DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

Syllabus for

B.Sc. APPLIED GEOLOGY

(SEMESTER PATTERN)

(For Candidates admitted in the Colleges affiliated to Periyar University from 2021 onwards)
REGULATIONS

1. ELIGIBILITY
   Refer this office circular No: PU/R/AD-1/UG/PG/Programs Eligibility/2019

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.

I. SEMESTER
   1. Language - I (Tamil etc.)
   2. Communication English-I
   3. Core Geology Paper - I- Physical Geology and Geodynamics
   4. Allied Chemistry Paper - I or Allied Mathematics Paper-I
   5. Skill Based Elective Course-I (select any one from list-1 SBEC)
   6. Value education
   7. Professional English - I

II. SEMESTER
   8. Language - II (Tamil etc.)
   9. Communication English - II
   10. Core Geology Paper - II-Geomorphology and Structural Geology
   11. Core Geology Practical Paper - I* Structural Geology and Surveying
   12. Allied Chemistry Paper-II or Allied Mathematics Paper - II
   13. Allied Chemistry Practical Paper-I* or Allied Mathematics Paper - III
   14. Skill based Elective Course – II (select any one from list – 1 SBEC)
   15. Environmental Studies
   16. Professional English - II

III. SEMESTER
   17. Language - III (Tamil etc.)
   18. English - III
   19. Core Geology Paper – III Paleontology
   20. Allied Physics Paper - I
   21. Skill based Elective Course – III (select any one from list-1 SBEC)
IV. SEMESTER
22. Non-Major Elective Course - I
23. Language - IV (Tamil etc.)
24. English - IV
25. Core Geology Paper – IV Stratigraphy
26. Core Geology Practical Paper - II Paleontology and Stratigraphy
27. Allied Physics Paper - II
28. Allied Physics Practical Paper - I*
29. Skill based Elective Course – IV (select any one from list -1SBEC)
30. Non-Major Elective Course - II
31. Add on course-Internship Training

V. SEMESTER
32. Core Geology Paper – V Crystallography
33. Core Geology Paper – VI Mineralogy
34. Core Geology Paper - VII Igneous Petrology
35. Core Geology Paper - VIII Sedimentary and Metamorphic Petrology
36. Skill based Elective Course – V (select any one from list - 1 SBEC)
37. Skill based Elective Course – VI (select any one from list - 1SBEC)

VI. SEMESTER
38. Core Geology Paper - IX Economic Geology
39. Core Geology Paper - X Photo geology and Remote Sensing
40. Core Geology Paper - XI Mining and Engineering Geology
41. Core Geology Paper - XII Hydrogeology and Environmental Geology
42. Core Geology Practical Paper - III* Crystallography and Mineralogy
43. Core Geology Practical Paper - IV* Economic Geology and Petrology
44. Skill based Elective Course – VII (select any one from list-1 SBEC)

LIST - 1: SKILL BASED ELECTIVE COURSES
1. Mapping Techniques in Geology
2. Gemology and Gemstone Evaluation
3. Field Hydrogeology and Techniques
4. Water Quality analysis
5. Granite exploration and exploitation
6. Geostatistics and Computer Applications
7. Remote Sensing and GIS
8. Mines and Minerals Legislation of India
9. Introduction to Geo instrumentation
10. Cartography
11. Geology for competitive examination
12. Principles of Surveying

**LIST - 2: NON-MAJOR ELECTIVE COURSES**
1. Oceanography
2. Climatology
3. Basic Geochemistry
4. Basic Geophysics
5. Geohazards

**LIST - 3: 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:
<table>
<thead>
<tr>
<th>PART</th>
<th>SUBJECT</th>
<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>INTERNAL (25 %)</td>
<td>EXTERNAL (75 %)</td>
</tr>
<tr>
<td>I</td>
<td>Tamil or any other Language Paper –I</td>
<td>6</td>
<td>3</td>
<td>3</td>
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<td>25 75</td>
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<tr>
<td>II</td>
<td>English - I Communicative English</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td></td>
<td>25 75</td>
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<tr>
<td></td>
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<td>3</td>
<td>5</td>
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<td>25 75</td>
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<tr>
<td></td>
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<td></td>
<td>Allied Chemistry Paper –I or Allied</td>
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<td>3</td>
<td>4</td>
<td></td>
<td>25 75</td>
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<tr>
<td></td>
<td>Maths Paper -I</td>
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<tr>
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<td>2</td>
<td>3</td>
<td>-</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>III</td>
<td>Skill based Elective course-I (Select</td>
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<td>3</td>
<td>2</td>
<td></td>
<td>25 75</td>
</tr>
<tr>
<td></td>
<td>one from the list-1)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Value education</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
<td>25 75</td>
</tr>
<tr>
<td>IV</td>
<td>Professional English-Physical science-I</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td></td>
<td>25 75</td>
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*Examinations will be at the end of II semester
<table>
<thead>
<tr>
<th>PART</th>
<th>SUBJECT</th>
<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>INTERNAL (%)</td>
</tr>
<tr>
<td>I</td>
<td>Tamil or any other Language Paper –II</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>II</td>
<td>English –II Communicative English</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>25</td>
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<tr>
<td>III</td>
<td>Core III - Geology Paper – II</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>25</td>
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<tr>
<td>III</td>
<td>Core IV - Geology Practical Paper –I*</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>25</td>
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<tr>
<td>III</td>
<td>Allied Chemistry Paper –I or Allied Maths Paper -II</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<tr>
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<td>Allied Chemistry Practical Paper –I* Or Allied Maths Paper – III</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<td>3</td>
<td>2</td>
<td>25</td>
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<td>1</td>
<td>3</td>
<td>2</td>
<td>25</td>
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<td>IV</td>
<td>Professional English-Physical science-II</td>
<td>6</td>
<td>3</td>
<td>4</td>
<td>25</td>
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</table>

