The Course structure of B.Sc. (Hons.) in Geology under Choice Based Credit System

FIRST YEAR- First Semester-Total 20 credits

In all eight questions of equal value (15 marks) will be set, out of which an examinee shall have to answer four questions. Question no. 1 will be compulsory, consisting of ten very short answer type questions, each of one and half (1.5) marks covering the entire syllabus.

**Paper -1, CORE 1 (Theory) –Crystallography** - 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .60 (University examination), Time – 3 hours. (Sessional – 15 marks)

**Crystallography**


**Paper -2, CORE 2 (Theory) Geomorphology, Mathematical Geology** - 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM – 60 + 15(Sessional)

**Geomorphology & Mathematical Geology**


**Paper 3, CORE 1 & 2 Practical, 2 Credits** (Teaching 4 hours per week and minimum 48 teaching hours). F.M. 40 + 10 (Sessional)

1. Study of toposheet,
2. Identification of drainage pattern in a topographic map
3. Calculation of Earthquake Epicentre with given data
4. Clinographic and stereographic projections of the following crystal models: Cube, octahedron, dodecahedron, zircon and vesuvianite.
5. Records of laboratory work and viva-voce.
Books recommended

1. A text book of Geology                                P.K.Mukherjee
2. Engineering & General Geology                        Pravin Singh
3. Geomorphology                                         P. Dayal
4. Principles of Physical Geology                        Holmes
5. A text book of Mineralogy                             E.S. Dana
6. Elements of crystallography and mineralogy            Wade & Mattox

Paper 4, Generic Elective (GE-1) Theory, 5 Credit, FM 75

Paper 5, Generic Elective (GE-1) Practical, 1 Credit, FM 25
Paper 6, Ability Enhancement Compulsory Course (AECC), English/MIL, 2 Credit, FM 25

Second Semester – Total 20 Credits

Paper 1, CORE 3 (Theory), Computer Application, General Geology & Physical Geology - 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Computer Application


General Geology & Physical Geology


Paper 2, CORE 4 (Theory) Optical mineralogy, Mineralogy - 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75
Optical mineralogy


Mineralogy


Paper 3, CORE 3 & 4 Practical, 2 Credits (Teaching 4 hours per week and minimum 48 teaching hours). F.M. 50

1. Megascopic study the following rock forming minerals: (common rock forming minerals)
   Quartz, orthoclase, talc, gypsum, calcite, fluorite, apatite, biotite, muscovite, corundum, topaz, tourmaline, beryl, garnet, hornblende, olivine.
2. Microscopic study of the following rock forming minerals - Quartz, orthoclase, plagioclase, microcline, olivine, biotite, muscovite, tourmaline, hornblende and hypersthenes
3. Sign determination of uniaxial minerals
4. Determination of composition of Plagioclase feldspar
5. Pleochroic scheme of biotite
6. Records of laboratory work and viva-voce.

Books recommended

1. Geomorphology P.Dayal
2. Principles of Physical Geology Holmes
3. Rutley’s Mineralogy H.H.read
4. Optical Mineralogy Phillips
5. An introduction to rock forming minerals Deer, Howie and Zusman

Paper 4, Generic Elective (GE-2) Theory, 5 Credit, FM 75

Paper 5, Generic Elective (GE-2) Practical, 1 Credit, FM 25

Paper 6, Ability Enhancement Compulsory Course (AECC), Environmental Science, 2 Credit, FM 25
SECON D YEAR- Third Semester-Total 26 Credits

FM .75, Time – 3 hours.

In all eight question of equal value (15 marks) will be set, out of which an examinee shall have to answer four questions. Question no. 1 will be compulsory, consisting of ten very short answer type questions, each of one and half (1.5) marks covering the entire syllabus.

Paper 1, CORE 5 (Theory) – Igneous Petrology-5 Credits (Teaching 5 hours per week and minimum 60 teaching hours).

Igneous Petrology


Paper 2, CORE 6 (Theory) – Sedimentary Petrology-5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Sedimentary Petrology


Paper 3, CORE7 (Theory) – Metamorphic Petrology-5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Metamorphic Petrology

Paper 4, CORE 5, 6 & 7 Practical, 3 Credits (Teaching 6 hours per week and minimum 72 teaching hours). F.M. 75

1. Megasscopic study of important igneous, sedimentary and metamorphic rocks.
2. Microscopic study of common igneous, sedimentary and metamorphic rocks.
3. Geological field work for 7 days
4. Practical records and viva-voce

Books Recommended

1. The Principles of Petrology - G.W.Tyrrell
2. Petrology - Ehlers and Blatt
3. Petrology of igneous rocks - Hatch and Wells
5. Igneous and metamorphic Petrology - Best

