SYLLABUS FOR

B.Sc. GEOLOGY

( SEMESTER PATTERN )

( For Candidates admitted in the Colleges affiliated to Periyar University from 2017-2018 onwards )
REGULATIONS

1. ELIGIBILITY

Candidates for admission to the first year of the Degree of Bachelor of science under Branch. VII – Geology course are required to have passed the Higher Secondary Examination (Academic Stream) conducted by the Government of Tamil Nadu or an examination as equivalent to 10 +2 courses including CBSE, which have been recognized by the Periyar University.

The candidate for admission to the Branch VII - Geology shall have passed the qualifying Examination with the subjects under any one of the following groups.

Group – I (Maths, Physics, Chemistry and Computer Science) Group – II (Maths, Physics, Chemistry and Biology)

Group – III (Physics, Chemistry, Zoology and Botany)

For admission of students in the Government/Aided/ Unaided Colleges of Arts and Science, guidelines issued by the Director of Collegiate Education, Chennai – 6 may be followed.

2. DURATION OF THE COURSE

The course for the degree of Bachelor of Science shall consist of three years divided into six semesters with internal assessment under choice based credit system.

3. COURSE OF STUDY

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

4. SEMESTER

1. Language -I (Tamil etc)
2. English -I
3. Core Geology Paper-I Physical Geology and Geodynamics
4. Allied Chemistry Paper –I or Allied Maths Paper -I
5. Skill Based Elective Courses-I
6. Value education

II. SEMESTER

7. Language -II (Tamil etc)
B.Sc. GEOLOGY

8. English –II
9. Core Geology Paper-II Geomorphology and Structural Geology
10. Core Geology Practical Paper-I* Structural Geology and Surveying
11. Allied Chemistry Paper-II or Allied Maths Paper -II
12. Allied Chemistry Practical Paper-I* or Allied Maths Paper -III
13. Skill based Elective Course -II
14. Environmental Studies

III. SEMESTER
15. Language -III (Tamil etc)
16. English -III
17. Core Geology Paper-III Palaeontology
19. Skill based Elective Course –III
20. Non -Major Elective Course –I

IV. SEMESTER
21. Language -IV (Tamil etc)
22. English -IV
23. Core Geology Paper-IV Stratigraphy
24. Core Geology Practical Paper-II Palaeontology and Stratigraphy
25. Allied Physics Paper–II
26. Allied Physics Practical Paper- I*
27. Skill based Elective Course –IV
28. Non -Major Elective Course -II

V. SEMESTER
29. Core Geology Paper - V Crystallography
30. Core Geology Paper - VI Mineralogy
31. Core Geology Paper - VII Igneous Petrology
32. Core Geology Paper - VIII Sedimentary and Metamorphic Petrology
33. Skill based Elective Course - V
34. Skill based Elective Course - VI
35. Non-Major Elective Course - III

VI. SEMESTER

36. Core Geology Paper - IX Economic Geology
37. Core Geology Paper - X Photogeology and Remote Sensing
38. Core Geology Paper - XI Mining and Engineering Geology
39. Core Geology Paper - XII Hydrogeology and Environmental Geology
40. Core Geology Practical Paper - III* Crystallography and Mineralogy
41. Core Geology Practical Paper - IV* Economic Geology and Petrology
42. Skill based Elective Course - VII

List of Skill Based Elective Courses

1. Principles of Surveying
2. Remote Sensing and GIS
3. Cartography
4. Field Hydrogeology and Techniques
5. Geostatistics and Computer Applications
6. Gemology and Gemstone Evaluation
7. Granite exploration and exploitation
8. Mines and Minerals Legislation of India
9. Introduction to Geoinstrumentation
List of Compulsory Courses

1. Value Education
2. Environmental Studies
3. Extension Activities (NSS, NCC, YRC, RRC, Green Club,)

4. Examinations

The theory examination shall be three hours duration to each paper at the end of each semester. The candidates failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examination.
5. SCHEME OF EXAMINATION

The scheme of examination of a different semester shall be as follows.

**B.Sc GEOLOGY Course Structure under CBCS**
(For candidates admitted from the academic Year 2017-2018 onwards)

<table>
<thead>
<tr>
<th>Part</th>
<th>Subject Title</th>
<th>Instructional Hrs / Week</th>
<th>Exam Hrs.</th>
<th>Credits</th>
<th>University Examination</th>
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* - Examinations will be at the end of II semester

II SEMESTER

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* - Continued from I semester and Examinations will be at the end of II semester

Total Credit for I and II Semester = 45 credits
Total Marks for I and II Semester = 1400 Marks
### III SEMESTER

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* - Examinations will be at the end of IV semester

### IV SEMESTER

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* - Continued from III semester and Examinations will be at the end of IV semester

Total Credit for III and IV Semester = 45 credits

Total Marks for III and IV Semester = 1400 Marks
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* - Examinations will be at the end of VI semester

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* - Continued from III semester and Examinations will be at the end of VI semester