*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 = 1600Marks
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<thead>
<tr>
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<th>SUBJECT</th>
<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<td>INTERNAL (25%) EXTERNAL (75%) TOTAL</td>
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<td>I</td>
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<td>English Paper –III</td>
<td>6</td>
<td>3</td>
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<td>25</td>
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<tr>
<td>III</td>
<td>Core V - Geology Paper –III</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>25</td>
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<tr>
<td></td>
<td>Core VI - Geology Practical Paper –II*</td>
<td>3</td>
<td>3</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Allied Physics Paper –I</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Allied Physics Practical Paper –I*</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
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<td>IV</td>
<td>Skill based Elective course-III (Select any one from the list-1)</td>
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<td>3</td>
<td>2</td>
<td>25</td>
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<td></td>
<td>Non-Major Elective Course – I</td>
<td>2</td>
<td>3</td>
<td>2</td>
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*Examinations will be at the end of IV semester*
<table>
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<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<tr>
<td></td>
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<td>INTERNAL (25%)</td>
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<td></td>
<td></td>
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<td>EXTERNAL (75%)</td>
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<td>TOTAL</td>
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<tr>
<td>I</td>
<td>Tamil or any other Language Paper –IV</td>
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<td>3</td>
<td>25  75  100</td>
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<tr>
<td>II</td>
<td>English Paper –IV</td>
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<td>3</td>
<td>3</td>
<td>25  75  100</td>
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<tr>
<td>III</td>
<td>Core VII - Geology Paper – IV</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>25  75  100</td>
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<td>Core VIII - Geology Practical Paper –II*</td>
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<td>3</td>
<td>5</td>
<td>25  75  100</td>
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<td>Allied Physics Paper –II</td>
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<td>4</td>
<td>25  75  100</td>
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<td>3</td>
<td>4</td>
<td>25  75  100</td>
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<td>Skill based Elective course-IV (Select any one from the list-1)</td>
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<td>Non-Major Elective Course</td>
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<td>3</td>
<td>2</td>
<td>25  75  100</td>
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<tr>
<td></td>
<td>Add on course-Internship</td>
<td>2</td>
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*Continued from III semester and Examinations will be at the end of IV semester

Total Credits for III and IV Semester = 49 credits

Total Marks for III and IV Semester = 1500 Marks
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<thead>
<tr>
<th>PART</th>
<th>SUBJECT</th>
<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<td></td>
<td>INTERNAL (25%)</td>
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<tr>
<td>I</td>
<td>Core IX - Geology Paper – V</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<tr>
<td></td>
<td>Core X - Geology Paper – VI</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<tr>
<td></td>
<td>Core XI - Geology Paper – VII</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Core XII - Geology Paper – VIII</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<tr>
<td>II</td>
<td>Core XIII - Geology Practical – III</td>
<td>3</td>
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<tr>
<td>III</td>
<td>Core XIV - Geology Practical – IV</td>
<td>3</td>
<td>3</td>
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<tr>
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<td>3</td>
<td>2</td>
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<td>Skill based Elective course-VI (Select any one from the list-1)</td>
<td>2</td>
<td>3</td>
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*Examinations will be at the end of VI semester*
<table>
<thead>
<tr>
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<th>INSTRUCTION HRS/WEEK</th>
<th>EXAM HRS.</th>
<th>CORE CREDITS</th>
<th>UNIVERSITY EXAMINATION</th>
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<td></td>
<td>INTERNAL (25%)</td>
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<tr>
<td>I</td>
<td>Core XV - Geology Paper – IX</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>25</td>
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<td>Core XVI - Geology Paper – X</td>
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<td>4</td>
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<td>25</td>
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<td>Core XIX - Geology Practical - III*</td>
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<td>3</td>
<td>5</td>
<td>25</td>
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<td>Core XX - Geology Practical - IV*</td>
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<td>3</td>
<td>5</td>
<td>25</td>
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<tr>
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<td>Skill based Elective course-VII (Select any one from the list)</td>
<td>2</td>
<td>3</td>
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</table>

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

Total credits for V and VI semester = 48
Credits Total Marks for V and VI Semester = 1300 Marks

Total credit for 3 years = 152 Credits
Total Marks for 3 years = 4400 Marks
6. QUESTION PAPER PATTERN FOR EXAMINATION

Time: 3 Hours  
Maximum Marks: 75

Part-A (15 x 1 = 15 Marks)
(Answer all Questions, Three questions from each unit)

Part - B (2 x 5 = 10 Marks)
(Answer any two Questions, One question from each unit)

Part - C (5 x 10 = 50 Marks)
(Answer all Questions, One question from each unit with internal choice)

7. MINIMUM PASSING MARKS

Theory-IA (25 marks)  
University Examination: 75 marks

<table>
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<tr>
<th>EVALUATION OF IA</th>
<th>PASSING MINIMUM</th>
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<tr>
<td>Test</td>
<td>IA (40%)</td>
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<tr>
<td>Assignment</td>
<td>UE (40%)</td>
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<tr>
<td>Attendance</td>
<td>Total</td>
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<tr>
<td>Total</td>
<td>25 Marks</td>
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<tr>
<td>UE</td>
<td>75 Marks</td>
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</table>

Practical-IA (25 marks)  
University Examination: 75 marks

<table>
<thead>
<tr>
<th>EVALUATION OF IA</th>
<th>PASSING MINIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field visit, Collections and Report</td>
<td>IA (40%)</td>
</tr>
<tr>
<td>Model Exam</td>
<td>UE (40%)</td>
</tr>
<tr>
<td>Record Submission</td>
<td>Total</td>
</tr>
<tr>
<td>Attendance</td>
<td>25 marks</td>
</tr>
<tr>
<td>UE</td>
<td>75 marks</td>
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</tbody>
</table>
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 provided 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:

