MODIFIED CBCS CURRICULUM OF

GEOLOGY HONOURS PROGRAMME

SUBJECT CODE = 53

FOR UNDER GRADUATE COURSES UNDER RANCHI UNIVERSITY

Implemented from
Academic Session 2017-2020 & 2018-2021

COURSES OF STUDY FOR **GENERIC ELECTIVE 'B. Sc. Hons'** PROGRAMME IN

"GEOLOGY"

SEMESTER I **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

I. GENERIC ELECTIVE (GE 1):

(Credits: Theory-04, Practicals-02)

- All Four Generic Papers (One paper to be studied in each semester) of Physics to be studied by the Students of **Other than Geology Honours.**
- Students of **Geology Honours** must Refer Content from the **Syllabus of Opted Generic Elective Subject**.

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	**Pass Marks: Th ESE = 30 + Pr ESE =10**

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ESSENTIALS OF GEOLOGY

Theory: 60 Lectures

Unit 1: Introduction to Geology, scope, sub-disciplines and relationship with other branches of sciences

Unit 2: Earth in the solar system: origin. Solar System- Introduction to Various planets- Terrestrial and Jovian Planets, Internal constitution of the earth: core, mantle and crust.

Unit 3: Convections in the earth's core and production of magnetic field; Earthquake: causes, effects and distribution; Volcanoes: types, products and distribution.

Unit 4: Introduction to hydrosphere, biosphere and atmosphere; Origin of mountains; Elementary idea about Plate Tectonics.

Unit 5: Age of the earth: Radioactivity and its application in determining the age of the Earth.
Basic concept of
- Rocks: types with examples
- Minerals: Definition and classification.
- Fossils: mode of preservation and uses

Suggested Readings:

- Holme's Principles of Physical Geology. 1992. Chapman & Hall.
- Emiliani, C, 1992. Planet Earth, Cosmology, Geology and the Evolution of Life and Environment. Cambridge University Press.
- Gross,M.G., 1977. *Oceanography: A view of the Earth*, Prentice Hall.

GE 1 LAB: ESSENTIALS OF GEOLOGY

60 Lectures

Marks : 25 (Pr 3Hrs)=25	**Pass Marks: Pr ESE =10**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

1. Contour maps : profile drawing, identification and description of important topographical features.
2. Physical properties of minerals: Study and Documentation.
3. Study of physical properties of important rock forming minerals in hand specimen:
4. Plotting of major Dams on the outline map of India, mention name of the river and utility of the dam.
5. Study of Seismic Zones of India.

SEMESTER II **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

II. GENERIC ELECTIVE (GE 2)

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	Pass Marks: Th ESE = 30 + Pr ESE =10

Instruction to Question Setter for

End Semester Examination (ESE):

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

ROCKS & MINERALS

Theory: 60 Lectures

Unit 1: Minerals
Definitions, Classification and Physical properties of minerals.

Unit 2: Mineral structures. Silicate Structure.

Unit 3: Nature of light and principles of optical mineralogy.
Classification of minerals based on optical properties;
Petrological Microscope.; Optical properties of minerals.

Unit 4: Rocks- Definitions and types, Basics of rock formation.
Igneous rock- texture and Structure, magma: origin and composition, Bowen's reaction series and magmatic differentiation.
Sedimentary rocks- process of formation, texture and Structure.
Metamorphic rocks- Agents and types of metamorphism, texture and Structure.

Suggested Readings:

- Earth Materials- Introduction to Mineralogy and Petrology, Cornelis Klein and Anthony Philpotts, Cambridge University Press, 2013.
- Understanding Earth (Sixth Edition), John Grotzinger and Thomas H. Jordan, 2010, W.H. Freeman and company, New York.

GE 2 LAB: ROCKS & MINERALS **60 Lectures**

Marks : 25 (Pr 3Hrs)=25	Pass Marks: Pr ESE =10

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

1. Observation and documentation of important structures of sedimentary and metamorphic rocks.
2. Observation and documentation of forms of igneous rocks.
3. Study of optical properties of minerals.
4. Study of rocks in hand specimen.

SEMESTER III **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

III. <u>GENERIC ELECTIVE (GE 3)</u>

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	Pass Marks: Th ESE = 30 + Pr ESE =10

Instruction to Question Setter for

<u>End Semester Examination (ESE):</u>

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

FOSSILS & THEIR APPLICATIONS

Theory: 60 Lectures

Unit 1: Introduction to fossils

Definition of fossil, fossilization processes, modes of fossil preservation and uses.

Unit 2: Species concept

Definition of species, methods of description and naming of fossils.