Total credit for V and VI semester = 50 Credits

Total Marks for V and VI Semester = 1400 Marks

Total credit for 3 years = 140 Credits

Total Marks for 3 years = 4200 Marks
6. Question Paper pattern for Examination

Time: 3 Hrs.         Max. Marks – 75

Part A: 10 x 2 = 20 Marks
(Answer all Questions) (Two questions from each unit)

Part B: 5 x 5 = 25 Marks
(Answer all Questions)
(One question from each unit with internal choice)

Part C: 3 x 10 = 30 Marks
(Answer any three Questions out of five)
(One question from each unit)

7. Passing Minimum

Theory:

IA: 25 marks

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<th>Passing Minimum</th>
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<td>Assignment</td>
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Practical

IA: 25 marks

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<tr>
<td>Collections Report</td>
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8. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed in First Class. All other successful candidates shall be declared to have passed in Second Class. Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed in First Class with Distinction provide they pass all the examinations prescribed for the course at first appearance.

Candidates who pass all the examinations prescribed for the course in the first attempt and within a period of three academic years from the year of admission to the course alone are eligible for University Ranking.

Evaluation of Credits

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\[
GP = \frac{(\text{Marks obtained in course} \times \text{credit})}{100}
\]

\[
GPA = \frac{\text{Total Grade Points earned in a semester}}{\text{Total Credits Registered in a Semester}}
\]

\[
GPPA = \frac{\text{Sum of Grade Points earned}}{\text{Sum of Credits Registered}}
\]

Classification

<table>
<thead>
<tr>
<th>CGPA</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>9 and above</td>
<td>I Class with Distinction</td>
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<tr>
<td>between 7 and 8.9</td>
<td>I Class</td>
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<tr>
<td>between 5 and 6.9</td>
<td>II Class</td>
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</tbody>
</table>

The above classification shall be given for over all performance including Non – Major Electives and Skill based Courses. i.e., For Performance in the Part III only.
B.Sc. GEOLOGY

9. MAXIMUM DURATION FOR THE COMPLETION OF UG PROGRAM

The maximum duration for the completion of UG Program shall not exceed twelve semesters.

10. COMMENCEMENT OF THIS REGULATION

These regulations shall take effect from the academic year 2017 - 2018 and thereafter.

11. TRANSITORY PROVISION

Candidates who were admitted to the UG course of study before 2017 - 2018 shall be permitted to appear for the examinations under those regulations for a period for three years i.e. up to and inclusive of the examination of April/May 2020. Thereafter they will be permitted to appear only under regulations then in force.
### Subject and Subject codes:

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subject</th>
<th>Paper Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Paper-I</td>
<td>Physical Geology and Geodynamics</td>
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<tr>
<td>Core Paper -II</td>
<td>Geomorphology and Structural Geology</td>
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<tr>
<td>Core Paper-III</td>
<td>Palaeontology</td>
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<tr>
<td>Core Paper IV</td>
<td>Stratigraphy</td>
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<tr>
<td>Core Paper V</td>
<td>Crystallography</td>
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<tr>
<td>Core Paper VI</td>
<td>Mineralogy</td>
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<tr>
<td>Core Paper VII</td>
<td>Igneous Petrology</td>
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<td>Core Paper VIII</td>
<td>Sedimentary and Metamorphic Petrology</td>
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<td>Core Paper IX</td>
<td>Economic Geology</td>
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<td>Core Paper X</td>
<td>Photogeology and Remote Sensing</td>
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<tr>
<td>Core Paper XI</td>
<td>Mining and Engineering Geology</td>
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<tr>
<td>Core Paper XII</td>
<td>Hydrogeology and Environmental Geology</td>
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<tr>
<td>Core Practical I</td>
<td>Structural Geology and Surveying</td>
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<tr>
<td>Core Practical II</td>
<td>Palaeontology and Stratigraphy</td>
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<tr>
<td>Core Practical III</td>
<td>Crystallography and Mineralogy</td>
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<tr>
<td>Core Practical IV</td>
<td>Economic Geology and Petrology</td>
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<tr>
<td><strong>Skill based Elective courses</strong></td>
<td><strong>List of courses</strong></td>
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<tr>
<td></td>
<td>1. Principles of Surveying</td>
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<td>2. Remote Sensing and GIS</td>
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<td>3. Cartography</td>
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<td>4. Field Hydrogeology and Techniques</td>
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<td>5. Geostatistics and Computer Applications</td>
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<td>6. Gemology and Gemstone Evaluation</td>
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<td>7. Granite Exploration and Exploitation</td>
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</table>
### Allied Geology Papers

<table>
<thead>
<tr>
<th>Subject Paper</th>
<th>Paper Code</th>
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<tbody>
<tr>
<td>Allied Geology Paper I</td>
<td></td>
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<tr>
<td>Allied Geology Paper II</td>
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<tr>
<td>Allied Geology Practical I</td>
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</tbody>
</table>
B.SC. GEOLOGY

SEMESTER-I

CORE I - PHYSICAL GEOLOGY AND GEODYNAMICS

Unit – I


Unit – II


Unit – III


Unit – IV

Dynamic Earth: Isostasy, Orogeny and Epeirogeny. origin and evolution of oceans, Geosynclines, Profile of continental margins, Island arcs. Sub Marine Topography features, Principles of Geodesy, neotectonics

