

**FOUR YEAR COURSE STRUCTURE OF
UNDERGRADUATE PROGRAMME IN GEOLOGY UNDER NEP 2020**

First Year- Undergraduate Certificate

COURSES OF STUDY FOR INTRODUCTORY REGULAR FYUGP IN "GEOLOGY"

SEMESTER I/II/III	INTRODUCTORY REGULAR COURSE	1 Paper
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1. INTRODUCTORY REGULAR COURSE IRC-1/VPG-GEL

(Credits: Theory 03, Practical 0)

The INTRODUCTORY REGULAR COURSE (IRC) of Geology is to be studied by the Students opting major subject other than Geology

Students opting Geology as major subject have to select a subject associated with Geology as INTRODUCTORY REGULAR COURSE (IRC)

Marks: 25 (5 Attendance & others + 20 SIE: 1.5 Hr) + 75 (ESE: 3Hrs) = 100

Pass Marks: Th. (MSE+ESE) = 40

Instruction to Question setter:

Semester Internal Examination (SIE 10+5=15 marks)

The semester internal examination shall have two components

[a] One Semester Internal Assessment Written Test (SIA) of 15 Marks

[b] Class Attendance Score (CAS) including the behaviour of the students towards teacher and other student of the college of 5 marks

End Semester Examination (ESE 75 marks)

There will be two groups of questions. Group A is compulsory which will contain three questions. Question No. 1 will be very short answer type consisting of five questions of 1 mark each. Question No. 2 & 3 will be short answer type of 5 marks each. Group B will contain descriptive type seven questions of fifteen marks each, out of which any four are to be answered

Note: There may be sub divisions in each question of group B

INTRODUCTORY GEOLOGY

Theory: 45 Lectures

Course Objectives:

This course is designed:

- To expose the students to the basic principles of Geology
- To introduce the first course

Course Learning Outcomes:

On successful completion of this course, the students will be able to understand other subjects such as Botany, Zoology, Mathematics, Physics, Chemistry etc.

INTRODUCTORY GEOLOGY – Total 03 credits (45 - hours)

Physical Geology – 5 Hrs

The nature and scope of geology; Origin of the Earth; Age of the Earth; An elementary idea of seismic waves and interior of the Earth; Geological work of river and Wind.

Crystallography – 3 Hrs

Elementary ideas about crystal structure; Crystal: faces, edges, solid angles and interfacial angles; Crystallographic axes and axial angles; Elements of Crystal Symmetry. Parameter, indices and symbol. Laws of crystallography; Isometric System.

Optical Mineralogy – 3 Hrs

Nature of light; Polarization of light; Isotropic and anisotropic substances (minerals); Phenomenon of Double refraction; Nicol prism – its construction; Construction and function of petrological microscope. Optical properties of Quartz, orthoclase, plagioclase, microcline, biotite, muscovite.

Mineralogy – 3 Hrs

Mineral - definition; Physical properties of minerals; Structure and classification of silicates; Chemical composition and diagnostic physical properties of the following rock forming minerals - quartz, orthoclase, microcline, kyanite, calcite, gypsum, apatite, talc, fluorite, garnet, biotite, muscovite, beryl.

Structural Geology – 4 Hrs

Understanding dip and strike. Construction and uses of Clinometer and Brunton compass; Elementary idea and nomenclature of Folds, Faults, Unconformity and Joints.

Stratigraphy – 4 Hrs

Stratigraphy: Definition; Principles of stratigraphy and stratigraphic correlation; Geological time scale; Stratigraphic approaches to study the Precambrian rocks of India with special reference to classification, lithological characteristics and economic significance of Precambrian of Singhbhum and Gondwana Supergroup.

Palaeontology – 4 Hrs

Palaeontology: Definition and its scope; Fossils definition, their mode of preservation and uses; Morphology and geological history of the following: Brachiopoda, Paleocypoda and Trilobita.

Petrology – 8 Hrs

Igneous Rocks - Definition and classification of igneous rocks; Forms of igneous bodies; Brief petrographic description of common igneous rocks such as – granite, gabbro, dolerite, basalt, rhyolite. Sedimentary rocks – texture and structure; Brief Petrographic descriptions of common sedimentary rocks such as – conglomerate, breccia, sandstone, limestone and shale. Metamorphic rocks – definition, types and its agents; Textures of metamorphic rocks; Brief Petrographic descriptions of common metamorphic rocks – slate, phyllite, schist, gneiss, marble and quartzite.

Economic Geology – 5 Hrs

Definition of ore, ore minerals, gangue minerals, tenor of ore; Processes of formation of mineral deposits – magmatic concentration and placer deposits; Mode of occurrence and distribution of metallic and non-metallic mineral deposits – Iron, Copper, Coal deposits of Jharkhand; Physical properties of chalcopyrite, pyrite, galena and hematite.

Environmental Geology – 2 Hrs

Definition and concept of environmental geology; Types of environmental pollution in environmental domains; Processes of soil formation, soil degradation and mitigation.

Hydrogeology – 2 Hrs

Occurrence and vertical distribution of groundwater; Hydrological cycle; Water bearing properties of rocks - Porosity and permeability, Specific yield, specific retention and storage coefficient. Aquifers and their types.

Computer Applications – 2 Hrs

Basic idea of Computer, Types of computers, Hardwares, operating Systems and programs; Use of MS-Office; Application of computers in Geology.

