HONOURS COURSE AT A GLANCE

SUBJECT- GEOLOGY

DISCIPLIN SPECIFIC CORE (14 PAPERS)

Number	Semester	Title of the Course	Credit	
			Theory	Practical
DSC-H-GEL-1	1ST	Earth System Science	4	2
DSC-H-GEL-2		Mineral Science	4	2
DSC-H-GEL-3	2nd	Element of Geochemistry	4	2
DSC-H-GEL-4		Structural Geology	4	2
DSC-H-GEL-5	3rd	Igneous Petrology	4	2
DSC-H-GEL-6		Sedimentary Petrology	4	2
DSC-H-GEL-7		Palaeontology	4	2
DSC-H-GEL-8	4th	Metamorphic Petrology	4	2
DSC-H-GEL-9		Stratigraphy	4	2
DSC-H-GEL-10		Hydrology	4	2
DSC-H-GEL-11	5th	Economic Geology	4	2
DSC-H-GEL-12		Geomorphology	4	2
DSC-H-GEL-13	6th	Engineering Geology	4	2
DSC-H-GEL-14		Remote Sensing	4	2

DISCIPLIN SPECIFIC ELECTIVE (4 PAPERS)

Number	Semester	Title of the Course	Credit	
			Theory	Practical
DSE-H-GEL-1	5th	Exploration Geology	4	2
DSE-H-GEL-2		Meteorology	4	2
DSE-H-GEL-3	6th	Fuel Geology	4	2
DSE-H-GEL-4		Environmental Geology and Disaster Management	4	2

GENERIC ELECTIVE (4 PAPERS)

Number	Semester	Title of the Course	Credit	
			Theory	Practical
GE-H-GEL-1	1st	General Geology, Crystallography and Mineralogy	4	2
GE -H-GEL-2	2nd	Geomorphology, Tectonics, Stratigraphy & Palaeontology	4	2
GE -H-GEL-3	3rd	Petrology, Geochemistry, Hydrology & Natural hazards	4	2
GE -H-GEL-4	4th	Structural Geology, Engineering Geology & Economic Geology	4	2

SKIL ENHANCEMENT COURSES-LIST-A (Any one Paper)

Number	Semester	Title of the Course	Credit	
			Theory	
SEC-H-GEL-1	3rd	Field Geology (Field study, Mapping & Report)	2	
SEC-H-GEL-2	3rd	Information Technology	2	

FIRST SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-I, DSC-H-GEL-1 (EARTH SYSTEM SCIENCE)
(Credits: Theory-4, Practical-2)

Objectives of the Course:

The aim of this course is to study General geology part can give an idea about endogenetic process operating inside the earth and its resultant land forms, Different plate boundaries, seismic belts of India, continental drifting in world

Expected outcome:

The said courses will make the students to understand about the interior of earth. The above knowledge will enable the students to study the history and relative age of rocks. They shall have the knowledge of the mechanism of formation of continents, sea and mountain ranges.

UNIT-I	**General Geology(A):** Scope, Subdivisions of Geology, Solar system and its planets, the terrestrial and jovian planets, Origin of earth, Seismology and internal structure of earth, Age of the earth, Process of formation of soil, Soil profile and Indian types.
UNIT-II	**General Geology (B):** Volcanoes-Types, causes, products, volcanic topography and volcanic belts Earthquake- Terminology, Intensity, Magnitude, Causes, Effects, Seismic belts of India and Earth and Prediction of Earthquake
UNIT-III	**Geotectonics (A):** Concept of Plate Tectonics, Continental drift, Hotspot, Isostasy, Gravity Anomaly
UNIT-IV	**Geotectonics (B):** Geosynclines, Convergent Plate boundaries, Island arcs, Benioff zones, Subduction zones, Tectonic design and evolution of Himalayas.
UNIT-V	**Geotectonics (C):** Orogeny and Epiorogeny, Divergent Plate boundaries, Mid oceanic ridge, Sea floor spreading and Palaeo magnetism, Narmada rift valley, Triple junction, Transform faults

Books Recommended:

1. Condie, K. C. (1989) Plate tectonics and Crustal development, Pergamon, 3rd edition, Page no. 1-504.
2. Beloussov, V. V. (1962) Basic Problems in Geotectonics, McGraw-Hill, Page no. 1-265
3. Valdiya, K. S. (1985) Aspects of Tectonics, McGraw-Hill Education, Page no. 1-304.
4. P. Kerry, K. Klepeis and F.J. Vine,Global Tectonics, 3rd Edition, Page no. 1-463
5. Wyllie. P. J.(1976) The Way the Earth works Wiley; 1 edition, page no: 1-304
6. Wyllie, P. J.(1972) The dynamic Earth, John Wiley & Sons, page no: 1-432

Practical Paper-I

Drawing of tectonic elements, Seismic zones of Odisha and India, Drawing of seismic belts of world, Drawing of soil profiles of Indian soils, Lab Record, Viva-voce

FIRST SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-II DSC-H-GEL-2 (MINERAL SCIENCE)
(Credits: Theory-4, Practical-2)

Objectives of the course:

The aim of this course is to study the crystals through external elements of symmetry, crystal classes and systems, and the relations of symmetry to the internal structure using the chemical and physical properties of the minerals. The course aims also to study the major mineral groups, their occurrences, physical, chemical and crystallographic properties and their possible uses in industry. In these units, the physical, chemical and optical properties of the minerals are described. One should know them to identify the types of rocks.

Expected outcome:

The said courses will make the students to understand about crystal chemistry. The students will be equipped with the knowledge of identifying different minerals with their possible varieties and their occurrence in different types of rocks as a combining unit.