Unit – V

Continental Drift, Sea floor spreading theory and evidences: Plate Tectonics. oceanic trenches, volcanic arcs, mid-ocean ridges, Palaeomagnetism and its application, Raised beach, River terraces, river meandering.
B.Sc. GEOLOGY

TEXT BOOKS

REFERENCE BOOKS
B.SC. GEOLOGY

SEMESTER II

CORE II - GEOMORPHOLOGY AND STRUCTURAL GEOLOGY

Unit I

Unit II

Unit III
Landforms produced due to erosion and deposition with reference to: Glaciers, Winds, and Waves. Uplift – subsidence pattern in coastal areas, Applied Geomorphology: Application in various fields of earth sciences Mineral prospecting, Geohydrology, Civil Engineering and Environmental studies, Geomorphology of India

Unit IV

Unit V
Shear Zones: Brittle and ductile shear zones, geometry and products of shear zones; Mylonites and cataclasites, their origin and significance. Time relationship between crystallization and deformation. Unconformities and basement-cover relations. Structural behaviour of igneous plutons, diapirs and salt domes. Introduction to petrofabric analysis.
B.Sc.GEOLOGY

GEOMORPHOLOGY

TEXT / REFERENCES BOOKS

   N.Y.
   landscapes. Cambridge University Press.

STRUCTURAL GEOLOGY

TEXT BOOKS:


REFERENCE BOOKS

1. V.V. Belousov-Structural Geology, Moscow
4. Park, P.G.-Fundamentals of structural Geology, John Willey & sons,
B.SC. GEOLOGY

SEMESTER II

PRACTICAL I - STRUCTURAL GEOLOGY AND SURVEYING

STRUCTURAL GEOLOGY:

Contour maps and their interpretation. Exercises to predict trends of the outcrop of Horizontal, vertical an incline beds with respect to topography – reading of solid conformable maps – deciphering dip and strike of outcrops – construction of map when three points over a bedding plane are given - construction of vertical sections order of superposition – vertical thickness of formations.

Reading of solid fold and fault maps construction of vertical sections – Determination of throw of vertical faults. Reading of unconformable solid maps – construction of sections. Reading of solid maps of areas when more than one structure is involved – determination of comparative ages of structures and intrusions – geological history.

Structural Problems – problems relating to true dip and apparent dip; Determination of vertical and true thickness.

Description of features in Survey of India's (SOI) toposheet: Extra marginal, marginal, intramarginal information, major conventional signs and symbols, physical and socio-cultural features

SURVEYING

Chain survey – prismatic compass survey – plane table survey – leveling. Clinometer Compass and Brunton Compass:-To find out dip and strike of the beds. GPS:- Fundamentals and applications.
Unit I


Unit II


Unit III


Unit IV


Unit V

of Devonian fishes, Mesozoic Reptiles, Siwalik mammals. General classification of plant kingdom –
plant fossils from India – A brief account of the following plant fossils :- Glossopteris, Gangamopteris,
Ptilophyllum, Calamites, Lepidodendron and Sigillaria. Applications of Micro palaeontology

TEXT BOOKS

REFERENCE BOOKS
   publication Easton - Invertebrate Paleontology
B.Sc. GEOLOGY

B.Sc. GEOLOGY

SEMESTER-IV

CORE : IV - STRATIGRAPHY

Unit I


Unit II


Unit III

Paleozoic Stratigraphy: Distribution of Paleozoic rocks in India, Cambrian of Salt Range, Age of Saline Series, Upper Carboniferous and Permian rocks of Salt Range, Paleozoic rocks of Kashmir Valley, Paleozoic rocks of Spiti Valley, Paleozoic rocks of Peninsular India.

Unit IV


Unit V

Cenozoic Stratigraphy: Comprehensive account of the geological events took place during Cenozoic era in India, rise of Himalayas, stratigraphy of Siwalik system, fauna and flora of Siwaliks, Tertiary rocks of Assam, Karewa formation, Tertiary rocks of Tamilnadu, Tertiary rocks of Kerala, Pleistocene Glaciation - Mineral wealth of Tertiary rocks of India.
TEXTBOOKS
3. Ravindrakumar K.R. - Stratigraphy of India.

REFERENCE BOOKS

MICRO FOSSILS
Lagena, Nodosaria, Textularia, Operculina, Elphidium, Ammonia.

DIAGRAMS
Paradoxides, Pentremites, Trigonia, Arca, Meretrix, Murex, Turritella, Nautilus, Spirifer.

Stratigraphy: Arranging the different Indian Stratigraphic horizons in accordance with age, Stratigraphic position, fossil content and order of superposition.
B.SC. GEOLOGY

SEMESTER-V

CORE V - CRYSTALLOGRAPHY

Unit I


Unit II

Classification of crystals into systems and classes - Holohedral, Hemihedral, Hemimorphic and Enantiomorphic forms in crystals. Elementary knowledge of spherical and stereographic projections. study of the symmetry elements, and forms of the Normal, pyritohedral, tetrahedral and plagiohedral classes of cubic system with special reference to well developed crystals of Galena, Spinel, Garnet, Flourite, Diamond, Pyrite, Tetrahedrite, Boracite and cuprite.