<table>
<thead>
<tr>
<th>LETTER GRADE</th>
<th>CUMULATIVE GRADE POINTS AVERAGE</th>
<th>GRADE DESCRIPTION</th>
<th>RANGE OF MARKS</th>
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<tr>
<td>S</td>
<td>10</td>
<td>Outstanding</td>
<td>90-100</td>
</tr>
<tr>
<td>A</td>
<td>9</td>
<td>Excellent</td>
<td>80-89</td>
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<td>B</td>
<td>8</td>
<td>Very Good</td>
<td>70-89</td>
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<td>C</td>
<td>7</td>
<td>Good</td>
<td>60-69</td>
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<tr>
<td>D</td>
<td>6</td>
<td>Average</td>
<td>50-59</td>
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<tr>
<td>E</td>
<td>5</td>
<td>Satisfactory</td>
<td>40-49</td>
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<tr>
<td>RA</td>
<td>0</td>
<td>Re-Appear</td>
<td>0-39</td>
</tr>
</tbody>
</table>

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

\[
GPA = \frac{\text{Total grade points earned in a semester}}{\text{Total credits registered in a semester}}
\]

\[
GPA = \frac{\text{Sum of grade points earned}}{\text{Sum of credits registered}}
\]

CLASSIFICATION:

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

The above classification shall be given for overall performance including Non-Major Electives and Skill based Courses. i.e., For Performance in the Part III only.

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 2021. Thereafter they will be permitted to appear only under regulations then in force.

12. SUBJECT AND PAPER CODES

<table>
<thead>
<tr>
<th>PAPER</th>
<th>SUBJECT</th>
<th>PAPERCODE</th>
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<td>Core Paper-I</td>
<td>Physical Geology and Geodynamics</td>
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<td>Core Paper-II</td>
<td>Geomorphology and Structural Geology</td>
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Remote sensing and GIS  
21UGYS07

### Mines and Mineral Legislation of India
Mines and Mineral Legislation of India  
21UGYS08

### Introduction to Geoinstrumentation
Introduction to Geoinstrumentation  
21UGYS09

### Cartography
Cartography  
21UGYS10

### Geology for Competitive Examination
Geology for Competitive Examination  
21UGYS11

### Principles of Surveying
Principles of Surveying  
21UGYS12

### List of courses
- Oceanography  
  21UGYN01
- Climatology  
  21UGYN02
- Basic Geochemistry  
  21UGYN03
- Basic Geophysics  
  21UGYN04
- Geohazards  
  21UGYN05
- Groundwater Management and Rain Water Harvesting  
  21UGYN06

### ALLIED GEOLOGY PAPERS

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B.Sc. APPLIED GEOLOGY
SEMESTER-I
CORE I - PHYSICAL GEOLOGY AND GEODYNAMICS
21UGY01

COURSE OBJECTIVES:
1. Geology is the study of the Earth as a whole.
2. Physical Geology introduces different topics which define geology as a branch of Physical Geology.
3. The teaching and learning methodology involves class lectures, practical and laboratory demonstrations. To impart knowledge of various tectonic features and their evolution.
4. Understand the formation of continents and ocean and distribution of volcanoes and earthquakes.

PHYSICAL GEOLOGY:
UNIT-I
UNIT-II
UNIT-III

GEODYNAMICS:
UNIT-IV
Topography features, Principles of Geodesy, Neotectonics.

UNIT-V

TEXT BOOKS:

REFERENCE BOOKS

B.Sc.APPLIED GEOLOGY
SEMESTER II
CORE II - GEOMORPHOLOGY AND STRUCTURAL GEOLOGY
21UGY02

COURSE OBJECTIVE:
1. The dynamic instability of the lithosphere, continuous and discontinuous deformation takes place within the rocks in solid or semi-solid state.
2. To decipher the fundamentals of structures and the underlying physical processes of rock deformation and geotectonics to understand landforms and their evolution.
3. To educate the students about the concept of rock deformation.
4. To understand qualitative aspects of brittle and ductile deformation processes, and descriptive analysis.

GEOMORPHOLOGY:
UNIT-I


UNIT-II


UNIT-III


STRUCTURAL GEOLOGY:

UNIT -IV


UNIT- V

Folds: Definition-Parts of Folds -Types of Folds-Classification of Folds-Recognition of Folds.

Faults: Definition- Types of Faults-Classification of Faults-Recognition of Faults.

Joints: Definition- Types of Joints-Classification of Joints.


TEXTBOOK:

GEOMORPHOLOGY:

STRUCTURAL GEOLOGY:

REFERENCE BOOK:
1. V.V. Belousov-Structural Geology, Moscow
B.Sc. GEOLOGY
SEMESTER II
CORE PRACTICAL I - STRUCTURAL GEOLOGY AND SURVEYING
21UGYP01

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.

Determination of true dip & apparent dip and thickness by calculation and graphical method.

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

SURVEYING:

PERIYAR UNIVERSITY B.Sc. APPLIED GEOLOGY  UG SYLLABUS

B.Sc. APPLIED GEOLOGY
SEMESTER-III
CORE III - PALAEONTOLOGY
21UGY03

COURSE OBJECTIVES:

1. To make the participant acquire knowledge on ancient life, skills on identification and documentation of paleontology.
2. The knowledge in palaeontology is to equip the students for understanding.
3. To educate various aspects of biological events such as origin of life, evolution, mass extinctions, radiations, paleo-ecology, exceptional preservation, and functional morphology.
4. To prepare the students for a professional job perspective in the field of basic paleontological research, to benefit them in the preparation of various exams.