UNIT-I	**Crystallography:** Crystalline and non-crystalline substance, Symmetry elements, forms, parameter and indices, Symmetry operation, H-M Symbols, 32 point groups, Classification of crystals into six systems, Study of six normal classes w.r.t. symmetry elements and forms present, Zonal equation, Twinning, Stereographic projection of crystals
UNIT-II	**Mineralogy (A):** Introduction and formation of minerals, Classification of minerals, Physical properties of minerals, Silicate structure, Isomorphism, Polymorphism, Pseudomorphism,
UNIT-III	**Mineralogy (B):** Study of structure, Chemistry, Physical and optical properties, occurrence of following mineral groups-Olivine, Garnet, Pyroxene, Amphibole, Feldspar, Quartz, Mica and Feldspathoid, Physical and optical properties of other rock forming minerals.
UNIT-IV	**Optical Mineralogy (A):** Nature of light rays and their propagation, Polarisation, Double refraction, Total internal reflection & Critical angle, Nicol prism: Construction, Principle & Use, Petrological microscope: Parts and Functions, Preparation of thin sections
UNIT-V	**Optical Mineralogy (B):** Isotropism, Anisotropism, Pleochroism, Refractive Index, Birefringence, Extinction, Interference Colour, Uniaxial Interference Figure, Determination of optic sign, An outline study of optical characters of minerals in thin sections

Books Recommended:

1. W.A DEER, R.A. HOWIE & J. JUSSMAN (1992) Introduction to the rock forming minerals, ELBS (British Govt.),

2. William D. Nesse, Introduction to Optical Mineralogy, Page no. 1- 442

3. James D. Dana (Revised by c. Klein & C.S. Hurlbut), Dana's Manual of Mineralogy, Twenty First Edition, Page no. 1-681

4. Dexter Perkins, Mineralogy, Pearson India Education Limited Pvt. Ltd., Third edition, Page no. 1-553

5. F. Rutley, H. H. Read & G.T. Holoway(1916) Elements of Mineralogy, Nineteenth edition, Page no. 1-388.

6. Phillips, F. C. (1977) An Introduction to Crystallography, Longman Higher Education, Page no. 1-295

Practical Paper-II

Study and identification of crystal models, stereographic projection of crystal models, Megascopic and Microscopic identification of rock forming minerals, Lab Record, Viva-voce

SECOND SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-III, DSC-H-GEL-3, (ELEMENTS OF GEOCHEMISTRY)
(Credits: Theory-4, Practical-2)

Objectives of the course: In these units, the students can know the characteristic properties, origin and distribution of ore minerals.

Expected outcome:

After the study, the student will have the knowledge about Cosmic abundance of elements, Distribution of major and trace elements in the earth crust.

UNIT-I	**Geochemistry (A):** Concepts of geochemistry, Periodic table, Geochemical classification of elements,
UNIT-II	**Geochemistry (B):** Composition of planets, Types and composition of meteorites
UNIT-III	**Geochemistry (C):** Structure and composition of earth in igneous, metamorphic and sedimentary rocks
UNIT-IV	**Geochemistry (D):** Concept of stable and radiogenic isotopes, Half life period, determination of age of earth by radioactive isotopes
UNIT-V	**Geochemistry (D):** Elements of marine chemistry, Diagenetic reactions

Books Recommended:

1. B.Mason& C. B. Moore (1968) Principles of Geochemistry, John Wiley & Sons, 3rd International edition, Page no. 1-330.
2. Goldschmidt, V. M. (1954) Geochemistry, Oxford University Press, Page no. 1- 742
3. Rankama&Sahama, T. G. (1950) Geochemistry, University of Chicago Press, Page no.1- 928
4. Krausokf, K. B. (1994) Introduction to Geochemistry, McGraw-Hill College, Subsequent edition, Page no. 1- 640
5. Bateman, A. M. (1981) Economic Mineral deposits, John Wiley & Sons Inc, 3rd edition, Page no. 1- 604
6. Smith, F. G. (1963) Physical Geochemistry, Addison-Wesley, Page no. 1- 624

Practical Paper-III

Geochemical data plotting and interpretation of anomalies, Numerical problems related to age of the earth, Lab Record, Viva-voce

SECOND SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-IV, DSC-H-GEL-4, (STRUCTURAL GEOLOGY)
(Credits: Theory-4, Practical-2)

Objectives of the course: In these units, the students can know the characteristic properties, origin and types of various structural features found in rocks.

Expected outcome:

The above knowledge will enable the students to study the history of mechanism of formation and structure of rocks.

UNIT-I	**Structural Geology(A):** Concept of stress and strain, Dip and Strike, Rake, Plunge V's rule, Outcrop patterns of different structures
UNIT-II	**Structural Geology(B):** Fold morphology: Geometric Classification of folds, Introduction to mechanics of folding, Criteria for recognition of folds, Salt domes, Effect of erosion on folded strata.
UNIT-III	**Structural Geology(C):** Joints: Geometry, classification and significance Fractures and Fault: Classification, Mechanism, Significance, Recognition in the field, Effects of faulting on outcrops, Top & bottom criteria
UNIT-IV	**Structural Geology(D):** Unconformity: Types, significance and recognition in the field, Top and bottom criteria Overlap, Offlap, Outlier, Inlier Petrofabric Analysis
UNIT-V	**Structural Geology(E):** Foliation: Description and origin, Axial plane cleavage & tectonic significance Lineation: Description and origin, relation with major structures

Books Recommended:

1. Billings, M. P. (1972) Structural Geology, Pearson College Div,3rd editions, Page no. 1-606.
2. Ghosh, S. K. (1993) Structural Geology, Pergamon, Page no. 1-598.
3. Davis, G. H. and Reynolds, S. J. (1997) Geology of Rocks and Regions, 2nd (second)
4. S. Marshak and G. Mitra, Basics Methods of Structural Geology, Part I and II, page no. 1-437
5. B.S. Satya Narayanswami, Structural Geology, Page no. 1-191
6. S.K. Ghosh, Structural Geology, Page no. 1-543

Practical Paper-IV

Drawing of geological section and interpretation, Completion of outcrops, Use of stereo net in solving structural problems and determination of thickness of beds, Three point problems, Rule of V, Lab Record, Viva-voce

THIRD SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-V, DSC-H-GEL-5, (IGNEOUS PETROLOGY)
(Credits: Theory-4, Practical-2)

Objectives of the course:

In these units, the students can know the characteristic properties of initial rocks (those formed from molten material) as well as their origin and types.

Expected outcome:

The students shall have the potential to know the mechanism of formation of different types of igneous rocks. They will be in a position to classify the igneous rocks basing on various parameters.