Unit III

Study of symmetry elements and forms of Normal, Hemimorphic, Tripyramidal, Pyramidal Hemimorphic, Sphenoidal and Trapezohedral classes of Tetragonal system with special reference to well developed crystals of Zircon, Rutile, Cassiterite, Vesuvianite, Apophyllite, Shellite, Melonite, Wulfenite and Chalcopyrite.

Unit IV

Study of the symmetry elements and forms of Normal, Hemimorphic Tripyramidal, pyramidal Hemimorphic, Trapezohedral, Rhombohedral, Rhombohedral Hemimorphic, Trirhombohedral and Trapezohedral classes of Hexagonal system with special reference to well developed crystals of Beryl, Zincite, Apatite, Calcite, Corundum, Tourmaline, Phenacite and Quartz. Study of the symmetry elements and forms of the Normal, Hemimorphic and Sphenoidal classes of Orthorhombicsystem with special reference to well developed crystals of Barite, olivine topaz, staurolite, Sulphur, Calamine, Struvite and Epsomite.

Unit V

B.Sc. GEOLOGY

(spinel law), Pyrite (iron cross twin), Rutile (geniculate), Calcite, Quartz (Brazil law), Aragonite (mimetic twin), Staurolite (cruciform), Gypsum, Augite and Feldspars (Carlsbad, Baveno, Manebach, Albite and Pericline).

TEXT BOOKS


REFERENCE BOOKS

B.SC. GEOLOGY
SEMESTER-V
CORE VI - MINERALOGY

Unit I

Unit II
Mineralogy, structure, chemical composition, optical and physical properties, modes of occurrence and industrial uses of the following group of minerals: Quartz - Feldspar - Feldspathoid - Zeolite.

Unit III
Mineralogy, structure, chemical composition, optical and physical properties, modes of occurrence and industrial uses of the following group of minerals: Pyroxene – Amphibole – Mica - Olivine - Garnet.

Unit IV
Physical and optical properties, chemical composition, uses and modes of occurrence of the following minerals: Epidote, Chlorite, Scapolite, Cordierite, Talc, Serpentine, Steatite, Calcite, Dolomite, Andalusite, Kyanite, Sillimanite, Topaz, Staurolite, Beryl, Tourmaline, Wollastonite, Fluorite, Apatite, Zircon, Rutile, Sphene and Corundum. Unit V
Mineralogy, mode of occurrence, uses and distribution in India of the minerals required for the following industries: Abrasives, Fertilizer, Paint, Refractory, Glass, Ceramic and Cement - Mineral wealth of Tamil Nadu.

REFERENCES AND TEXTBOOKS
B.SC. GEOLOGY

SEMESTER-V

Core VII - IGNEOUS PETROLOGY

Unit I
Definition of Petrology – Earth zones. Composition and constitution of magmas – Primary and Parental Magmas. Forms of Intrusive igneous rocks: Concordant forms - Sill, Laccolith, Lopolith and Phacolith, Discordant forms - Dykes, Cone Sheets, Volcanic neck, Ring dyke, Batholiths, Stocks, Bosses and Psymaliths. Forms of Extrusive igneous rocks: Lava flows, Pyroclastic deposits - Agglomerate, Lapilli, volcanic ash and volcanic froth

Unit II

Unit III

Unit IV
Texture, Mineralogy, Classification, and Modes of occurrence of: Granite, Granodiorite, Syenite, Diorite, Gabbro, their hypabyssal and volcanic equivalents. Petrographic characters, distribution in India and origin of Pegmatites, Lamprophyres, Alkaline rocks, Dunite, Peridotite and Anorthosites.

Unit V
REFERENCE AND TEXTBOOKS

6. Hatch, F.H. Wells, A.K. (1949), Petrology of Igneous Rocks, Thomas Murby & Wells,
B.SC. GEOLOGY

SEMESTER-V

Core VIII - SEDIMENTARY AND METAMORPHIC PETROLOGY

Unit I


Unit II


Unit III


Unit IV


Unit V

REFERENCE AND TEXTBOOKS

2. Huang, W.T. - Petrology, MC Graw Hill
4. Harker, A. - Petrology for Students, Cambridge,
Core IX - ECONOMIC GEOLOGY

Unit I


Unit II


Unit III


Unit IV

Diagnostic physical properties, chemical composition, uses, modes of occurrence and distribution in India of the following economic minerals. Graphite, Realgar, Orpiment, Stibinite, Molybdenite, Cinnabar, Anglesite, Barite, Gypsum, Celestite, Corundum, Ochre, Ilmenite, Chromite, Franklinite, Cassiterite, Magnesite, Cerussite, Halite, Fluorite, Phosphatic Nodule, Monazite, Wollastonite, Colembite, Tantalite, Samarskite, Asbestos, Steatite and Vermiculite. Mineralogy, mode of occurrence, uses and distribution in India of the following precious metals and minerals. Gold deposits – Gem stones. Character, distribution and mode of occurrence of structural and building materials.
Unit V

Mineralogy, mode of occurrences, uses and distribution in India of the following metalliferous deposits – Iron, Manganese, aluminium, copper, lead, Zinc – chromium. Fossil fuels – coal – uses, classification, constitution, origin and distribution in India. Petroleum- composition, uses, theories of origin, oil traps, and important oil fields of India.

