

FOUR YEAR UNDERGRADUATE PROGRAMMES (FYUGP)
IN GEOLOGY FOR AFFILIATED COLLEGES UNDER RABINDRANATH TAGORE
UNIVERSITY
AS PER NEP-2020

1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-5)
3. Semester: Fifth Semester
4. Course Name: Economic Geology, Stratigraphy and Palaeontology.
5. Paper code: MIN-GLG-5.1
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course Outcome: *In this course they will get a detailed concept about the processes of formation of economic mineral deposits, mode of formation of ore deposits and classification of economic mineral deposits. They will study about structural, physical, chemical and stratigraphic control of ore localization. The students will learn about the Metallogenic provinces and epochs, important deposits of India.*

The students will be able to learn the stratigraphic principles and nomenclature, major stratigraphic units, methods of stratigraphic correlation. The students will be able to know standard Geological time scale. In this paper the students will get a brief idea of the Indian stratigraphy of Precambrian, Proterozoic and Phanerozoic eras.

This course intends to give the students a basic idea about Palaeontology which includes modes of preservation and importance of fossil in various aspects of geological studies. They will learn the morphological characteristics and geological distribution and functional adaptation of various classes of invertebrate fossils.

In practical course students will be able to identify economic minerals in hand specimens. In this paper the students will also get clear idea about the distribution of important geological formations in India. In practical course students will be able to identify different genera of fossils by their external morphology and stratigraphic ranges.

Syllabus showing each unit against class number and marks

Unit No.	Unit Content	Class hours	Credit/Marks
Unit-1	<p>Introduction to economic geology: Ore, gangue, grade, tenor, Metallogenic provinces and epochs.</p> <p>Preliminary idea of Geological Processes of formation of mineral deposits.</p> <p>Important deposits of India:</p> <p>Metallic ores-Iron, copper, Manganese, Lead and Zinc.</p> <p>Nonmetallic ores- Coal, petroleum of NE India.</p>	15	25
Unit-2	<p>Principles to Stratigraphy: Superposition of strata, Warner and Neptunism; Hutton and Uniformitarianism and Plutonism; Smith and applied Stratigraphy; Lyell's Principles of Geology.</p> <p>Geological time scale, stratigraphic units and correlation.</p> <p>Precambrian Stratigraphy of India: Description of litho-stratigraphy, age, structure and metamorphism in the Dharwar Province, Singhbhum-Orissa Province.</p> <p>Proterozoic Basins of India: Description of litho-stratigraphy, age, structure and metamorphism Vindhyan and Shillong Basins</p> <p>Phanerozoic Stratigraphy of India: Distribution, lithology, fossil content and economic importance with special reference to Gondwanadeposits of Indian Subcontinent, stratigraphy and vertebrate palaeontology of Siwalik Basin.</p>	15	25
Unit-3	<p>Introduction to Palaeontology: Definition; different branches of palaeontology and scope; kinds of fossils; modes of preservation of fossils; importance of fossils: chronological, palaeogeographical, palaeoecological, biostratigraphical, evolutionary and economic studies.</p> <p>Descriptive palaeontology: A study of the morphological characters, geological distribution significance of the following phyla/classes: Brachipoda, Lamelibranchia, Gastropoda, Cephalopoda, Trilobita.</p>	15	25

Unit-4	<p>Practical:</p> <p>Economic Geology: Identification of the following economic minerals in hand specimens: Graphite, Malachite, Chalcopyrite, Pyrite, Haematite, Magnetite, Pyrolusite, Psilomelane, Sphalerite, Galena, Coal.</p> <p>Indian Stratigraphy: Preparation of lithostratigraphic maps of India showing distribution of important geological formations: Dharwar Province, Singhbhum-Orissa Province, Shillong Group of rocks, Vindhyan Super Group, Gondwana Super Group.</p> <p>Palaeontology: Identification of the following genera of fossils by their external morphology. Their stratigraphic ranges will also have to be studied:</p> <p>a) Orthis, Productus, Spirifer, Terebratula, Rhynchonella. b) Arca, Cardita, Exogyra, Pecten, Ostrea, Trigonia. c) Conus, Murex, Turritella, Physa, Cypraea. d) Belemnites, Ceratites, Nautilus, Perisphinctes.</p>	30	8
			9
			8

SUGGESTED READINGS:

- 1) Bateman, A.M. and Jensen, M.L. (1990). Economic Mineral Deposits. John Wiley.
- 2) Evans, A.M. (1993). Ore Geology and Industrial minerals. Wiley
- 3) Deb S. (1980) Industrial minerals and rocks of India. Allied Publishers.
- 4) Sarkar, S.C. and Gupta, A. (2014) Crustal Evolution and Metallogeny in India. Cambridge Publications.
- 5) Stratigraphic Principles and Practices – JW. Weller, Universal Book Stall, Delhi
- 6) Geology of India and Burma – M. S. Krishnan, CBS Publisher & Distributor
- 7) Precambrian Geology of India – S. M. Naqvi & J. J. W. Rogers, Oxford University Press
- 8) Geology of India Vol.-1 and Vol.-2 by Ramakrishnan and Vaidyanadhan. Geological Society of India, Bangalore.
- 9) Fundamentals of Historical Geology and Stratigraphy of India – R. Kumar, New Age International Publishers
- 10) Indian Precambrian – B.S. Paliwal, Scientific Publications (India) Jodhpur
- 11) Raup, D. M., Stanley, S. M., Freeman, W. H. (1971). Principles of Paleontology
- 12) Clarkson, E. N. K. (2012). Invertebrate paleontology and evolution, 4th Edition by Blackwell Publishing.