5. Paper 5, Generic Elective (GE-3) Theory, 5 Credit, FM 75

6. Paper 5, Generic Elective (GE-3) Practical, 1 Credit, FM 25

7. Paper 7. Skill Enhancement Course (SEC-1), 2 Credits, FM 25

Skill Enhancement Course -Gemology


Fourth Semester-Total 26 Credits

Paper 1, CORE 8 (Theory) – Structural Geology -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Structural Geology

Concept of dip and strike. Clinometer and Brunton compass. Basic concepts of planar and linear structures. Folds- their classification and recognition. Faults- their classification and recognition. Unconformity and related structures such as offlap, overlap, outlier and inlier. Joints and their types.
Paper 2, CORE 9 (Theory) – Stratigraphy -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Stratigraphy

Principles of stratigraphy and stratigraphic correlation. Geological time scale. Classification, lithological characteristics, fossil contents and economic importance of the following: Precambrian of Singhbhum, Cuddapah Supergroup of cuddapah Basin, Vindhyan Supergroup of Central India, Gondwana sequence of India with special reference to coal bearing formations, Deccan Trap and Tertiary of Assam.

Paper 3, CORE 10 (Theory) – Paleontology -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Paleontology


Paper 4, CORE 8, 9&10 Practical, 3 Credits (Teaching 6 hours per week and minimum 72 teaching hours). F.M. 75

1. Drawing of geological cross section of important geological maps.
2. Structural problems related to dip and strike.
3. Identification of important invertebrate and plant fossils.
4. Plotting of important Geological formations on the political map of India
5. Records and Viva-voce

Paper 5, Generic Elective (GE-3) Theory , 5 Credit, FM 75

Paper 6, Generic Elective (GE-3) Practical, 1 Credit, FM 25

Paper 7. Skill Enhancement Course (SEC-2), 2 Credits, FM 25

Skill Enhancement Course –Survey and mapping


Books Recommended

1. A guide to field geology-N W Gokhale
2. Structural Geology - M.P. Billings
3. Theory of Structural Geology - N.W. Gokhale
4. Structural Geology of Rocks & Regions - Davis
5. Structural Geology - S.K. Ghosh
6. Geology of India & Burma - M.S.Krishnan
7. Principle of Historical Geology - Ravindra Kumar
8. Invertebrate Palaeontology - Woods
9. Principles of Palaeontology - Raup and Stanley

THIRD YEAR -Fifth Semester-Total 24 Credits

In all eight question of equal value (15 marks) will be set, out of which an examinee shall have to answer four questions. Question no. 1 will be compulsory, consisting of ten very short answer type questions, each of one and half (1.5) marks covering the entire syllabus.

Paper 1, CORE 11 (Theory) – Hydrogeology -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Hydrogeology


Paper 2, CORE 12 (Theory) – Environmental Geology -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Environmental Geology

Definition and concept of environmental geology. Processes of soil formation, types of soil, soil degradation and mitigation. Environmental changes due to the influence of geological events and anthropogenic activities. Environmental degradation due to mining and related activities and remedies. Water and air pollution.

Paper 3, CORE 11 & 12 Practical, 2 Credits (Teaching 4 hours per week and minimum 64 teaching hours). F.M. 50

1. Hydrological properties of rocks.
2. Preparation of hydrographs  
3. Hydrological properties of Gondwana rocks of Jharkhand  
4. Hydrological properties of Lower Vindhyan rocks of Jharkhand  
5. Plotting of Ground water provinces of India on the political map of India  
6. Record and viva-voce  

**Paper 4, Discipline Specific Elective (DSE)-1, Field Geology, 5 Credits** (Teaching 5 hours per week and minimum 60 teaching hours). F.M. 75  

**Field Geology**  
General idea of field geology and its importance. Equipments and materials required during field work. Clinometer and Brunton Compass. Interpretation of topographic and geological maps. Methods of sampling.  

**Paper 5, Discipline Specific Elective (DSE)-2, Mineral Exploration, 5 Credits** (Teaching 5 hours per week and minimum 60 teaching hours). F.M. 75  

**Mineral Exploration**  

**Books recommended**  
1. Field Geology - Lahee  
2. Hydrogeology - D.K.Todd  
3. Environmental Geology - Keller  
4. Economic Mineral Deposits - Jensen and Bateman  
6. Economic Geology - Umeshwar Prasad  
7. Mineral Resources of India - D.K.Banerjee  
8. Field Geology - Lahee  
9. Geophysical Exploration and Mapping - T.S.Ramakrishna  

**Paper 6, Discipline Specific Elective (DSE)-Practical of DSE -1 &2, 2 Credits** (Teaching 4 hours per week and minimum 64 teaching hours). F.M. 50  

1. Measurement of Forward Bearing and Backward Bearing by Brunton Compass and Clinometer Compass  
2. Bore hole problems
3. Determination of dip and strike
4. Completion of outcrop form partial outcrop
5. Record and viva-voce

Sixth Semester - Total 24 Credits

Paper 1, CORE 13 (Theory) – *Engineering Geology* -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

**Engineering Geology**

Geological considerations in the selection of sites of dams and associate reservoir, tunnels and bridges. Assessment and management of land sliding in the hilly areas. Slope failure.