TEXT BOOKS AND REFERENCE BOOKS

B.Sc. GEOLOGY

B.SC. GEOLOGY
SEMESTER-VI
CORE X - PHOTOGEOLOGY AND REMOTE SENSING

Unit I

Unit II
Types of remote sensing: based on 1) Energy sources: active and passive. 2) Platforms: aerial and satellite and 3) Sensors: optical, thermal, and microwaves. 4) RADAR. Aerial remote sensing: Types of Aerial Photographs: vertical and oblique. Scale of aerial photographs – flight procedures. Stereoscopes: pocket and mirror stereoscopes.

Unit III

Unit IV

Unit V
A short account of the remote sensing techniques in the study of drainage patterns, major land forms, geological structures. Groundwater exploration and mineral exploration.

REFERENCE AND TEXTBOOKS
B.SC. GEOLOGY

SEMESTER-VI

CORE XI - MINING AND ENGINEERING GEOLOGY

Unit I


Unit II


Unit III


Unit IV

Unit V

Tunnels: definition, parts of a tunnel, types, tunnelling in hard and soft rocks, geological investigations, and groundwater conditions. Foundations: definition, geological investigations, and ground water problems. Outline of support structures: rods, bolts, anchors, arches, rings, linings, and retaining walls.

TEXT BOOK AND REFERENCE BOOKS

2. Mckinstry- Mining Geology.

REFERENCE AND TEXT BOOKS

B.SC. GEOLOGY

SEMESTER-VI

CORE XII - HYDROGEOLOGY AND ENVIRONMENTAL GEOLOGY

Unit I

Unit II

Unit III

Unit IV
B.Sc. GEOLOGY

Earthquake risk and Earthquake prediction - Earthquake warning system. Volcanic activity - Volcanic Hazards, Forecasting volcanic activity. Landslides: Human use Landslide - Minimising the Landslide Hazards - Perception of Landslides.

Unit V


REFERENCE AND TEXTBOOKS


REFERENCES AND TEXTBOOKS

CRystallography and Mineralogy

Crystallography Crystal Models


Simple Twin Models

Galena, Fluorite, Pyrite, Rutile, Calcite, Quartz, Staurolite, Gypsum, Augite, Orthoclase, Albite.

Mineralogy

Megascopic Mineralogy:


Microscopic Mineralogy:

Description of optical properties and their identification of the following minerals: Quartz, Orthoclase, Microcline, Albite, Labradorite, Nepheline, Leucite, Enstatite, Hypersthene, Augite, Diopside, Hornblende, Glaucophane, Biotite, Muscovite, Olivine, Epidote, Garnet, Apatite, Zircon, Sphene, Tourmaline, Calcite, Andalusite, Kyanite, Sillimanite, Staurolite, Cordierite.

BLOW PIPE:

Identification of the following mineral powders by simple blow pipe tests: Apatite, Barite, Calcite, Celestite, Cerusite, chalcopyrite, Galena, Gypsum, Chromite, Haematite, Magnesite, Magnetite, Psilomelane, Pyrolusite, Siderite, Sphalerite, Strontianite, Witherite, Stibnite, Ilmenite and Wolframite.
Megascopic identification and description, Indian occurrences and uses of the following ore and industrial Minerals: Realgar, Orpiment, Stibnite, Molybdenite, Galena, Sphalerite, Cinnabar, Covelite, Bornite, Chalcophyrite, Pyrite, Arsenopyrite, Marcasite, Barite, Celestite, Gypsum, Cuprite, Zincite, Corundum, Hematite, Ilmenite, Magnetite, Chromite, Franklinite, Cassiterite, Rutile, Pyrolusite, Psilomelane, Goethite, Limonite, Bauxite, Calcite, Dolomite, Magnesite, Siderite, Aragonite, Witherite, Strontionite, Cerussite, Azurite, Malachite, Chrysocolla, Columbite, Halite, Fluorite, Phosphatic Nodule, Monazite, Graphite, Coal and its varieties.

PETROLOGY


B.Sc. Geology

List of Skill Based Elective Courses

Paper I - Principles of Surveying

Unit I
Surveying - Definition - Scope and content - types of surveying - Area measurement - Height determination - Advantages of survey.

Unit II
Chain survey - Accessibility - FMB - Methods of chain survey - Triangulation - Open and Closed traverse - Plotting of chain survey and results.

Unit III
Prismatic compass - Parts of prismatic compass - Accessories - Traverse - Plotting of prismatic compass - Errors and its corrections - Bowditch's method of correction - calculation of bearings from included angles.

Unit IV

Unit V
Height measurement - Determination of height - by Dumpy level - Parts of Dumpy level - Methods of dumpy level survey - Height measurement by Indian Clinometer and Abney level.