FOUR YEAR UNDERGRADUATE PROGRAMMES (FYUGP)
IN GEOLOGY FOR AFFILIATED COLLEGES UNDER RABINDRANATH TAGORE
UNIVERSITY
AS PER NEP-2020

1. Four Year Undergraduate Programmes (FYUGP)
2. Subject: Geology (MINOR-6)
3. Semester: Sixth Semester
4. Course Name: Engineering Geology, Hydrogeology and Remote Sensing
5. Paper code: MIN-GLG-6.1
6. Course level: 200
7. Credit:4(Th-3, Pract-1)

Course Outcome: *In this paper the students will get the knowledge of physical and chemical characterization of earth materials. The students will also be able to learn about the rock mechanics, dams, tunnels and slope stability.*

They will learn the basic concepts of hydrogeology, the occurrence of groundwater, water bearing properties of formations, aquifer types and aquifer parameters. They will also get the knowledge groundwater flow, well hydraulics and surface and subsurface investigation of ground water.

The student will learn about the different types of aerial photographs and their acquisition; principles of stereoscopy. The students will also get the basic idea of remote sensing and its application. In this paper they will get a brief idea of GIS and GPS with their applications in earth system sciences.

In practical course students will get the knowledge about dams and tunnels of India and learn to determine the moisture content and unit weight of soil.

Syllabus showing each unit against class number and marks

Unit No.	Unit Content	Class hours	Credit/Marks
Unit-1	<p>Engineering Properties of materials: Physical and chemical characterization of earth material, Moisture content, void ratio, porosity, permeability, degree of saturation, unit weight, density, specific gravity, strength (compressive, shear and tensile), deformability. Atterberg's Limits and consistency of soil, Indian Standard Soil Classification System. Elementary knowledge about soil compaction, compressibility and consolidation, Liquefaction.</p> <p>Geology and Engineering Structures: Dams, Tunnels and Slope Stability. Classification and terminologies. Geological and geophysical investigations associated with construction of dams, tunnels and stability of slopes. Dam foundation, abutment and reservoir problems. Seepage and leakage.</p>	15	25
Unit-2	<p>Basic Concepts of Hydrogeology: Definition of hydrology and hydrogeology; Hydrologic cycle - precipitation, evapotranspiration, run-off, infiltration and subsurface movement of water; Concept of Residence Time.</p> <p>Rock properties effecting groundwater; vertical distribution of subsurface water.</p> <p>Aquifers - their types and classification; aquiclude, aquitard and aquifuge; Groundwater Recharge and Discharge; Aquifer Parameters - occurrence of groundwater openings in rocks, porosity, types of porosity; permeability and void ratio; specific storage, transmissivity, storativity, specific yield and specific retention.</p> <p>Groundwater Flow and Well Hydraulics: Ground Water movement; Darcy's law - its range of validity and limitation; hydraulic conductivity, basic principles of well hydraulics drawdown and cone of depression.</p>	15	25

Unit-3	<p>Photogeology:</p> <p>Types and acquisition of aerial photographs; Scale and resolution; Principles of stereoscopy, relief displacement, vertical exaggeration and distortion Elements of air photo interpretation.</p> <p>Remote Sensing: Concepts in Remote Sensing, EMR, Sensors and Platforms, Satellites and their characteristics, Spectral Reflectance Curve.</p> <p>Applications of Remote Sensing, advantages and limitation of remote sensing.</p> <p>Basic concepts of GIS and GPS: Components, overlays, datum.</p> <p>Applications of GIS and GPS in earth system sciences.</p>	15	25
Unit-4	<p>Practical:</p> <p>Engineering Geology: Study and identification of important dams and tunnels of India. Determination of moisture content and unit weight of soil.</p> <p>Hydrogeology: Numerical problems on groundwater flow and aquifer properties. Preparation and interpretation of depth to water table map.</p> <p>Remote Sensing: Aerial Photo interpretation.</p>	30	8 9 8

SUGGESTED READINGS:

- 1) Principles of Engineering Geology and Geotechnics by Krynine and Judd. CBS Publishers.
- 2) Engineering Geology by Duggal, Pandey and Rawal. McGraw Hill Education (India) Pvt. Ltd.
- 3) Raghunath, H.M. (2007) Ground Water, 3rd Edition. New Age International Publishers
- 4) Todd, D.K. and Mays, L.W. (2005) Groundwater Hydrology, 3rd Edition. John Wiley & Sons
- 5) Todd, D. K. (2006) Groundwater Hydrology, 2nd Edition., John Wiley & Sons, New York
- 6) Demers, M.N. (1997). Fundamentals of Geographic Information System, John Wiley & sons. Inc.
- 7) Jensen, J.R. (1996). Introductory Digital Image Processing: A Remote Sensing Perspective, Springer- Verlag.
- 8) Lillesand, T. M. & Kiefer, R.W. (2007). Remote Sensing and Image Interpretation, Wiley.