UNIT-I

Definition of Palaeontology – Scope of Palaeontology - Geological Time Scale.

UNIT-II


UNIT -III


Phylum Hemichordata – Class Graptozoa – General Morphology, Classification, Geological distribution.

UNIT- IV

Phylum Brachiopoda: General morphology – Shell forms - Ornamentation, Classification, Geological history. Distinguish between Lamellibranches and Brachiopods.


UNIT-V


Paleobotany: General classification of Plant kingdom – Gondwana Indian Plant fossils – A brief account of the following Plant fossils: Glossopteris, Gangamopteris, Ptilophyllum, Calamites, Lepidodendron and Sigillaria. Introduction to Spores and pollens. Significance and Paleoclimatic conditions of Gondwana flora. Applications of Micropalaeontology.

TEXT BOOKS

2. Romer, A.S. Vertebrate palaeontology, Chicagopress.
4. B.U. Hag and A. Boersma (1978), Introduction to marine Micropalaeontology, Elsevier, Netherlands
REFERENCE BOOKS


B.Sc. APPLIED GEOLOGY
SEMESTER-IV
CORE IV – INDIAN STRATIGRAPHY
21UGY04

COURSE OBJECTIVE:
1. To impart basic knowledge about Indian Stratigraphy.
2. To train the students to understand the processes of formations of timescale stratigraphy and significance of fossils.

UNIT-I

UNIT- II

UNIT- III
Paleozoic Stratigraphy: Distribution of Paleozoic rock in India, Cambrian, Carboniferous and Permian of salt Range, Paleozoic of Kashmir Valley. Paleozoic of Spiti Valley and Paleozoic rock of Peninsular India.
UNIT- IV


UNIT- V


TEXTBOOKS
2. Wadia, D.N. (1953), Geology of India, TATA McGraw –Hill.
3. Ravindrakumar, K.R. Stratigraphy of India.

REFERENCE BOOKS
2. Gregory, J.W. and Barret B.H- General Stratigraphy

B.Sc. APPLIED GEOLOGY

SEMESTER-IV
CORE PRACTICAL PAPER-II PALAEONTOLOGY AND STRATIGRAPHY 21UGYP02

Athyris, Orthis. **Graptolites:** - Phyllograptus, Tetragraptus, Didymograptus, Diplograptus, Monograptus. **Corals:** Calceola, Zaphrenitis, Favosites, Halysites. **Plant fossils:** Glossopteris, Gangamopteris, Ptillophyllum, Lepidodendron, Sigillaria and Calamites.

**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. APPLIED GEOLOGY**
**SEMESTER-V**
**CORE V – CRYSTALLOGRAPHY**
**21UGY05**

**COURSE OBJECTIVE:**
1. The course’s specific aim is to acquaint students about crystal structures and their classification into unit systems and symmetry classes.
2. To acquaint students about various laws of crystallography governing the consistency of crystal structures with respect to specific chemical composition.
3. To introduce how minerals form. To explain chemical composition, bonding and internal structure of minerals

**UNIT-I**

**UNIT- II**
Introduction of Holohedral, Hemihedral, Hemimorphic and Enantiomorphic
forms in crystals. **Isometric system:** Normal class - Pyritohedral class - Tetrahedral class - Plagiohedral class - Tetrahexahedral class, with references to well-developed crystals of Galena, Spinel, Garnet, Fluorite, Diamond, Pyrite, Tetrahexahedrite, Boracite, and Cuprite. **Tetragonal System:** Normal class - Hemimorphic class - Tripyramidal class - Pyramidal - Hemimorphic class - Sphenoidal class - Trapezohedral class - Tetrahexahedral class. With references to well-developed crystals of Zircon, Rutile, Casseterite, Vesuviane, Apophyllite, Shellie, Melonite, Wulfenite and Chalcopyrite.

**UNIT- III**

**Hexagonal system: Hexagonal Division:** Normal class - Hemimorphic class – Tripyramidal class - Pyramidal - Hemimorphic class – Trapezohedral class with references to well-developed crystals: Beryl, Zincite, Apatite, Calcite, Corundum, Tourmaline, Phenacite, and Quartz. **Rhombohedral division:** Trigonal class - Rhombohedral class - Rhombohedral hemimorphic class - Tri-Rhombohedral class - Trapezohedral class.

**UNIT-IV**

**Orthorhombic system:** 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 with special reference to well-developed crystals of Barite, Olivine Topaz, Staurolite, Sulphur, Calamine, Struvite and Epsomite. **Monoclinic system:** Normal class- Hemimorphic class-Clinohedral class. –**Triclinic system.** Normal class- Asymmetry class.

**UNIT- V**


**TEXT BOOKS**

REFERENCES BOOKS

B.Sc. APPLIED GEOLOGY
SEMESTER-V
CORE VI –MINERALOGY
21UGY06

COURSE OBJECTIVES:
1. To study the physical chemical and optical properties of rock forming minerals. The course will lay the foundation for the broader understanding of geology by imparting the basic knowledge about the rock forming minerals.
2. To learn about minerals their formation, complexity, association, identification of the basic idea of mineral interaction.

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 Group - Description, General Characteristics, Crystalline Varieties, Cryptocrystalline Varieties, Amorphous Varieties. Feldspar Group:

**UNIT- III**

Mineralogy, Structure, Chemical composition, Optical and Physical properties, Modes of Occurrence and Industrial uses of the following group of minerals: **Feldspathoid Group**: Introduction, Chemistry, Leucite, Nepheline, Cancrinite, Sodalite, Hauynite, Noselite, Lazurite. **Pyroxene Group**: General Characteristics, Orthopyroxene, Clinopyroxene, Clinoenstatites, Pigeonite, Diopside-Hedenbergite, Augite, Wollastonite, Agerite, Jadeite, Spodumene, Rhodonite

**UNIT-IV**


**UNIT- V**


**REFERENCES AND TEXTBOOKS**

B.Sc. APPLIED GEOLOGY
SEMESTER-V
CORE VII - IGNEOUS PETROLOGY
21UGY07

COURSE OBJECTIVE:
1. To understand characteristics and genesis of Igneous rocks.
2. To understand igneous processes, physical and chemical characteristics of magma and various rock types, its geological setting, petrogenesis, classification, and natural characteristics, textures and structures.
3. To identify mineral assemblages, textural and chemical composition of minerals.