UNIT-I	**Igneous Petrology(A):** Concept of Igneous Petrology and Magma, Forms, Textures and Structures of Igneous Rocks, Mode of Occurrence of Igneous Rocks
UNIT-II	**Igneous Petrology(B):** Bowen's Reaction Series, Differentiation and Assimilation, Classification of Igneous Rocks
UNIT-III	**Igneous Petrology(C):** Crystallisation behavior of Unicomponent mama, Bicomponent magma: Solid Solution, Eutectic and Peritectic Relation, Incongruent melting
UNIT-IV	**Igneous Petrology(D):** Ternary Systems, Tectonics and Magmatism
UNIT-V	**Igneous Petrology(E):** Description of igneous rocks: Basalt, Dolerite, Gabbro, Granite, Pegmatite, Syenite, Dunite, Diorite, Peridotite, Carbonatite, Anorthosite, Kimberlite, Komatiitite, Lamporite

Books Recommended:

1. Turner, F. J. and Verhogen (2002) Igneous and Metamorphic Petrology, CBS, 2nd edition, Page no. 1-185.
2. Best. (2002) Igneous and Metamorphic Petrology, Wiley-Blackwell; 2nd edition, Page no. 1-752.
3. Tyrell, G. W. (1926)The Principles of petrology,Chapman and Hall, New edition Page no. 1-364.
4. Mihir K. Bose (1997) Igneous Petrology, Page no. 1-526
5. John D. Winter, Principles of Igneous and Metamorphic Petrology, 2nd Edition, Page no. 1-443
6. Mc Birney, A. R.: (2006) Igneous Petrology Jones & Bartlett Learning; 3rd edition, Page no. 1-550

Practical Paper-V

Megascopic identification of igneous rocks, Microscopic identification of igneous rocks, Numerical problems, Field Report, Lab Record, Viva-voce

THIRD SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-VI, DSC-H-GEL-6, (SEDIMENTARY PETROLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course:

In this paper, the students can know the characteristic properties of the stratified rocks (formed by deposition of sediments) together with their knowledgeon the origin and types of the said rocks.

Expected outcome: The students shall have the potential to know the mechanism of formation of different types of sedimentary rocks. They will be in a position to classify the said rocks basing on various parameters.

UNIT-I	**Sedimentary Petrology(A):** Origin of sediments, Weathering and Sedimentary flux, Soils
UNIT-II	**Sedimentary Petrology(B):** Sedimentary Textures, Structures and Environment, Palaeocurrent Analysis
UNIT-III	**Sedimentary Petrology(C):** Classification of Sedimentary rocks, Diagenesis – Concepts and Stages, Compaction and Cementation
UNIT-IV	**Sedimentary Petrology(D):** Heavy minerals, their analysis and significance, Sedimentary basins of India.
UNIT-V	**Sedimentary Petrology(E):** Description of Sedimentary rocks – Sandstone, Conglomerate, Breccia, Shale. Limesone

Books Recommended:

1. Pettijohn, F. J. (1983) Sedimentary rocks, HarperCollins; 3rd edition, Page no. 1-526.
2. Nichols, Gary, Sedimentology &Stratigraphy,(2nd Edition) Willey-Blackwell
3. Pettijohn, F. J., Potter. P. E. and Siever, R. (1987), Sand & Sandstones, Springer; 2nd edition, Page no. 1-553.
4. Sengupta, S. M. (2007), Introduction to Sedimentology, CBS, 2nd edition,Pageno. 1-339.
5. Reneick and Singh, I. B.: (1973) Depositional Sedimentary environment, First Edition Springer, Page no. 1-439
6. Potter, P. E. and Petttijohn, F J. (1963) Paleocurrent and basin Analysis, Springer, Page no. 1-210

Practical Paper-VI

Megascopic identification of Sedimentary rocks, Microscopic identification of Sedimentary rocks, Sedimentary grain size analysis and interpretation, Field Report, Lab Record, Viva-voce

THIRD SEMESTER
CORE COURSE: GEOLOGY
Theory Paper-VII, DSC-H-GEL-7, (PALAEONTOLOGY)
(Credits: Theory-4, Practical-2)

Objectives of the course: In these units, the students can know the characteristic properties, origin and classification of fossils.

Expected outcome:

This knowledge will enable the students to find out the age of various strata and also to interpretthepalaeoenvironment.

UNIT-I	**Palaeontology(A):** Fossilisation and Fossil Record, Definition, Mode of Preservation and fossilization process, Significance of fossils, Biozones, Index fossils, Correlations
UNIT-II	**Palaeontology(B):** A brief idea on organic evolution, Evolution of man and horse, Foraminifera- Morphology, Distribution and Significance
UNIT-III	**Palaeontology(C):** Morphology, evolution and geological history of Brachiopoda, Pelecypoda, Gastropoda
UNIT-IV	**Palaeontology(D):** Morphology, evolution and geological history of Cephalopoda, Trilobita, Echinoidea, Corals and Graptolites
UNIT-V	**Palaeontology(E):** Introduction to Palaeobotany, Gondwana Flora, Application of fossils in stratigraphy,

Books Recommended:

1. Amal Dasgupta, An Introduction to Palaeontology, 2nd Edition, Page no. 1-543
2. P.C. Jain & M.S. Anantharaman, Palaeontology (Palaeobiology) Evolution and Animal Distribution, Page no. 1-315
3. Woods, H.: (1961) Invertebrate Paleontology, Cambridge University Press, 8th Edition,Page no.1-123
4. Taylor, (2009) Paleobotany, Academic Press, 2nd edition, Page no. 1-1252
5. Moor, Lalicker and Fisher, (1952) Invertebrate Fossils, McGraw-Hill Book Company, page no. 1-766.
6. Shrock and Twenhofel, (1953) Principles of Invertebrate Paleontology, McGraw-Hill Book Company; 2nd Revised & Enlarged edition page no. 1-816.

Practical Paper-VII

Identification of Important Fossils, Drawing and labeling of fossils, Arrangement of fossils in chronological order, Field Report, Lab Record, Viva-voce

FOURTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-VIII, DSC-H-GEL-8, (METAMORPHIC PETROLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course:

In this paper, the students can know the characteristic properties of the metamorphic rocks together with their knowledge on the origin and types of the said rocks.

Expected outcome: The students shall have the potential to know the mechanism of formation of different types of metamorphic rocks. They will be in a position to classify the said rocks basing on various parameters.

