

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**

**COURSE CURRICULUM  
COURSE TITLE: MINING GEOLOGY-II  
(Code: 3342202)**

|  |                                  |
|--|----------------------------------|
| <b>Diploma Programme in which this course is offered</b> | <b>Semester in which offered</b> |
| Mining Engineering                                       | 4th Semester                     |

### 1. RATIONALE

The mining diploma pass outs have to plan, carryout mining of rocks, ores, minerals, etc. economically, which involves knowledge and skills of nature and quantum of such deposits based on proper studies and assessment. This course empowers students with such necessary knowledge and skills of geological deposits and its estimation for economical mining.

### 2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop different types of skills so that student is able to acquire following competency.

- **Estimate various geological formations and geological structures of rocks, minerals and petroleum on/ below earth for mining operations.**

### 3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Explain rock formation and their distribution
- Select the methods of drilling
- Explain different geological maps
- Describe the importance and property of various types of rock formation

### 4. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme<br>(In Hours) |   |   | Total Credits<br>(L+T+P) | Examination Scheme |    |                 |    | Total<br>Marks |
|-------------------------------|---|---|--------------------------|--------------------|----|-----------------|----|----------------|
| L                             | T | P |                          | Theory Marks       |    | Practical Marks |    |                |
| L                             | T | P | C                        | ESE                | PA | ESE             | PA | 150            |
| 3                             | 0 | 2 | 5                        | 70                 | 30 | 20              | 30 |                |

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

**5. DETAILED COURSE CONTENT**

| <b>Unit</b>                                | <b>Major Learning Outcomes</b><br>(in cognitive domain)  | <b>Topics and Sub-topics</b>  |
|--|--|---|
| <b>Unit – I<br/>Stratigraphy</b>           | <p>1a. Describe the importance and property of various types of rock formation.</p> <p>1b. Explain geographical distribution of rock formations.</p> <p>1c. Explain stratigraphy of the Gondwana group of rocks.</p> | <p>1.1 Physiographic Divisions of India, knowledge of standard Geological time scale including added columns of Indian Equivalent systems (Peninsular &amp; Extra peninsular), the economic importance of Major Indian systems, Important events in Indian subcontinent recorded all through the Geological ages.</p> <p>1.2 Definitions of Archean Dharwars, Tertiaries</p> <p>1.3 Archean / Dharwarian / Tertiary stratigraphy<br/>of a) Gujarat b) Rajasthan<br/>c) Madhyapradesh d) Maharashtra.</p> <p>1.4 Economic importance of Archea Dharwarian, Tertiary rocks of India.</p> <p>1.5 Stratigraphy of the Gondwana group of rocks/ System, what are Gondwana rocks? Why they are called a group of rocks rather than a system? Their distribution in India, classification Gondwana land, full succession of Gondwana Rocks (Table) Description of lower Gondwanas (with special reference to Eastern Indian coal Bearing stages), important plant fossils of lower Gondwanas. Economic Importance of Gondwana rocks.</p> |
| <b>Unit – II<br/>Economic Fuel Geology</b> | <p>2a. Define the rock</p> <p>2b. Explain the origin, formation and properties various types of coal forming rocks.</p>  | <p>2.1. Definition of coal, Rank of coal, whether coal is " Rock or " Mineral, cyclic order of coal formation, pattern of deposition in the Damodar valley Area.</p> <p>2.2. Origin of coal In-situ &amp; drift theory with special reference to the origin of coal in the Indian subcontinent Name the places of Occurrence of coal.</p> <p>2.3 Formation of coal (Brief knowledge) Biochemical stage or Humification process &amp; Geological stage or coalification process.</p> <p>2.4. General knowledge of different coal / Lignite fields of India.</p>  |
| <b>Unit – III<br/>Oil Mining</b>           | <p>3a. Explain the formation and distribution of petroleum resources</p>   | <p>3.1 Properties and origin of petroleum.</p> <p>3.2 Trap formation.</p> <p>3.3 Introduction of important onshore</p>  |