UNIT-I
Introduction to Petrology – Igneous Rocks-Magma- Definition, Types and Origin; Basaltic, Andesitic, Rhyolitic magma –Rock cycle - Plutonic, Hypabyssal and Volcanic rocks formation - Composition and Constitution of magma- Primary and Parental magma. Forms of Intrusive igneous rocks: concordant and Discordant forms- Forms of Extrusive igneous rocks with an Indian Examples.

UNIT -II
Structures: Definition- Types: Vesicular and Amygdaloidal, Blocky lava, Ropy lava, Pillow structure, Flow structure, Sheet joints, Mural joints, Columnar joints, Rift and Grain, Reaction Rims, Xenolithic structure.

UNIT- III
Physical properties of magma: Temperature and Other Thermal properties, Calculation of Densities and Viscosities of silicate melts. Effect of cooling and

UNIT- IV

Classification of igneous rock: CIPW classification, Mineralogical classification, Megascopic (or) field classification, Tyrrell tabular classification, -Classification based on the Alkali to Plagioclase feldspar. USGS classification.

UNIT- V


REFERENCE AND TEXTBOOKS
6. Hatch, F.H. Wells, A.K. (1949), Petrology of Igneous Rocks, Thomas Murby & Wells,
8. B.Sc.APPLIED GEOLOGY
CORE-VIII
SEDIMENTARY AND METAMORPHIC PETROLOGY
21UGY08

SEDIMENTARY PETROLOGY:

COURSE OBJECTIVE:
1. To impart knowledge of formation of sedimentary rocks.
2. To train the students to understand the mode of formations, transportation and deposition of the sediments and also about the processes modifying the sediments after their burial.
3. To infer the metamorphic agents, kinds and formation of metamorphic rocks.
4. To understand implications of various physic-chemical parameters in formulating metamorphic history of rocks

UNIT-I

**Sedimentary formation:** Description and formation of Sedimentary Rocks-Mechanical deposits, Chemical deposits, Organic deposits and Pelitic deposits  

UNIT- II

**Sedimentary Classifications:** Brief study of F.J. Pettijhon and Tyrell classification of sedimentary rocks into Residual Mechanical, Chemical and Organic deposits. **Textures of sedimentary rocks:** Origin of grains, Size, Shape, Packing, Fabric and Crystallization of grains. **Structures of Sedimentary Rocks:** Mechanical, Chemical, Organical.

UNIT- III

Petrographic details of important Silicic and Carbonate rocks such as-Conglomerate, Breccia, Shale, Sandstone, Clay, Limestone, Dolomite, Coal-Iron ores of Sedimentary Origin-Gypsum-Rock Salt-flint and Chert-Phyllite. Sedimentary Basins of India and Tamil Nadu.

**METAMORPHIC PETROLOGY:**  
UNIT- IV


UNIT- V

REFERENCE AND TEXTBOOKS
2. Huang, W.T.-Petrology, MC Graw Hill
4. Harker, A. -Petrology for Students, Cambridge,

B.Sc. APPLIED GEOLOGY
SEMESTER-VI
CORE IX - ECONOMIC GEOLOGY
21UGY09

COURSE OBJECTIVES:
1. To study mineral deposits and processes of formation of deposits and the nature of different mineral deposits, its genesis and distribution of major ore minerals.
2. To understand the genetic controls of physical and chemical processes of ore formation in various geological settings.
3. To provide the knowledge on geological processes responsible for mineral and ore formation, weathering and other secondary mineralization processes.
4. To familiarize mode of occurrence of economic minerals, metallic and non-metallic minerals.

UNIT-I

UNIT- II

UNIT- III


UNIT- IV

Mineral Resources of India– Ore mineralogy, Association, Genesis, Modes of occurrence, origin and Indian Distribution of the following Metallic Ore Deposits- Copper, Gold, silver, uranium, thorium, beryllium, zirconium, tin, lead-zinc.

UNIT- V


TEXT BOOKS AND REFERENCE BOOKS

**B.Sc. GEOLOGY**

**SEMESTER-VI**

**CORE X - PHOTOGEOLOGY AND REMOTE SENSING**

**21UGY10**

**COURSE OBJECTIVE:**

1. To understand the aerial photography and Preparation of Photo-geologic Maps. Mosaic controlling factors of aerial photograph.
2. To know about Electro-Magnetic Spectrum, Space platforms and Elementary ideas about active and passive sensors.
3. Application of photo-geology and remote sensing in geological studies.
4. To impart knowledge of environmental geology, natural hazards and basic concepts of remote sensing and GIS.

**PHOTOGEOLOGY:**

**UNIT- I**


**UNIT- II**


**UNIT- III**

REMOTE SENSING:

UNIT - IV


UNIT - V


REFERENCE AND TEXTBOOKS


B.Sc. APPLIED GEOLOGY

SEMESTER-VI

CORE XI - MINING AND ENGINEERING GEOLOGY

21UGY11

COURSE OBJECTIVES:

1. To understand the basic fundamental concepts of various mining methods, their terminologies, and the type of sampling adopted, explosives used in the mine, and to have a basic knowledge about mine machineries.