UNIT-I	**Metamorphic Petrology(A):** Definition of metamorphism, Factors controlling metamorphism, Types of metamorphism, Impact of metamorphism
UNIT-II	**Metamorphic Petrology(B):** Textures and structures of metamorphic rocks, Classification, Metamorphic differentiation, Index minerals, zones, isograds
UNIT-III	**Metamorphic Petrology(C):** Concept of metamorphic facies, Mineralogical Phase Rule of closed and open systems, AKF and ACF diagrams
UNIT-IV	**Metamorphic Petrology(D):** Metamorphism and tectonism, Migmatites and their origin, Granitisation, Paired metamorphic belts
UNIT-V	**Metamorphic Petrology(E):** Description of metamorphic rocks – Schist, Gneiss,Khondalite, Charnockite, Eclogite, Blueschist, Marble, Quartzite, Phyllite, Slate, Skarn

Books Recommended:

1. Turner, F. J. and Verhogen, (1960) Igneous and Metamorphic Petrology, McGraw-Hill, 2nd Edition, Page no. 1-694

2. John D. Winter, Principles of Igneous and Metamorphic Petrology, 2nd Edition, Page no. 445-683

3. Bhaskar Rao (1986) Metamorphic Petrology, CRC Press,1st edition, Page no. 1-190

4. Best (2002), Igneous and Metamorphic Petrology, Wiley-Blackwell, 2nd edition, Page no. 1-752

5. Winkler, H. J. F, (1985) Petrogenesis of Metamorphic rocks, Springer; 5th edition, Page no. 1-348

6. Miyashiro, A.: (1973)Metamorphism & MetamorphicBelts, Springer, Page no. 1-492

Practical Paper-VIII

Megascopic identification of metamorphic rocks, Microscopic identification of metamorphic rocks, Numerical problems, Field Report, Lab Record, Viva-voce

FOURTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-IX, DSC-H-GEL-9, (STRATIGRAPHY)

(Credits: Theory-4, Practical-2)

Objectives of the course:

In these units, the students can know the logical deposition of strata according to geological time. They shall come to know about the distribution of rocks of various time periods in different parts of India.

Expected outcome:

This knowledge will enable the students to find out the age, lithological constitution and economic importance of various strata.

UNIT-I	**Stratigraphy(A):** Introduction, Principle, Correlation, Code of stratigraphic nomenclature and classification, Stratigraphic time scale, Tectonic divisions of India
UNIT-II	**Stratigraphy(B):** Introduction to Indian Shield Archaean: DharwarSupergroup, Singbhum-Orissa, Bundelkhand, Aravalli, Delhi Supergroup, Sausar Group, EasternghatSupergroup
UNIT-III	**Stratigraphy(C):** CuddapahSupergroup, VidhyanSupergroup, Gondwana Supergroup with special emphasis on fossils, climate and economic importance
UNIT-IV	**Stratigraphy(D):** Palaeozoics of Himalayas, Triassic of Spiti, Jurassic of Kutch, Cretaceous of Trichnipoly, Kutch basin, Siwalik Basin, Assam, Andaman and Arakan basin
UNIT-V	**Stratigraphy(E):** Volcanic Provinces: Deccan Trap, Rajmahal Trap , Sylhet Trap, Siwalik Group, Tertiary of Asam Stratigraphy of Odisha, Quarternary landforms and deposits of India.

Books Recommended:

1. Wadia. D. N. (1975)Geology of India, McGraw Hill Education India Pvt. Ltd, 4th edition, Page no. 1-560.
2. Ravindra Kumar (1998) Historical Geology and Stratigraphy of India, New Age, 1st edition, Page no. 1-268.
3. Krumbein and Sloss(1951)Stratigraphy and sedimentation, CA, W. H. Freeman & Company San Francisco, Page no. 1-497
4. Krishnan, M. S. (2009)Geology of India and Burma, CBS, 6th edition, Page no. 1- 536
5. Weber: (2004) Principles of Stratigraphy, Wiley-Blackwell; 1 edition Page no. 1-340
6. Krumbein and Sloss: (1951) Stratigraphy and sedimentation, San Francisco, CA: W. H. Freeman & Company, Page no. 1-497

Practical Paper-IX

Drawing of stratigraphic units in outline map of India and Odisha, Identification and integration of stratigraphic assemblages, Stratigraphic correlation, Tectonic divisions of India, Field Report, Lab Record, Viva-voce

FOURTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-X, DSC-H-GEL-10, (HYDROGEOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course: In this course, the students can know the characteristic properties, origin, movement and types of groundwater.

Expected outcome:

This knowledge will enable the students to use groundwater properly and will have the knowledge to install various types of wells.

UNIT-I	**Hydrogeology(A):** Introduction, Scope of hydrogeology, Hydrologic cycle, Properties of water bearing formations, porosity, permeability,
UNIT-II	**Hydrogeology(B):** Specific Yield, Specific Retention, Storage Coefficient, Aquifer types, Darcy's Law
UNIT-III	**Hydrogeology(C):** Groundwater exploration: Geological, Geophysical and Remote sensing Methods, Physical and Chemical properties of water,
UNIT-IV	**Hydrogeology(D):** Ground water provinces of India and Odisha, Sea water intrusion, Artificial recharge of ground water, Rainwater harvesting
UNIT-V	**Hydrogeology(E):** Quality of Ground water and its use in domestic, agriculture and industries, Ground water pollution, Groundwater management

Books Recommended:

1. Todd, D. K. (2015) Ground water Hydrology, Page no. 1- 656
2. N ChennaKesavulu, Textbook of Engineering Geology, 2nd edition, Page no. 240-260
3. Davis, S. N. and Dewiest (1966) Hydrogeology, John Wiley & Sons, Page no. 1- 464
4. Garg, S. P. (1979) Ground water and Tube wells, Oxford and IBH Publishing Co., Page no. 1-348
5. Garg, S. P. (1979) Ground water and Tube wells, Oxford and IBH Publishing Co.,
Page no. 1- 348
6. Krynine and Judd: (2005) Principles of Engineering Geology, CBS Publishers & Distributors; 1st edition, Page No: 1-425

Practical Paper-X

Simple numerical problems related to ground water, Groundwater maps, Problems related to ground water quality, Interpretation of occurrence of ground water from maps, Field Report, Lab Record, Viva-voce

FIFTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-XI, DSC-H-GEL-11, (ECONOMIC GEOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course: In this course, the students can know the characteristic properties, origin and distribution of coal, petroleum and nuclear minerals. After the study, the student will have the knowledge of their conservation and management.

Expected outcome:

The students can have the knowledge of various environmental laws related to mining of minerals.