Reference Books
1. Lekh Raj & Raghunandan Singh - Map work and practical geography.
2. Jayachandran - Practical geography.
LIST OF SKILL BASED ELECTIVE COURSES

PAPER II - REMOTE SENSING AND GIS

Unit I


Unit II


Unit III

Fundamentals of Aerial Remote Sensing: Components of Aerial Camera, Types of Aerial Photographs, Marginal Information of Aerial Photographs, elements of Photo Interpretation.

Unit IV


Unit V

Geographical Information Systems (GIS) Meaning- Developments-Raster and Vector data-Data integration-Global positioning system (GPS) Advantages and Limitations of GIS and GPS.

REFERENCE BOOKS

B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER III - CARTOGRAPHY

Unit I


Unit II


Unit III

Symbolization: Types of Cartographic symbols - Point, line, and Area symbols - Qualitative and Quantitative data generalization.

Unit IV

Map Design and Layout: General design problems - Principles of Cartographic design and design of map symbols - Lettering - Lettering methods, Positioning of letters - Geographical names.

Unit V


REFERENCE BOOKS

1. Misra R.P. and A.P. Ramesh - Fundamentals of Cartography
2. Robinson - Elements of Cartography
4. Raiz - Principles of Cartography.
B.Sc. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER IV - FIELD HYDROGEOLOGY AND TECHNIQUES

Unit –I

Importance of Hydrology – Difference between Hydrogeology and Hydrology, Water bearing geologic formations. Ground water provinces of Tamil Nadu. Collection of rain fall data. Short account on Thiessen Polygon isohyetal maps.

Unit –II

Hydrogeologic parameters: Calculation of Porosity and Permeability, Pumptest data, calculation of ground water fluctuations.

Unit – III

Wells – Well inventory survey: water level, water level fluctuation, subsurface layers (Soil thickness, weathered zone, Fractured zone, Bed rock) - Well construction - Well logging - Sedimentary aquifers: Sandstone, limestone.

Unit – IV

Hard rock aquifers: charnockites, Gneiss, Granite formation - Field observation and measurement of soil moisture zone, zone of aeration, zone of saturation.

Unit – V


TEXT BOOKS


B.SC. GEOLOGY
LIST OF SKILL BASED ELECTIVE COURSES
PAPER V - GEOSTATISTICS AND COMPUTER APPLICATIONS

Unit – I
median, mode, dispersion and Measures of central tendency: Merits and Demerits: Measures of
Dispersion Skewness and kurtoisis, addition, multiplication and division.

Unit – II
Sampling and Sampling plan in Geoscience: Theoretical basis and sampling: Sample Random Sampling
Systematic and stratified and cluster sampling: Standard errors. Null hypothesis. Correlation and
Regression Analysis in Geoscience

Unit – III
Introduction to Computer – Elements of Computer: Hardware and Software. Hardware: Input
devices: Keyboard, Mouse – Output devices: Monitor, Printer – Memory – Primary: - RA, RAM and
Secondary Memory: Hard Disk, Floppy & CD. Unit – IV
Windows – DBMS. Computer applications in Geology : Flowcharts for simple programmes –
Geological aspects in windows.

Unit – V
Introduction to GIS softwares in GIS, Utility of computer software in geological studies – Bar diagram,
pie diagram, role diagrams, scatter diagram, X-Y plots.

TEXT BOOKS
1. Balagurusamy, Introduction to Computers
Co., New Delhi.
Publication Ltd.,

REFERENCE BOOKS
Application in the Earth Sciences, A.A. Affi. an international Symposium Pienum Press, New
York.
2. Robert L. Miller (1982), Statistical analysis in the Geological Sciences, John Wiley and Sons,
New York.
B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER VI - GEMOLOGY AND GEMSTONE EVALUATION

Unit – I


Unit – II


Unit – III


Unit – IV

Weight standard schemes used in gemology – 4Cs scheme for diamonds. Polishing of gemstones – polishing angles and limits. Polishing equipment and instruments. Feasibility and economics of gem industries in India with special reference to Tamil Nadu. Grading, valuation and pricing of gems.

Unit – V

Gemstone prospecting: Host rocks – gemstone mineralization – deposits. Exploration techniques and exploitation. Gemstone occurrences in India and with special references to Tamil Nadu.

REFERANCE AND TEXT BOOKS

UNIT-I

UNIT-II
Mining methods of Granites - Marking methods. Methods of cutting and polishing of Granites.

UNIT III

UNIT IV
Machineries used in Granite Industries – Wire saw machine, Cutting and Polishing Machines.

UNIT V
Marketing, pricing and Export of Granites. Granites and granite industries of India and Tamilnadu. End uses of Granite wastes. Manufacture Sand

REFERENCE BOOKS

2. Economic minerals –U.Prasad-CBS
5. Field Geology-Mathur
B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER VIII - MINES AND MINERALS LEGISLATION OF INDIA

Unit – I


Unit – III


Unit – IV


Unit – V


REFERENCE BOOKS

B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER IX - INTRODUCTION TO GEOINSTRUMENTATION

Unit – I

Basic equipments: Description, handling and applications of the following equipments: Hammers, Chisels, Hand lenses, Clinometer, Brunton Compass, Jacob's staff, Pedometer.