2. To provide the knowledge of geological investigation for site selection of engineering projects.
3. To understand the rock type and their engineering properties, suitability of site conditions for Dam, tunnel, roads and highways.
4. To develop concepts and applied aspects of geology in various civil or geo engineering projects.

MINING GEOLOGY:

UNIT- I


UNIT- II

Mining Methods: Open Cast Mining: Loading by manual, Machines, Glory hole and Kaoline Mining. Underground mining: Stoping-Open stopes: Overhand: Timbered, Filled, Shrinkage and Slicing system

UNIT-III


ENGINEERING GEOLOGY:

UNIT-IV

UNIT- V


Earthquakes -Definition- Terminology, Causes, Factors, and Preventive measures. Seismic zones of India, Seismic design of building. Case histories related to Indian Civil Engineering Projects.

TEXT AND REFERENCE BOOKS
2. Mckinstry- Mining Geology.

TEXT AND REFERENCE BOOKS
**COURSE OBJECTIVE:**
1. To impart knowledge of basic hydrogeology including groundwater origin, occurrence and distribution.
2. To train students on the basics of well hydraulics, method of exploration, water budget and management.
3. To impart theoretical, practical and field knowledge pertaining to Hydrogeological domain.
4. To understand the relationship between water and rock interaction and salt water intrusion and its remedial measures in the coastal aquifers.

**HYDROGEOLOGY:**

**UNIT-I**

**UNIT-II**

**UNIT-III**
drinking and irrigation water standards of WHO and BIS – Waterborne diseases
Groundwater Recharge: Recharge Methods - Basin Method, Stream Mhannel
Method, Ditch or Furrow Method, Flooding Method, Irrigation Method, Pit Method,

ENVIRONMENTAL GEOLOGY:

UNIT- IV

Definition, Importance and its scope. A brief account of the Energy System.
Classification of Natural Resources -Renewable and Non-Renewable resources.
Water Resources: Surface and Groundwater, Uses and Exploitation. Flood, Drought,
Dams, Benefits and Problems. Mineral Resources: Resource and Exploitation,
Effects of Extraction on Environment. Land Resources: Land as a Resource, Land
Degradation, Man induced landslides, Soil Erosion, Desertification. Role of
Individual in Conservation natural Resources, Equitable use of resources for
sustainable lifestyle.

UNIT- V

Ecosystem: Concept of an Ecosystem, Structure and function of an ecosystem.
Forest, Grass land, Desert, Aquatic Ecosystem. Cause, Effects and Control measures
of Air pollution and Mine Pollution- Marine pollution- Noise pollution. Cause,
Effects and Control measures of Thermal pollution- Nuclear hazards- Solid and
Radioactive waste management. Role of Individual in prevention of Pollution.
Disaster management: Floods, Earthquakes, Cyclone and Landslides.

REFERENCE AND TEXTBOOKS
Year
Tata McGraw Hill.

REFERENCES AND TEXTBOOKS
Delhi.
B.Sc. APPLIED GEOLOGY
SEMESTER-VI
CORE PRACTICAL - III CRYSTALLOGRAPHY AND MINERALOGY
21UGYP03

CRYSTALLOGRAPHY CRYSTAL MODELS:
Description of forms present and determination of Miller indices of the following:

CRYSTAL MODELS:
1. **Isometric System**: Normal Class – Galena, Fluorite, Magnetite, Garnet, and Leucite, Copper-Pyritohedral class – Pyrite, Tetrahedral Class – Tetrahedrite.
5. **Monoclinic System**: Normal – Gypsum, Pyroxenes and Amphiboles.
7. **Twin Crystals**: Contact and Penetration twins of Fluorite, Iron Cross Twin of Pyrite, Knee type twin of Cassiterite, Polysynthetic twin of Aragonite, Cyclic twin of Cerussite, Swallow Tail of Gypsum, Twins of Carlsbad, Baveno, Manebach, Albite law of Albite

MINERALOGY:
Megascopic identification and description of the following:
1. **Quartz group**: Quartz, chalcedony, Opal, Agate, Flint, Jasper, Amethyst, Rose Quartz, Chert.
2. **Feldspar group**: Orthoclase, Microcline, Albite, Oligoclase, Labradorite
3. **Feldspathoid group**: Adularia, Sanidine, Nepheline, Sodalite, llapislazul
4. **Pyroxene group**: Enstatite, Bronzite, Hypersthene, Augite
5. **Amphibole group**: Hornblende, Actinolite, Tremolite
6. **Olivine group**: Olivine, Serpentine
7. **Mica group**: Muscovite, Biotite, Phlogopite, Lepidolite, Vermiculite
Optical Mineralogy:

Microscopic identification and description of the following: Quartz, Orthoclase, Albite, Oligoclase, Andesine, Labradorite, Anorthite, Nepheline, leucite, Sodalite, Hypersthene, Augite, Diopside, Aegirine, Hornblende, Tremolite, Actinolite, Glauconphane, Riebeckite, Muscovite, Biotite, Phlogopite, Olivine, Serpentine, Chlorite, Epidote, Garnet, Apatite, Zircon, Sphene, Magnetite, Tourmaline, Calcite, Dolomite, Andalusite, Staurolite, Sillimanite, And Cordierite

Geochemistry:

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.

B.Sc. APPLIED GEOLOGY
SEMESTER-VI
CORE PRACTICAL PAPER – IV
ECONOMIC GEOLOGY AND PETROLOGY
21UGYP04

ECONOMIC GEOLOGY:


PETROLOGY:

Megascopic identification of the following rocks: Granite, Graphic granite, Pegmatite, Aplite, Schorl Rock, Granite Porphyry, Syenite, Syenite porphyry, Diorite, Gabbro, Anorthosite, Dunite, Pyroxenite, Dolerite, Dolerite Porphyry, Basalt, Trachyte, Rhyolite, Obsidian, Pumice, Scoria. Conglomerate, Breccia, Sandstone, Arkose, Shale, Limestone, Laterite, Peat, Lignite, Slate, Phyllite, Schists,
Gneisses, Quartzite, Marble, Amphibolite, Eclogite, Leptynite, Charnockite, Khondalite, and Basic Granulite.