UNIT-I	**Economic Geology(A):** Ores & gangues, tenor, grade and lOdes ore genesis: Magmatic Concentration, Pegmatitic deposits, hydrothermal process, Metamorphic process of ore deposit
UNIT-II	**Economic Geology(B):** Oxidation & supergene enrichment, Residual & mechanical Concentration, sedimentation, paragenesis, wall rock alteration, zoning.
UNIT-III	**Economic Geology(C):** Classification of mineral deposits, metallogenic epochs and provinces, controls of ore lacalisation, geothermometry.
UNIT-IV	**Economic Geology(D):** Mineral resources: Mineralogy, mode of occurrence, distribution and uses of Fe-ore, Mn, Cr, Pb, Zn, Cu, Bauxite
UNIT-V	**Economic Geology(E):** Asbestos, limestone, diamond, Kyanite, Gold, graphite, magnesite Introduction to gemstones

Books Recommended:

1. Krishnaswamy, S. (1988) Mineral Resources of India, Oxford & IBH, Page no. 1- 613
2. Banerjee, D. K. (2010) Mineral Resources of India, Vikas Publishing House, Technology & Engineering, Page no. 1- 672
3. Deb, S. (1980) Industrial Minerals and Rocks of India, Allied Publishers, Page no: 1- 603
4. Sharma, N. L., and Ram, K. S. V. (1964) Introduction to India's Economic Minerals, Dhanbad Publications, Mines and mineral resources, Page no:1- 258
5. Gokhle, K. V. G. K. and Rao: (1978) Ore Deposits of India, Thomson Press (India), Ore deposits, Page no. 1- 226
6. Chatterjee, K. K. (2008) An Introduction to Mineral Economics, New Age International Pvt. Ltd. Publishers, Page no. 1- 406

Practical Paper-XI

Megascopic identification of economic minerals (metallic and nonmetallic), Location of Economic Mineral deposits on the outline map of India and Odisha, Lab Record, Viva-voce

FIFTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-XII, DSC-H-GEL-12, (GEOMORPHOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course:

In this unit, different types of earth features and their causative geological agents have been described. The students can analyse the type of agents that has shapes a particular zone of the earth surface.

Expected outcome:

The students can have the knowledge about the physical features of the surface of the earth and their relation to its geological structures.

UNIT-I	**Geomorphology(A):** Basic concepts of Geomorphology, Weathering and Erosion, Karst Topography, Rejuvenated Landforms, Drainage System and Pattern
UNIT-II	**Geomorphology(B):** Geological work of running water, wind and glacier
UNIT-III	**Geomorphology(C):** Coastal Geomorphology: Spit, Tombolo, Lagoon, Sandbar, Bays, Coves, Coral Reef.
UNIT-IV	**Geomorphology(D):** Relief of ocean floor, Marine sediments and their classification, Marine resources, Pollution Of marine environment, Man and ocean
UNIT-V	**Geomorphology(E):** Volcanic landforms, Plateau: general characteristics and classification, Geomorphic divisions of India,

Books Recommended:

1. Thurnbury, W. D. (2004) Principles of Geomorphology, CBS, 2nd edition,Page no. 1-213
2. Holmes, A. (1978) Principles of Physical Geology, Wiley, 3rd edition,Page no. 1-730
3. Worcester, P. G. (1939) A test book of Geomorphology
4. Majid Husain (2010) Fundamentals of Physical Geography, Rawat Publication, Page no. 1-784
5. Savindra Singh, Geomorphology
6. Strahler, A.: (2010) Physical Geography, Wiley, 5th edition, Page no. 1-656

Practical Paper-XII

Study of topographic maps and drawing of profile, Study of land forms and representation of land forms by contour diagrams, Interpretation of top sheets, Drainage basin analysis, Lab Record, Viva-voce.

SIXTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-XIII, DSC-H-GEL-13, (ENGINEERING GEOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course:

The students can also know the requirement of geology for the construction of various engineering structures such as bridge, tunnel etc.

Expected outcome:

They shall have the knowledge to utilize the geological skills in the construction of various engineering structures.

UNIT-I	**Engineering Geology(A):** Introduction, role of engineering geologists in planning, design & construction of major man made structural features.
UNIT-II	**Engineering Geology(B):** Site investigation, foundation treatment: grouting, rock bolting & other support mechanisms, Back filling, soil stabilization, building stones, alkali aggregate reaction.
UNIT-III	**Engineering Geology(C):** Engineering properties of rocks & soils, Geological, geotechnical & environmental considerations for dams and reservoirs.
UNIT-IV	**Engineering Geology(D):** Tunnel- geological consideration and environmental impact.
UNIT-V	**Engineering Geology(E):** Geological consideration in bridge site, landslides- causes, factors & preventive measures.

Books Recommended:

1. Krynine and Judd: (2005) Principles of Engineering Geology, CBS Publishers & Distributors; 1st edition, Page no. 1-425
2. N ChennaKesavulu, Textbook of Engineering Geology, 2nd edition, Page no. 331-441
3. Ries and Watson: (1914) Engineering Geology, New York, J. Wiley & sons, Page no. 1- 142
4. Leggeet, R. F. (1988) Geology and Engineering, McGraw-Hill College, Subsequent edition, Page no. 1- 631
5. Price, D. G.: (2008) Engineering geology- Principals and Practice, Springer; 2009 edition, Page no. 1- 450
6. Ries and Watson: (1914) Engineering Geology, New York, J. Wiley & sons, Page no. 1- 142

Practical Paper-XIII

Engineering properties of building and road materials, Merits, demerits and remedial measures based upon geological cross section of project sites, Problems on porosity and permeability, Lab Record, Viva-voce.

SIXTH SEMESTER

CORE COURSE: GEOLOGY

Theory Paper-XIV, DSC-H-GEL-14, (REMOTE SENSING)

(Credits: Theory-4, Practical-2)

Objectives of the course:

To provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing and to acquire skills in storing, managing digital data for planning and development.

Expected outcome:

In this unit, the students are introduced with the concepts of statistics and satellite data and remote sensing has become very helpful for resolving so many geological problems.

UNIT-I	**Remote sensing(A):** Concept of aerial photography and remote sensing, Types of aerial photography, Indian R.S. Satellites and sensors, Sequence involved in Aerial Photography, Drift &Crab, Mosaic, Scale in Aerial Photography
UNIT-II	**Remote sensing(B):** Sensors, filters, stereoscopes, elements of aerial photo interpretation
UNIT-III	**Remote sensing(C):** Application of Photogeology and R.S in Ground water and Mineral exploration
UNIT-IV	**Remote sensing(D):** Application of Photogeology and R.S in geomorphological and structural mapping.
UNIT-V	**Remote sensing(E):** Application of Photogeology and R.S in studies on soil and agriculture, forestry and environment

Books Recommended:

1. M. Anji Reddy (2004) Geoinformatics for Environmental Management, BS Publications, Hyderabad
2. Sharma V.K. (1991) Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi
3. Qihao, Weng(2010)Remote sensing & GIS Integration, McGrew Hill
4. Robert A. Schowengerdt (2007)Remote Sensing: Methods for Image Processing, 3rd edition
5. Sharma V.K. (1991). Remote Sensing for Land Resources Planning, Concept Publishing Company, New Delhi.
6. LO. C.P., and Albert K. W. Yeung (2006) Concepts and Techniques of Geographic Information Systems, Prentice-Hall of India, New Delhi, 2006.