Unit 3: Introduction to various fossils groups

Brief introduction of important fossils groups: morphology and geological history of Brachiopoda, Gastropoda and lamellibranchia

Important age diagnostic fossiliferous horizons of India.

Unit 4: Application of fossils

Application of fossils in the study of paleoecology, paleobiogeography and paleoclimate.

Unit 5: Societal importance of fossils

Implication of larger benthic and micropaleontology in hydrocarbon exploration: identification of reservoirs and their correlation.

Application of spore and pollens in correlation of coal seams.

Fossils as an indicator of pollution

Suggested Readings:

- Schoch, R.M. 1989. Stratigraphy, Principles and Methods. VanNostrand Reinhold.
- Clarkson, E.N.K.1998. Invertebrate Palaeontology and Evolution George AIlen & Unwin
- Prothero, D.R. 1998. Bringing fossils to life - An introduction to Palaeobiology, McGraw Hill.
- Benton, M.J. 2005. Vertebrate palaeontology (3rd edition). Blackwell Scientific, Oxford.
- Colbert's Evolution of the Vertebrates: A History of the Backboned Animals Through Time, Edwin H. Colbert, Michael Morales, Eli C. Minkoff, John Wiley & Sons, 1991.

GE 3 LAB: FOSSILS & THEIR APPLICATIONS 60 Lectures

Marks : 25 (Pr 3Hrs)=25	**Pass Marks: Pr ESE =10**

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

1. Study of fossils showing various modes of fossilization.
2. Distribution of diagnostic fossils in India.
3. Study of morphological characters of important Invertebrate fossils.
4. Drawing and labelling of important invertebrate fossils.

SEMESTER IV **GENERIC ELECTIVE** **1 Paper**

Total 100 x 1 = 100 Marks

IV. <u>GENERIC ELECTIVE (GE 4))</u>

(Credits: Theory-04, Practicals-02)

Marks : 75 (ESE: 3Hrs) + 25 (Pr 3Hrs)=100	Pass Marks: Th ESE = 30 + Pr ESE =10

Instruction to Question Setter for

<u>End Semester Examination (ESE):</u>

*There will be **two** group of questions. **Group A is compulsory** and will contain two questions. **Question No.1 will be very short answer type** consisting of ten questions of 1 mark each. **Question No.2 will be short answer type** of 5 marks. **Group B will contain descriptive type** six questions of fifteen marks each, out of which any four are to answer.*

***Note:** There may be subdivisions in each question asked in Theory Examinations.*

EARTH RESOURCES

Theory: 60 Lectures

Unit 1: Earth Resources

Definition: Mineral, Ore and Gangue, Tenor, Grade.
Introduction to Essential, Critical and Strategic minerals.
A brief overview of Classification of Mineral deposits with respect to processes of formation and mode of occurrences.

Unit 2: Definition of Energy

Primary and Secondary Energy.
Renewable and Non-Renewable Sources of Energy.
Environmental Dimension of Energy.

Unit 3: Major Types and Sources of Energy

Resources of Natural Oil and Gas.
Coal and Nuclear Minerals: Types and distribution.
Introduction to Hydroelectric Power, Solar Energy, Wind, Wave and Biomass based power and Energy

Unit 4: Groundwater resources and its management

Groundwater resources and its role in economic development of a country.
Rainwater harvesting and artificial recharge to groundwater.
Watershed management.

Suggested Readings:

- Energy and the Environment by Fowler, J.M 1984. McGraw-Hill
- Global Energy Perspectives by Nebojsa Nakicenovic 1998, Cambridge University Press.
- Energy Resources and Systems: Fundamentals and Non-Renewable Resources by Tushar K. Ghosh and M. A. Prelas. 2009, Springer
- Introduction to Wind Energy Systems: Hermann-Josef Wagner and Jyotirmay Mathur. 2009, Springer.
- Renewable Energy Conversion, Transmission and Storage. Bent Sorensen, 2007, Springer.

GE 4 LAB: ESSENTIALS OF GEOLOGY **60 Lectures**

Marks : 25 (Pr 3Hrs)=25	Pass Marks: Pr ESE =10

Instruction to Question Setter for

End Semester Practical Examination (ESE):

Distribution of Marks in Practical Examination:

Total = 25 Marks [Experiment = 15; Record = 5; Viva = 5]

Practicals:

1. Plotting of major Indian oil fields on map of India.
2. Plotting of major Indian coalfields on the map of India / Jharkhand.
3. Plotting of natural hazards on the map of India.
4. Megascopic study of important ore forming minerals.