Unit – II

Survey equipments: Chain survey, Plane table, Prismatic Compass, Theodolite, GPS. Field photographic Techniques, Spot analysis Kit for water and soil test.

Unit – III

Geophysical Survey Equipment: Gravimeters, Magnetometers, Resistivity survey equipments, seismic survey equipments, scintillation counter, Well logging instruments.

Unit – IV

Pocket stereoscope, Mirror Stereoscope, Stereometer, Pantograph, Rotometer, Plotting equipments. Petrological microscope, Ore microscope, Photomicrograph equipment, Stereomicroscope.

Unit – V

Geochemical Equipment: PH & Eh meters, Potentiometers, TDS determination, Chromatographic Techniques, AA Spectrometer, ICP – MS, XRF – XRD,

REFERENCE BOOKS

1. Field Geology - S.M. Mathur,
2. Field Geology - GoKhale
3. Field Geology - F. Lahee4
4. Field Geology - R. Compton
5. Surveying - Punmia
6. Geophysics - Telford
7. Geophysics - Ramachandra Rao
8. Mineralogy - Dennan
9. Text Book of Surveying - S.K. Husain and M.S. Nagaraj
B.Sc. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER X - WATER QUALITY ANALYSIS

Unit – I

Physical properties of water: Colour, odour, taste, temperature, turbidity & viscosity. Methods of analysis of physical properties. World Health Organisation (WHO) and Bureau of Indian Standards (BIS).

Unit – II

Chemical properties of water: PH-alkalinity, acidity and their measurements, ionization potential, gas solubility, precipitation and dissolution of ions, equivalent weight and its measurement, colloids and coagulation, insoluble components and their measurements.

Unit – III


Unit – IV

Utility of Standards required for Potable, Agricultural and Industrial Purposes. Tools used for assessing the quality of water.

Unit – V


REFERENCES BOOKS

B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER XI - MAPPING TECHNIQUES IN GEOLOGY

Unit – I

Unit – II

Unit – III
Topographic maps:-definition of topography- parts of topographic map – features represented, map enlargement, reduction and preparation of base map – height / elevation datum in topographic maps.

Unit – IV

Unit – V

REFERENCE BOOKS
B.SC. GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER XII - GEOLOGY FOR COMPETITIVE EXAMINATIONS

Unit – I
Types of competitive examinations: State and Central competitive examinations – TNPSC, UPSC (Civil Services, GSI, IFS), UGC-CSIR, ONGC, AMD, Coal India Ltd etc.

Unit – II
Awareness of syllabus prescribed for various competitive examinations. Objective and descriptive type of questions. Preparation strategies - Collection of previous question papers - Internet and library search for information.

Unit – III
Scope and limits of objective type examinations - Pattern and style of objective type questions - Level of difficulty and standard expected - Long term study and planning. Preparation strategies for short answer and short essay type examination.

Unit – IV
Study methods - objective type - short essay type. Examination techniques: -pre- exam preparation - Writing / choosing questions from simple to complex (or) vem known to partly known before answering/writing answers –Time concept and examination ethics.

Unit – V
Interview - Basic English, Mathematical Ability, Logical Reasoning and Mental Aptitude - Group Discussion, Technical Interview and Management round. Dress code and Physical Fitness.

REFERENCES BOOKS
6. Jhulka. A. (1992) Objective Geology, CBCS, Delhi,
B.Sc. Geology

List of Non-Major Elective Courses

Paper I - Oceanography

Unit I


Unit II

Relief Features of the Major Oceans: Atlantic, Pacific and Indian Ocean - Horizontal and Vertical Distribution of Seawater Temperature, Salinity: Factors Affecting Salinity and Distribution.

Unit III


Unit IV

Marine Deposits: Classification and Distribution - Coral Reefs types - Conditions for the Growth.

Unit V

Marine Resources: Types - Distribution and Uses - Tidal Energy - Role of National Institute of Oceanography in India.

Reference Books

B.Sc. GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER II - CLIMATOLOGY

Unit I

Definition and Significances of Climatology - Rotation and Revolution of the Earth, Solstice, Equinox and Seasons, Elements of Weather and Climate, Composition and Structure of the Atmosphere, Isolation: factors affecting Isolation, Global energy budget, Horizontal and Vertical Distribution Inversion of Temperature and factors affecting them.

Unit II

Atmospheric Pressure: Diurnal and Seasonal Variations – Vertical and Horizontal distribution and factors affecting - Pressure Gradient - Corialies force and Deflection. Winds: Causes and Types - Jet stream, planetary winds, Monsoon and Local winds. Unit III

Atmospheric moisture and Precipitation: Humidity types - Condensation - Cloud types - Precipitation and Rainfall: Types and measurements.

Unit IV

Air Masses and Fronts: types, classification and properties - Atmospheric Disturbances: Tropical, Temperate Cyclones, thunderstorms and tornadoes - Origin, Development and associated weather conditions.

Unit V:

Climatic Classification: Need and Basis of Climatic Classification- Koppen's Climatic Classification - Weather forecasting: Observation, Types and Uses.