Books:

1. Mukherjee, P.K. (2013). A Textbook of Geology, World Press Pvt. Ltd.
2. Singh, Parbin (2013). Engineering and General Geology, S.K. Kataria & Sons.
3. Rutleys Elements of Mineralogy, 1991, Publisher: Cbs Publishers & Distributors
Pages: 482 ISBN10: 8123909160
4. Read, H.H. (1968): Rutley's Element of Mineralogy (Rev. Ed.), Thomas Murby and Co.
5. Billings, M.P. (1972): Structural Geology, Prentice Hall.
6. Kumar, R. (1985): Historical Geology and Stratigraphy of India, Wiley Eastern Ltd.
7. Shrock, R.R. and Twenhoffel, W.H. (1952): Principles of Invertebrate Paleontology, CBS Publ.
8. Woods, H. (1985): Palaeontology Invertebrate, CBS Publ.
9. Jain, P.C. and Anantharaman, M.S. (1983): Palaeontology: Evolution and Animal Distribution, Vishal Publ.
10. Ehlers, E.G. & Blatt, H (1982): Igneous, Sedimentary and Metamorphic Petrology, CBS Publ.
11. Tyrrell, G.W. (2019). Principles of Petrology: An Introduction to the Science of Rocks 2nd Edition.
12. Jense, M.L., Bateman, and A.M. (1981): Economic Mineral Deposits, John Wiley and Sons.
13. Krishnaswamy, S. (1979): India's Minerals Resources, Oxford and IBH Publ.
14. Sharma, N.L. and Ram, K.V.S. (1972): Introduction to India's Economic Minerals, Dhanbad Publ.
15. Prasad, U. (2019). Economic Geology: Economic Mineral Deposits. CBS 2nd edition.
16. Valdiya, K.S. (1987): Environmental Geology – Indian Context, Tata McGraw Hill.
17. Todd, D. K. (1995): Groundwater hydrology, John Wiley and Sons.

MAJOR COURSE – MJ-1/VPG-GEL

(Credits: Theory- 4, Practicals-02)

Marks: 15 (5 Attendance & others + 10 SIE: 1Hr. + 60 (ESE: 3hrs) =75

Pass Marks: Th. (MSE + ESE) = 30

Instruction to Question Setter for

Semester Internal Examination (SIE 10+5=15 Marks)

The Semester Internal Examination shall have two components

[a] One Semester Internal Assessment Written Test (SIA) of 15 Marks

[b] Class Attendance Score (CAS) including the behaviour of the students towards teacher and other student of the college of 5 marks

End Semester Examination (ESE 60 marks)

There will be two groups of questions. Group A is compulsory which will contain three questions. Question No. 1 will be very short answer type consisting of five questions of 1 mark each. Question No. 2 & 3 will be short answer type of 5 marks each. Group B will contain descriptive type five questions of fifteen marks each, out of which any three are to be answered

Note: There may be sub divisions in each question of group B

Semester-I [Credit – 4, Marks 60 + 15]

Section – A: Physical Geology

Geology- its branches with other branches of science. Study of atmosphere and hydrosphere, Radioactivity and age of the earth, an elementary idea of seismic waves and interior of the earth. Origin of the earth. Earth in the solar system-Size, Shape, Mass, Density, Rotational and Revolutional parameter.

Concept of isostasy, Origin and significance of mid-oceanic ridges and trenches. Sea floor spreading, continental drift. Brief idea about plate tectonics. Mitigation of environmental hazards- Earthquakes, floods, landslides.

Exogenic and endogenic geomorphic processes. A detailed account of the geological work of natural agencies- groundwater, rivers, glaciers, ocean and wind. Drainage pattern and its significance.

Section – B: Igneous Petrology

Magma- its nature and composition. Form and structure of igneous rocks. Texture of igneous rocks. Classification of igneous rocks. Bowen's reaction series and its significance. Magmatic differentiation and assimilation. Concept of Phase diagrams; Crystallization of unicomponent and bicomponent (immiscible and solid solution) magma. Magmatism in the oceanic domains

(MORB, OIB), Magmatism along the plate margins (Island arcs/continental arcs); Petrographic notes on granite, granodiorite, diorite, rhyolite, trachyte, syenite, gabbro, basalt, dolerite, anorthosite, dunite and pyroxenite.

Books:

1. Best, Myron G. (2002): Igneous and Metamorphic Petrology, Blackwell Science.
2. John D. Winter 2001. An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc.
3. Principles of physical geology- Holmes.
4. Geomorphology- P. Dayal.
5. Principles of Geomorphology- Thornbury. W. D.
6. Blatt, H. and Tracy, R.J. (1996): Petrology (Igneous, Sedimentary, Metamorphic), W.H. Freeman and Co., New York.
7. Ehlers, E.G. & Blatt, H (1982): Igneous, Sedimentary and Metamorphic Petrology, CBS Publ.
8. Tyrrell, G.W. (2019). Principles of Petrology: An Introduction to the Science of Rocks 2nd Edition.
9. Loren A. Raymond 2002. Petrology: The study of Igneous, Sedimentary and Metamorphic rocks. Mc Graw Hill. New York
10. Cox, K.G. Bel, J.D. and Pankthrust, R.J. 2002. The interpretation of Igneous rocks. Allen and Unwin, London

Practicals [Credit – 2, Marks – 25] No Internal

1. Megascopic study of important igneous rocks.
2. Microscopic study of common igneous rocks.
3. Determination of Epicentre through given data.
4. Identification of Drainage pattern in a Topographic Map.
5. Practical records and viva-voce

Book:

1. Ajoy Kumar Sen - Laboratory manual of Geology; Modern Book Agency Private Limited, Calcutta
2. N. W. Gokhale – Manual of Geological Maps: CBS Publishers & Distributors Pvt. Ltd.