Practical Paper-XIV

Aerial Photo interpretation, Identification of rock types in Aerial Photos, Simple numerical problems related to Aerial Photos, Identification of landforms and drainage patterns in Aerial Photos, Lab Record, Viva-voce

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER-V

PAPER-I (EXPLORATION GEOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course: In these units, the students can know the characteristic properties, origin and distribution of ore minerals.

Expected outcome:

After the study, the student will have the knowledge of exploring them by sampling and geophysical methods.

Unit-I Resource reserve definition, A brief overview of classification of mineral deposit with respect to process of formation and in relation to exploration strategies.

Unit-II Principles of mineral exploration, prospecting and exploration: Conceptualization, methodology and stages, sampling, sub-surface sampling including pitting, trenching and drilling, geological, geochemical and geophysical exploration.

Unit-III Drilling & logging, core & non-core drilling, planning of bore holes & location of bore holes on ground, core logging.

Unit-IV Reserve estimations & errors: Principles of reserve estimation, density & bulk density, factors affecting reliability of reserve estimation. reserve estimation based on geometrical methods (polygon, square, rectangular, triangular) & regular & irregular grid patterns, statistics & error estimation.

Unit-V Mining terminology, Classification of mining methods, Open cast mining, Underground mining methods (Stopping methods-Board and pillar, Long wall, Cut and fill, Shrinkage stopping), chain and compass survey.

Books Recommended:

1. Arogyaswamy, R. H. P (1973) Courses in Mining Geology, Oxford & IBH Pub. Co., Page no. 1- 916

2. Emmons, W. H. (1918) Principles of Economic Geology, New York, McGraw-Hill, Page no. 1-140

3. Bateman, A. M. (1981) Economic Mineral deposits, John Wiley & Sons Inc, 3rd edition, Page no. 1- 604

4. Park. C. F. (Jr) & Mac Diarmid, M. A. (1986) Ore Deposits, Page no. 1- 525

5. Mukharjee, A. (2007) Ore Genesis, Waveland Press, Page no. 1- 985

6. Stanton (1972) Ore Petrology, McGraw-Hill, 1972, Page no. 1- 713

PRACTICAL

Problems related to exploration, Reserve estimation, Chain and Compass survey, Preparation of sub-surface lithologs.

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER-V

PAPER-II (Meteorology)

(Credits: Theory-4, Practical-2)

Objectives of the course:

The objective to teach this paper is to offer basic knowledge on the meteorology part will provide a general knowledge of a range of atmospheric phenomena and applications, and have expertise in one or more program sub-disciplines or related interdisciplinary areas. Also to produce graduates who are equipped to contribute to solving problems in the atmospheric sciences and related disciplines, through service in business or as educators, researchers, and leaders in academia, government, the private sector, and civil society.

Expected outcome:

This paper will provide quality scientific and technical education with increased focus on research and innovation in the fields of earth sciences and environment to cater to the need of the country. To pursue creative research and strive for new innovations in the fields of earth sciences and environment in order to serve the nation for a sustainable future.

Unit-I	Elements of Weather and Climate; Structure and chemical composition of the atmosphere,
Unit-II	Temperature and pressure belts of the world; Jet streams and it effect on weather,
Unit-III	Planetary and local winds; Cloud formation and precipitation processes, Types and distribution of precipitation,
Unit-IV	Air masses (Source Region, Classification, its affect on world weather), fronts (general characteristics, frontogenesis, classification,
Unit-V	Heat budget of the earth; Indian monsoon,

Books Recommended:

1. Miller, A, and J. C. Thompson: (1983) Elements of Meteorology, Merrill Pub Co, Subsequent Edition, Page no. 1-448
2. J. E. Hobbes.: (1980) Applied Climatology, Butterworth-Heinemann, page no. 1-222
3. G. T. Trewarta: (1968) An introduction to Climate, McGraw-Hill; Fourth Edition, page no. 1-408
4. Menon, P. A. :(2005) Way of The Weather, National Book Trust, India, page no. 1-109
5. Savindra Singh, Geomorphology
6. Strahler, A.: (2010) Physical Geography, Wiley, 5th edition, Page no. 1-656

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER-VI

PAPER-III (FUEL GEOLOGY)

(Credits: Theory-4, Practical-2)

Objectives of the course: In this course, the students can know the characteristic properties, origin and distribution of coal, petroleum and nuclear minerals. After the study, the student will have the knowledge of their conservation and management.

Expected outcome:

The students can have the knowledge of various environmental laws related to mining of minerals.

Unit-I	Coal: definition, origin, grade, classification of coal, fundamental of coal petrology: lithotype, microlithotypes& macerals in coal.
Unit-II	Coal as fuel: coal bed methane (CBM) global & Indian scenario underground coal gasification, coal liquefaction. Distribution of coal in India
Unit-III	Petroleum: chemical composition and physical properties of crudes in nature. Origin of petroleum, maturation of kerogen: Biogenic & thermal effect
Unit-IV	Petroleum reservoirs & traps Reservoir rocks, classification of reservoir rocks, hydrocarbon traps: Definition, anticlinal and trap theory. Classification of hydrocarbon traps- structural, stratigraphic & combination. Cap rocks definition and properties.
Unit-V	Nuclear fuel, Distribution of petroleum in India.

Books Recommended:

1. Francis, W.: (1961) Coal-its formation and composition, Edward Arnold, Page no. 1- 806

2. Levorsen. I. (2004) Geology of Petroleum, CBS Publishers & Distributors Pvt. Ltd., second edition.

3. Hobson, G. D. and Tiratsoo, E. N. (1975) Introduction to Petroleum Geology, Beaconsfield, Eng., Scientific Press, Page no. 1- 300

4. Deb, S. (1980) Industrial Minerals and Rocks of India, Allied Publishers, page no. 1-603.

5. Chandra, D., Singh, R. M. and Singh, M. P. (2000) Textbook of Coal (Indian context), Tara Book Agency

6. Francis, W. (1961) Coal-its formation and composition, Edward Arnold, page no. 1-806.

PRACTICAL:

Plotting of coal, petroleum and radioactive mineral deposits in the map of India and Odisha, Study of hand specimens of coal, Reserve estimation of coal, Correlation of bore-logs of coal deposits.

