Apply K4-Analyze K5-Evaluate K6-Create
Course Objectives	• To study the megascopic identification of igneous, sedimentary and metamorphic rocks. • To study the microscopic identification of igneous, sedimentary and metamorphicrocks. • To study the megascopic identification of ore minerals. • To study the occurrence and distribution of rocks and oreminerals. • To study the industrial minerals.

LIST OF PRACTICALS:(18 Hrs)

PETROLOGY:

MEGASCOPIC IDENTIFICATION OF THE FOLLOWING ROCKS

Granite, Graphic granite, Pegmatite, Aplite, Schorl Rock, Granite Porphyry, Syenite, Syenite porphyry, Diorite, Gabbro, Anorthosite, Dunite, Pyroxenite, Dolerite, Diabase Porphyry, Basalt, Trachyte, Rhyolite, Obsidian, Pumice, Scoria. Conglomerate, Breccia, Sandstone, Arkose, Shale, Limestone, Laterite, Peat, Lignite, Slate, Phyllite, Schists, Gneisses, Quartzite, Marble, Amphibolite, Ecologite, Leptynite, Charnockite, Khondalite, Calc – Granulite 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, NephelineSyenite, 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, Ecologite Amphibolite, Leptynite, khondalite, Cordierite, gneiss, garnet – Sillimanite gneiss CalcGranulite.

ECONOMIC GEOLOGY:-

MEGASCOPIC 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.

Course Outcomes

On completion of the course students should be able to

CO 1: Students able to identify the megascopic minerals in thefield.

CO 2: Understand the microscopic thin section ofrocks.

CO 3: Students able to identify the ore minerals in thefield.

CO 4: Understand the various uses of economicminerals.

CO 5: Students able to identify industrial ore minerals.

Mapping of Course outcomes with Programme outcomes/ Programmes Specific outcomes

CO	PO					PSO				
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	S	S	S	S	S	S	M	S	S	S
CO 2	S	S	S	S	S	S	M	S	S	S
CO 3	S	S	S	S	S	S	M	S	S	S
CO 4	S	S	S	S	S	S	M	S	S	S
CO 5	S	S	S	S	S	S	M	S	S	S

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