**B.Sc. APPLIED GEOLOGY**

**LIST OF SKILL BASED ELECTIVE COURSES**

**PAPER I - MAPPING TECHNIQUES IN GEOLOGY**

**21UGYS01**

**COURSE OBJECTIVE:**
1. To impart knowledge of geological field surveys.
2. To train the students to understand the functioning of necessary instruments required during geological field surveys.

**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. APPLIED GEOLOGY
LIST OF SKILL BASED ELECTIVE COURSES
PAPER-II GEMOLOGY AND GEMSTONE EVALUATION
21UGYS02

COURSE OBJECTIVES:
1. To learn and to examine the nature, quality, rarity of gemstones. To understand the physical and optical properties of gemstones.
2. To summarize the origin, classification of gems.
3. To give an idea about the gem testing instruments.
4. To gain knowledge and to provide skills to become a successful gemologist.

UNIT- I

UNIT- II
UNIT- III

UNIT- IV

UNIT- V

REFERANCE AND TEXTBOOKS
Nadu. Collection of Rainfall data. Short account on Thiessen Polygon Isohyetal maps.

UNIT-II

**Hydro geologic parameters:** Calculation of Porosity and Permeability, Pump Test data, Calculation of Groundwater Fluctuations.

UNIT- III


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. APPLIED GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER IV - WATER QUALITY ANALYSIS

21UGYS04

COURSE OBJECTIVES:

1. To impart knowledge of basic water quality analysis.
2. To train students on the basics of laboratory methods using quality of water.
3. Study about Recycling of water, Water borne diseases, Reverse Osmosis (RO) System and Desalination of water.

UNIT- I

Physical Properties of Water: Color, Odor, Taste, Temperature, Turbidity
& Viscosity. Methods of Analysis of Physical Properties. World Health Organization (WHO) and Bureau of Indian Standards (BIS).

**UNIT- II**


**UNIT- III**


**UNIT- IV**

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

**UNIT-V**


**REFERENCE BOOKS**

COURSE OBJECTIVES:
1. The objective of this course is to give hands-on experience for the students in identifying types, mining methods of granite, exploration and marketing.

UNIT-I

UNIT-II

UNIT- III

UNIT- IV
Machineries used in Granite Industries – Wire Saw Machine, Cutting and Polishing Machines.

UNIT-V

REFERENCE BOOKS
2. Economic minerals–U. Prasad-CBS
5. Field Geology-Mathur.
COURSE OBJECTIVE:
1. To understand the description of statistical parameters employed to analyse.
2. To synthesize geological data for accurate and authentic interpretation.

GEOSTATISTICS:

UNIT- I

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

COMPUTER APPLICATIONS:

UNIT- III

UNIT- IV

UNIT- V
Introduction to GIS Software in GIS, Utility of computer Software in Geological studies – Bar diagram, Pie diagram, Role diagrams, Scatter diagram, X-Y plots.

TEXT BOOKS
3. C. Davis (1975), Statistics and data analysis in Geology, John Wiley & Sons.

REFERENCE BOOKS

B.Sc. APPLIED GEOLOGY
LIST OF SKILL BASED ELECTIVE COURSES
PAPER VII -REMOTE SENSING AND GIS
21UGYS07

COURSE OBJECTIVE:
1. To impart knowledge and applications of remote sensing and GIS in Geology.
2. To learn the basics of aerial remote sensing and its applications.
3. To understand the physics of the electromagnetic spectrum and learn satellite remote sensing.
4. To have training in GIS components, models and applications

REMOTE SENSING:
UNIT- I
Definition and Types: Aerial, Satellite and Radar, Development of Space Programmes - History and Organization Associated with Remote Sensing in India and in other Countries.

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.

GIS:

UNIT-IV

UNIT-V

REFERENCE BOOKS

B.Sc. APPLIED GEOLOGY
LIST OF SKILL BASED ELECTIVE COURSES
PAPER VIII - MINES AND MINERALS LEGISLATION OF INDIA 21UGYS08

COURSE OBJECTIVES:
1. The course aims to provide an overview of the legal and policy framework on the mining sector in India.
2. To understand the procedure for obtaining mineral concession of regulation and development.
UNIT- I


UNIT-II


UNIT- III


UNIT- IV


UNIT- V


REFERENCE BOOKS

COURSE OBJECTIVE:
1. To train the students to understand the functioning of necessary instruments required during geological field surveys.
2. To impart knowledge and applications of field photographic techniques and GIS in Geology.
3. To train the students description handling and application of the following equipment.

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

UNIT- IV

UNIT-V
Geochemical Equipment: p^H& 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. Lahee
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. APPLIED GEOLOGY**

**LIST OF SKILL BASED ELECTIVE COURSES**

**PAPER X – CARTOGRAPHY**

**21UGYS10**

**COURSE OBJECTIVE:**

1. To understand the various purposes, roles and representation of cartography. To gain and practice language in the creative design process.
2. To gain and practice skills in cartographic design, representation and produced in a GIS environment.
3. To be able to create digital maps in formats reflecting the purpose, content and function of input data.

**UNIT- I**


**UNIT- II**


**UNIT- III**

Symbolization: Types of Cartographic Symbols - Point, Line, and Area symbols - Qualitative and Quantitative Data Generalization.