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER-VII

PAPER-IV (ENVIRONMENTAL GEOLOGY & DISASTER MANAGEMENT)

(Credits: Theory-4, Practical-2)

Objectives and expected outcome:

The objective to teach this paper is to offer basic knowledge on different sphere such as atmosphere; hydrosphere and lithosphere. Also to produce graduates who are equipped to contribute to solving problems in the atmospheric sciences and related disciplines, through service in business or as educators, researchers, and leaders in academia, government, the private sector, and civil society.

The environmental geology will provide the quality scientific and technical education with increased focus on research and innovation in the fields of earth sciences and environment to cater to the need of the country. To pursue creative research and strive for new innovations in the fields of earth sciences and environment in order to serve the nation for a sustainable future.

UNIT -I Environmental Geology (A)
Spectrum of environmental geology, land-uses, Role of geologists in environmental planning and management.

UNIT-II Environmental Geology (B)
Erosion: causes and control, desertification and degradation, impact of mining activities on environment, Environmental impact of river valley project.

UNIT- III Environmental Geology (C)
Soil erosion and conservation, Soil pollution, impact of excess withdrawal of ground water.

UNIT- IV Natural disaster (A)
Concept of disaster, types of disaster: natural and manmade- land slide, earthquake, tsunami & volcanic eruption.

UNIT- V Natural disaster (B)
Disaster management, mitigation and preparedness, pre-disaster risk and vulnerability reduction, post disaster recovery & rehabilitation, disaster related infrastructure development.

Books Recommended:

1. Keller E. A.: (2010) Environmental Geology, Pearson, 9th edition, Page no: 1-624

2. Valdiya, K. S.: (2004) Environmental Geology-Indian context, Orient Blackswan Private Limited - New Delhi, Page no. 1-240

3. Odurn, E. P.: (2004) Fundamentals of Ecology Brooks/Cole; 5th Revised edition, Page no. 1-624

4. Savindra Singh (1998) Geomorphology, Prabalika Publication, Page no. 1- 552

5. Trewarta, G. T. (1968) An introduction to Climate, McGraw-Hill; Fourth Edition, page no 1-408.

6. Keller, E. A. (2010) Environmental Geology, Pearson; 9 edition page no. 1-624

PRACTICAL:

Seminar on any topic related to environment, Natural disaster and Geology.

FIRST SEMESTER

GEOLOGY HONS GENERIC ELECTIVE

Theory Paper-I (General Geology, Crystallography and Mineralogy)

Objectives of the Course:

The aim of this course is to study General geology part can give an idea about endogenetic process operating inside the earth. Study the crystals through external elements of symmetry, crystal classes and systems, and the relations of symmetry to the internal structure using the chemical and physical properties of the minerals. The course aims also to study the major mineral groups, their occurrences, physical, chemical and crystallographic properties and their possible uses in industry. In these units, the physical, chemical and optical properties of the minerals are described. One should know them to identify the types of rocks.

Expected outcome:

The said courses will make the students to understand about the interior of earth. It will help the students to understand about crystal chemistry. The students will be equipped with the knowledge of identifying different minerals with their possible varieties and their occurrence in different types of rocks as a combining unit.

UNIT-I	**General Geology:** Scope, importance and branches of geology , Age, Origin, and Internal structure of the Earth, Earthquake with its causes, scale, some examples
UNIT-II	**Crystallography:** Elementary idea about crystal morphology in relation to their internal structure, Crystal parameter and indices, Crystal symmetry and classification of crystal into six normal classes, along with their, axial relationship, symmetry elements, forms present and at least five examples
UNIT-III	**Optical Mineralogy:** Properties of light, petrological microscope, polarisation, double refraction, R.I, Nicol prism, pleochroism, Isotropism, extinction angle, Birefringence, Interference colour
UNIT-IV	**Mineralogy:** Silicate structure, physical properties of minerals, Polymorphism, Isomorphism
UNIT-V	**Mineral groups:** Description of different mineral groups with reference to its mineralogy, chemistry, physical properties, optical properties and uses of Olivine, Pyroxene, Mica, Feldspar, Quartz, Amphibole and Garnet group

Books Recommended:

1. W.A DEER, R.A. HOWIE, J. JUSSMAN (1992) Introduction to the rock forming minerals, ELBS (British Govt.)

2. William D. Nesse, Introduction to Optical Mineralogy, Page no. 1- 442

3. James D. Dana (Revised by c. Klein & C.S. Hurlbut), Dana's Manual of Mineralogy, Twenty First Edition, Page no. 1-681

4. Dexter Perkins, Mineralogy, Third edition, Page no. 1-388

5. Condie, K. C. (1989) Plate tectonics and Crustal development,Pergamon, 3rd edition, Page no. 1-504.

6. F. Rutley, H. H. Read & G.T. Holoway (1916) Elements of Mineralogy, Nineteenth edition, Page no. 1-388.

Practical Paper-I

Study of crystal models, Megascopic and Microscopic identification of minerals, Map (Geomorphology), Lab Record, Viva-voce.

SECOND SEMESTER

GEOLOGY HONS GENERIC ELECTIVE

Theory Paper-II (Geomorphology, Tectonics, Stratigraphy & Palaeontology)

Objectives of the course:

In this unit, different types of earth features and their causative geological agents have been described. The students can analyse the type of agents that has shapes a particular zone of the earth surface. below units will describe the logical deposition of strata according to geological time. They shall come to know about the distribution of rocks of various time period in different parts of India. It will help the students can know the characteristic properties, origin and classification of fossils.

Expected outcome:

The students can have the knowledge about the physical features of the surface of the earth and their relation to its geological structures. This knowledge will enable the students to find out the age, lithological constitution and economic importance of various strata. This knowledge will enable the students to find out the age of various strata and also to interpret the paleoenvironments.