REFERENCE BOOKS

B.SC. GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER III - BASIC GEOCHEMISTRY

Unit - I

Origin, abundance and distribution of elements in the universe solar system and earth – composition of crust, mantle, core, hydrosphere and atmosphere.- Geochemical classification of elements.

Unit - II

Basic crystal chemistry:- Minerals as chemical compounds-bonding – ionization potential-electronegativity-periodic table of elements: periodic law and its utility.

Unit – III

Geochemical processes and their geochemical signatures - Processes controlling chemical composition of igneous, metamorphic, and sedimentary rocks.

Unit – IV

Geochemistry of REE, trace elements, stable and radiogenic isotope and their applications.

Unit – V

Geochemistry to mineral exploration:- Elements, dispersion and halos around an ore body- sampling methodology-analytical techniques: AAS-ICP-MS- Gravimetry – chromatography-flame photometry-DTA.

REFERENCE BOOKS


B.SC. GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER IV - BASIC GEOPHYSICS

Unit I
Definition and scope of geophysics. Gross geophysical properties of Earth: Surface gravity variation, electrical and magnetic properties of rock.

Unit II
Seismic properties of rocks, Densities of various layers of earth (Lithosphere). Distribution of density and pressure within earth.

Unit III

Unit IV

Unit V
Isostasy: definition – scope – different theories and limitations of Isostasy. Introduction to geophysical tools.

REFERENCE BOOKS
B.SC. GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER V - GEOHAZARDS

Unit – I

Unit – II

Unit – III

Unit – IV

Unit – V

SUGGESTED BOOKS
B.SC. GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER VI

GROUNDWATER MANAGEMENT AND RAINWATER HARVESTING

Unit – I


Unit – II


Unit – III


Unit- IV


Unit – V


REFERENCE BOOKS

B.SC. GEOLOGY

GEOLOGICAL FIELD WORK

It is an integral part of the course, students should be taken to a field training during the academic year.

First Year

Students should be taken to the local area for studying geomorphological, structural aspects of geology. The duration of the trip may be a week and submit a report to the department.

Second Year

Students should be taken to nearby area and familiarize Paleontological and Stratigraphical aspect, collect geological samples from the field and display at the time of their practical examination for internal evaluation. The duration may be a week.

Third Year

A visit to geologically interested and mineralized zones within Tamilnadu it include, mine visit, geological mapping, minerals, rocks collection and display at the time of their practical examination for internal evaluation. The duration may be for two weeks.
B.Sc. GEOLGY

ALLIED GEOLOGY PAPERS

ALLIED GEOLOGY –I

Unit I


Unit II


Unit III


Unit IV


REFERENCE AND TEXTBOOKS


Unit I

Palaeontology: Definition of Palaeontology and fossils. Outlines of modes of preservation in sedimentary rocks. Brief account of the uses of fossils. Study of the morphological characters and geological age of the following fossil groups: pelecypods, gastropods, cephalopods, brachiopods, corals, and trilobites.

Unit II

Stratigraphy: Definition and scope of Stratigraphy. Outline of the Geological Time Scale. Brief account of the following geological formations in India: Dharwar Group, Cuddapah Group, Vindhyan Group, Gondwana Group, Cretaceous formations of Tiruchirapalli, and Karewa Formation.

Unit III

Igneous Petrology: Definition of igneous petrology and igneous rocks. Forms of igneous rocks: sill, lopolith, laccolith, phacolith, dyke, and batholith. Brief description of the following igneous rocks: dunite, pyroxenite, gabbro, dolerite, syenite, granite, pegmatite, aplite, andesite, and basalt.

Unit IV


Metamorphic Petrology: Definition of metamorphic rocks. Metamorphism and metamorphic process. Agents of metamorphism. Brief description of the following sedimentary rocks: sandstone, arkose, grit, shale, and limestone. Brief description of the following metamorphic rocks: slate, phyllite, schist, gneiss, marble, quartzite, granulite, and amphibolite.

Unit V

Economic Geology: An outline of the following processes of ore formation: magmatic – hydrothermal – placer – marine evaporites. Brief description of the physical properties and Indian occurrences of the following ore and industrial minerals: graphite, bauxite, magnesite, hematite, magnetite, chromite, gold, pyrolusite, pyrite, galena, asbestos, gypsum, chalk, calcite, dolomite, barite, and kaolin. Brief description of the following coal types: peat, lignite, bituminous, and anthracite. Brief introduction to petroleum, its origin and occurrence in India.
B.Sc. GEOLOGY

REFERENCE AND TEXTBOOKS


B.SC. GEOLOGY
ALLIED GEOLOGY PAPERS
ALLIED GEOLOGY PRACTICAL


Mineralogy: Identification and physical description of the following minerals:

Petrology: Identification and physical description of the following rocks: Igneous rocks: granite, pegmatite, syenite, diorite, gabbro, dolerite, dunite, pyroxenite. Metamorphic rocks: slate, mica schist, chlorite schist, hornblende gneiss, garnet-mica gneiss, granulite, marble. Sedimentary rocks: sandstone, conglomerate, arkose, grit, shale, limestone.