**UNIT- IV**

UNIT- V


REFERENCE BOOKS
2. Robinson - Elements of Cartography
4. Raiz - Principles of Cartography.

B.Sc. APPLIED GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES

PAPER XI - GEOLOGY FOR COMPETITIVE EXAMINATIONS

21UGYS11

COURSE OBJECTIVE:
1. To impart knowledge of objective geology for various competitive examinations, know about various question paper pattern information.

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


REFERENCES BOOKS
2. Maddox, H. (1985), How to study, Rupa publications, Delhi
7. Jhulka, A. (1992), Objective Geology, CBCS, Delhi,

B.Sc.APPLIED GEOLOGY

LIST OF SKILL BASED ELECTIVE COURSES PAPER I - PRINCIPLES OF SURVEYING

COURSE OBJECTIVES:
1. The systematic investigation of geology the purpose of creating a geological map. And contour and cross section.
2. To know about survey types and methods for field and ground.
3. To train the students to understand the survey equipments.

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

Plane Table - Equipments - Methods of Plane Table Survey - Preparation work for the Plane Table Survey - Leveling and Orienting the Table - Resection Points - Trial and Error Method - Tracing Paper Method - Advantages and Disadvantages of Plane Table Survey.

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.

B.Sc. APPLIED GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER-1 OCEANOGRAPHY

21UGYN01

COURSE OBJECTIVE:

1. To impart basic knowledge of morphological and structural features, and operating processes in sea and ocean basins.
2. To train the students in understanding the marine economic resources.

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. APPLIED GEOLOGY
LIST OF NON-MAJOR ELECTIVE COURSES
PAPER II–CLIMATOLOGY
21UGYN02

COURSE OBJECTIVES:
1. To understand the meteorology and earth radiation balance.
2. To know the behaviour of meteorological parameters.
3. To learn the concept of EL Nino impact and weather forecasting.
4. To study the climate changes over the geological period and its impact.
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

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

UNIT- IV

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

REFERENCE BOOKS
COURSE OBJECTIVE:
1. To impart basic knowledge of elemental and isotopic concentrations, classification and behaviour of elements in the crust, continental lithospheric mantle and mantle.
2. To train the students to understand the behaviour of geochemical elements in different igneous rock types.

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
3. Rollinson, H. (1993), Using Geochemical Data evaluation, preparation and
interpretation, Longman, Singapore.

B.Sc. APPLIED GEOLOGY
LIST OF NON-MAJOR ELECTIVE COURSES PAPER IV
BASIC GEOPHYSICS
21UGYN04

COURSE OBJECTIVE:
1. To impart knowledge of Geophysics and applications of physics in geology
2. To enhance knowledge and applications of geophysics in exploration of earth resources.

UNIT-I

UNIT- II
Seismic properties of rocks, Densities of various layers of earth (Lithosphere). Distribution of density and pressure within Earth. Survey Procedure: Electrical Profiling, Resistivity Sounding (VES), Precautions.

UNIT- III

UNIT- IV
Geochronology: Definition – Methods – Limitations – Radioactivity schemes – Concordia and Discordia ages.

UNIT - V
Isostasy: Definition – Scope – Different Theories and limitations of Isostasy. Introduction to Geophysical tools.
REFERENCE BOOKS

B.Sc. APPLIED GEOLOGY
LIST OF NON-MAJOR ELECTIVE COURSES
PAPER V GEOHAZARDS
21UGYN05

COURSE OBJECTIVES:
1. To explain to students about the physical and geological processes causing geohazards. To discuss the methods for quantifying geohazards.
2. To understand the possible consequences as well as risk and disaster management.
3. To make them aware about landslides, floods, tsunamis and earthquakes, for which the geological and physical process were to be discussed.
4. To discuss potential interlinkages between different types of geohazards, disaster prevention and management and quantification and communication of uncertainties.

UNIT-I

UNIT- II

UNIT- III

UNIT- IV
The Ocean-Atmosphere System – Thunderstorms & Tornadoes – Tropical

UNIT- V


REFERENCE BOOKS

B.Sc. APPLIED GEOLOGY

LIST OF NON-MAJOR ELECTIVE COURSES

PAPER V - GROUNDWATER MANAGEMENT AND RAINWATER HARVESTING

21UGYN06

COURSE OBJECTIVE:
1. To impart knowledge of global and national scenarios of water resources and associated challenges.
2. To familiarize about occurrence and movement of sub-surface water. Also to train students about various groundwater management techniques.
3. To understand the importance of rainwater harvesting for water supply and will learn about different types of rainwater harvesting systems.
4. To get familiar with different potential uses of rainwater and understand the advantages and limitations.

UNIT- I


UNIT- II

Parameters of groundwater balance – Conjunctive and Consumptive use.
Modeling Techniques in groundwater management. Groundwater resources evaluation in India. Estimation of recharge components.

UNIT- III

UNIT- IV

UNIT-V

REFERENCE BOOKS

B.Sc. APPLIED GEOLOGY

GEOLOGICAL FIELD WORK
It is an integral part of the course students should be taken to a field training course 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 areas and familiarize with Paleontological and Stratigraphical aspects, 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 Tamil Nadu includes 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. APPLIED GEOLOGY
ALLIED GEOLOGY PAPERS
ALLIED GEOLOGY–I
21UGYA01

UNIT- I


UNIT-II


UNIT- III

UNIT- IV


UNIT-V


REFERENCE AND TEXTBOOKS


B.Sc.APPLIED GEOLOGY
ALLIED GEOLOGY PAPERS
ALLIED GEOLOGY
21UGYA02

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 Tiruchirappalli 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


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.

REFERENCE AND TEXTBOOKS

B.Sc. APPLIED GEOLOGY
ALLIED GEOLOGY PAPERS
ALLIED GEOLOGY PRACTICAL