UNIT-I	**Geomorphology:** Weathering and erosion, Geological work of river and landforms developed because of erosion and deposition, Geological work of wind and glacier and landforms developed because of erosion and deposition, Volcano, its type, products
UNIT-II	**Tectonics:** Continental drift, Concept of plate tectonics, Isostasy, MOR, Island arc, Sea floor spreading
UNIT-III	**Stratigraphy (A):** Principles of stratigraphy, Stratigraphic correlation, General Stratigraphic timescale, stratigraphy of Cuddapah, Vindhyan, Gondwana and Dharwar along with its, Stratigraphic succession, lithology, economic importance, structure and fossil content if any
UNIT-IV	**Stratigraphy (B):** Stratigraphy of Triassic of Spiti, Jurassic of Kutch, Siwalik and Tertiary of Assam
UNIT-V	**Palaeontology:** Mode of preservation of fossils, Morphology, geological distribution and evolution of Brachiopods, Cephalopods, Gastropoda, Trilobita, Pelecypoda

Books Recommended:

1. Amal Dasgupta, An Introduction to Palaeontology, 2nd Edition, Page no. 1-543

2. P.C. Jain & M.S. Anantharaman, Palaeontology (Palaeobiology) Evolution and Animal Distribution, Page no. 1-315

3. Wadia. D. N. (1975) Geology of India, McGraw Hill Education India Pvt. Ltd; 4th edition, Page no. 1-560.

4. Ravindra Kumar (1998) Historical Geology and Stratigraphy of India,New Age; 1st edition, Page no. 1-268.

5. Condie, K. C. (1989) Plate tectonics and Crustal development,Pergamon, 3rd edition, Page no. 1-504.

6. P. Kerry, K. Klepeis and F.J. Vine, Global Tectonics, 3rd Edition, Page no. 1-463

Practical Paper-II

Tectonic zones of india, Plotting of Stratigraphy units in India and Odisha map, Identification of fossils, Lab Record, Viva-voce

THIRD SEMESTER

GEOLOGY HONS GENERIC ELECTIVE

Theory Paper-III (Petrology, Geochemistry, Hydrology & Natural hazards)

Objectives of the course:

In these units, the students can know the characteristic properties of initial rocks (those formed from molten material) as well as their origin and types. In these units, the students can know the characteristic properties, origin and distribution of ore minerals. The students will able to know the characteristic properties, origin, movement and types of groundwater

Expected outcome:

The students shall have the potential to know the mechanism of formation of different types of igneous rocks. They will be in a position to classify the igneous rocks basing on various parameters. After the study, the student will have the knowledge about Cosmic abundance of elements, Distribution of major and trace elements in the earth crust. This knowledge will enable the students to use groundwater properly and will have the knowledge to install various types of wells.

UNIT-I	**Igneous and Metamorphic Petrology:** Forms, structure, texture and classification of igneous rocks, Bowen's reaction series Agents and type of metamorphism, structure, texture of metamorphic rocks
UNIT-II	**Sedimentary Petrology:** Process of formation of sedimentary rock, texture, structure and Classification of sedimentary rock, Individual classification of Sandstone and Limestone
UNIT-III	**Geochemistry:** Cosmic abundance elements, Rock cycle, Composition of Meteorites, Geo-chemical classification of elements
UNIT-IV	**Ground Water/Hydrogeology:** Vertical zonation of ground water, Types of Aquifer, Hydro geological properties of rock like Porosity, permeability, specific retention, specific yield
UNIT-V	**Natural hazards:** The causes, effects and mitigation measures for flood and cyclone, Landslide, Tsunamis and Marine transgression and regression

Books Recommended:

1. Mason, B. (1968) Principles of Geochemistry, John Wiley & Sons; 3rd International edition, Page no. 1-330.

2. Best. (2002) Igneous and Metamorphic Petrology, Wiley-Blackwell, 2nd edition,Page no. 1-752.

3. John D. Winter, Principles of Igneous and Metamorphic Petrology, 2nd Edition, page no. 1-443

4. Pettijohn, F. J. (1983) Sedimentary rocks, HarperCollins, 3rd edition,Page no. 1-526.

5. Todd, D. K. (2015) Ground water Hydrology, Page no. 1- 656

6. Savindra Singh (1998) Geomorphology, Prabalika Publication, Page no. 1- 552

Practical Paper-III

Megascopic identification of igneous, metamorphic and sedimentary rocks, Microscopic identification of igneous, metamorphic and sedimentary rocks, Study of ground water conditions in a given map, Lab Record, Viva-voce

FOURTH SEMESTER

GEOLOGY HONS GENERIC ELECTIVE

Theory Paper-IV (Structural Geology, Engineering Geology & Economic Geology)

Objectives of the course: In these units, the students can know the characteristic properties, origin and types of various structural features found in rocks. The students can know the characteristic properties, origin and distribution of coal, petroleum and nuclear minerals. After the study, the student will have the knowledge of their conservation and management.

Expected outcome:

The above knowledge will enable the students to study the history of mechanism of formation and structure of rocks. The students can have the knowledge of various environmental laws related to mining of minerals.

UNIT-I	**Structural Geology(A):** Concept of dip and strike, Determination of top and bottom of beds, Definition and classification of folds.
UNIT-II	**Structural Geology(B):** Definition and classification of faults and its recognition in the field, Origin, types of unconformity and its recognition in the field. Definition and classification of joints
UNIT-III	**Engineering Geology:** Description, site selection and effect of Dam, Bridge, Tunnel Engineering properties of rock
UNIT-IV	**Economic Geology (A):** Process of formation of Ore deposits, Mode of occurrence, genesis, mineralogy, Indian distribution and uses of metallic ores of Iron, Manganese, Copper, Aluminium
UNIT-V	**Economic Geology (B):** Mode of occurrence, genesis, mineralogy, Indian distribution and uses of Nonmetallic ores Mica, Limestone, Gypsum, Asbestos, Mode of occurrence, genesis, Indian distribution and uses of Coal and Petroleum.

Books Recommended:

1.Billings, M. P. (1972) Structural Geology, Pearson College Div., 3rd editions, Page no. 1-606.

2. Ghosh, S. K. (1993) Structural Geology, Pergamon, Page no. 1-598.

3. Krishnaswamy, S.: (1988) Mineral Resources of India, Oxford & IBH, Page no. 1- 613

4. N ChennaKesavulu, Textbook of Engineering Geology, 2nd edition, Page no. 331-441

5. Ries and Watson: (1914) Engineering Geology, New York, J. Wiley & sons, Page no. 1- 142

6. B.S. Satya Narayanswami, Structural Geology, Page no. 1-191

Practical Paper-IV

Structural map, Megascopic identification of ores, Ore reserve calculation, Field Report, Lab Record, Viva-voce

SKILL ENHANCEMENT COURSE

Project work

(2 credit)

1. Geological Mapping
2. Remotesensing and GIS
3. Ground Water Studies
4. Engineering Geology
5. Economic Geology
6. Fossil Studies
7. Environmental Geology
8. Applied Geology
9. Geological Resource Management
10. Natural Disaster Management