Paper 2, CORE 14 (Theory) – *Economic Geology* -5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). FM .75

Definition of ore, ore minerals, gangue minerals, tenor of ore, mineral reserves and mineral resources. Processes of formation of mineral deposits with special reference to Magmatic concentration, Hydrothermal processes, Supergene sulphide enrichment and Mechanical concentration. Study of physical properties, chemical composition and uses of following minerals: Galena, Sphalerite, Chromite, Graphite, Asbestos, Kyanite, Sillimanite, Cassiterite, Baryl, Barite, Uraninite, Monazite.

Paper 3, CORE 13 &14 Practical, 2 Credits (Teaching 4 hours per week and minimum 64 teaching hours). F.M. 50

1. Identification and uses of important ores and industrial minerals.
2. Study of geological map for identification of dam establishment
3. Field work of at least one week duration in a geologically important area.
4. Records of laboratory work and viva-voce

Paper 4, Discipline Specific Elective (DSE)-3, *Photo Geology*, 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). F.M. 75

**Photo Geology**

Paper 5, Discipline Specific Elective (DSE)-4, Indian Mineral Deposit, 5 Credits (Teaching 5 hours per week and minimum 60 teaching hours). F.M. 75

A detailed study of the following economic mineral deposits of India with reference to their ores, genesis, mode of occurrence and geographical distribution: Iron ores, Copper ores, Aluminium ores, Manganese ores and Mica deposits, kyanite deposits, china clay. Study of Coal, Petroleum and Radioactive minerals of India.

Paper 6, Discipline Specific Elective (DSE)-Practical of DSE -3 & 4, 2 Credits (Teaching 4 hours per week and minimum 64 teaching hours). F.M. 50

1. Visual interpretation of aerial photographs and satellite images.
2. Determination of scale of the photographs and images.
3. Height measurement using parallax bar.
4. Plotting of important Geological formations containing ores on the political map of India
5. Record and viva-voce

Books Recommended
1. Economic Mineral Deposits - Jensen and Bateman
3. Economic Geology - Umeshwar Prasad
4. Principles and Applications of Photogeology - S.N. Pandey

Syllabus of Generic Elective (G.E.)

SEMESTER I

In all eight question of equal value (15 marks) will be set, out of which an examinee shall have to answer four questions. Question no. 1 will be compulsory, consisting of ten very short answer type questions, each of one and half (1.5) marks covering the entire syllabus.

Generic Elective (GE-I) Theory, Physical Geology, Structural, Crystallography, 5 Credits FM 75


**Generic Elective (GE-I) Practical, 1 Credit, FM 25**
1. Crystal drawing of the following forms- cube, Octahedron, Rhomb- dodecahedron
2. Study of simple geological maps from No 1 to 8 involving simple Dip, Fold, Fault and Unconformity, Drawing of geological sections and detailed geological description.
3. Record and viva-voce

**SEMESTER II**

**Generic Elective (GE-2) Theory, Optical Mineralogy, Descriptive mineralogy, Sedimentology, 5 Credits, FM 75**


2. Descriptive Mineralogy-

   Minerals- its definitions, and physical properties such as Form, Structure, colour, streak, Lustre, Hardness, specific gravity, Cleavage, Fracture. Mineralogy of important groups of rock forming minerals-Feldspar, Amphibole and Pyroxene.


**Generic Elective (GE-2) Practical, 1 Credit, FM 25**
1. Megascopic identification of following rocks: Sandstone, Conglomerate, Breccia, Limestone, Shale
2. Identification of minerals in hand specimen-Quartz, Orthoclase, Biotite, Muscovite, Beryl, Gypsum, Talc, calcite etc.
3. Record and viva-voce
SEMESTER III

Generic Elective (GE-3) Theory, Igneous Petrology, Metamorphic Petrology, Economic Geology, 5 Credits, FM 75

1. Igneous Petrology- Magma, nature, composition and origin. Structure, texture, and classification of igneous rocks.

Generic Elective (GE-3) Practical, 1 Credit, FM 25

1. Megascopic identification of following rocks: Granite, Pegmatite, Rhyolite, Basalt, Dolerite, Gneiss, schist, Marble.
3. Record and Viva-voce

SEMESTER IV

Generic Elective (GE-4) Theory, Stratigraphy, Paleontology, 5 Credits, FM 75


Generic Elective (GE-4) Practical, 1 Credit, FM 25

1. Identification of important invertebrate and plant fossils.
2. Field visit for seven days in any sedimentary basin of Jharkhand
3. Record and Viva—voce