| Unit                                     | Major Learning Outcomes<br>(in cognitive domain)  | Topics and Sub-topics   |
|--|---|---|
|  | <p>of the country.</p> <p>3b. Describe the extraction procedure with suitable diagram.</p>  | <p>and offshore oil field of India.</p> <p>3.4 Details of oil fields of the cambay-basin and other petroleum resources of Gujarat.</p> <p>3.5 Methods of Drilling.</p> <p>3.6 Primary &amp; secondary methods of oil Production.</p>  |
| <b>Unit – IV<br/>Ore Genesis</b>         | <p>4.a Classify the minerals.</p> <p>4.b Define the ore listed in 4.1.</p> <p>4.c Explain formation of ore and different mineral deposits included under the following four occurrences classes (with special reference to Indian if any) Viz.</p> <p>(i)Igneous Mineral Deposits</p> <p>(ii)Sedimentary Mineral Deposit</p> <p>(iii) Metamorphic Mineral Deposit</p> <p>(iv) Secondary Enriched Mineral Deposit.</p> | <p>4.1 Definition of ore, ore mineral, Gangue mineral, Tanor of ore, Metallogenetic epochs &amp; provines.</p> <p>4.2. Process of ore formation Knowledge of all the processes of formation of different Mineral Deposits included under the following four occurrences classes (with special reference to Indian if any)</p> <ol style="list-style-type: none"> <li>i. Igneous Mineral Deposits</li> <li>ii. Sedimentary Mineral Deposit</li> <li>iii. Metamorphic Mineral Deposit</li> <li>iv. Secondary Enriched Mineral Deposit.</li> </ol> |
| <b>Unit – V<br/>Economic Geology</b>     | <p>5a.Describe various minerals and metals with their uses and importance.</p>  | <p>5.1 Knowledge of different ore minerals of Important Metals, Use of extracted metals, Rock association of important ore deposits.</p>  |
| <b>Unit – VI<br/>Geological Mapping</b>  | <p>6a.Explain various geological maps.</p> <p>6b.Explain structures on a through geological map.</p>  | <p>6.1 Introduction to Topographic maps, Contour maps, Geological maps and various land forms.</p> <p>6.2 Brief knowledge of the reorganisation of the following structures on a geological map.</p> <ul style="list-style-type: none"> <li>- Horizontal, inclined, vertical beds.</li> <li>- Folds, faults, unconformity and igneous injections.</li> </ul>  |
| <b>Unit – VII<br/>Geology Of Gujarat</b> | <p>7a.Describe geology of Gujarat in terms of rock formation and economic importance.</p>   | <p>7.1 Major rock formations of Gujarat.</p> <p>7.2 Economic geology of Gujarat with special reference to lignite, oil deposits, limestone's &amp; Multi-metal deposits.</p>  |

**6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)**

| Unit         | Unit Title            | Teaching Hours | Distribution of Theory Marks |           |           |             |
|--------------|-----------------------|----------------|------------------------------|-----------|-----------|-------------|
|              |                       |                | R Level                      | U Level   | A Level   | Total Marks |
| I.           | Stratigraphy          | 6              | 7                            | 3         | 4         | 14          |
| II.          | Economic Fuel Geology | 6              | 5                            | 2         | 3         | 10          |
| III.         | Oil Mining            | 4              | 3                            | 1         | 2         | 06          |
| IV.          | Ore Genesis           | 8              | 4                            | 2         | 2         | 08          |
| V.           | Economic Geology      | 8              | 5                            | 2         | 3         | 10          |
| VI.          | Geological Mapping    | 4              | 6                            | 2         | 4         | 12          |
| VII.         | Geology of Gujarat    | 6              | 5                            | 2         | 3         | 10          |
| <b>TOTAL</b> |                       | <b>42</b>      | <b>35</b>                    | <b>14</b> | <b>21</b> | <b>70</b>   |

**Legends:** R = Remember; U = Understand; A = Apply and above levels (Bloom's Revised taxonomy)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

**7. SUGGESTED LIST OF EXERCISES/PRACTICAL**

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies / programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

*Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.*

| S. No.       | Unit No. | Practical/Exercise   | Approx. Hrs. Required |
|--------------|----------|--|-----------------------|
| 1            | I        | Find out important detail from Geological Time Scale.  | 4                     |
| 2            | I        | Prepare a sheet showing Stratigraphy and rock formation in Gujarat.                                  | 4                     |
| 3            | III      | Collect and record important feature of Earth Materials and classify them.                           | 6                     |
| 4            | IV       | Draw a sheet showing Geographic, and Geological Classification of Economic Minerals & Rock in India. | 4                     |
| 5            | VI       | Determine and sketch various deep and gradient of land using Brunton compass and clinometers.        | 4                     |
| 6            | VI       | Prepare Topographical & Contour maps and Sections.   | 4                     |
| 7            | VII      | Prepare a sheet showing various Land Forms.  | 2                     |
| <b>Total</b> |          |  | <b>28</b>             |

**8. SUGGESTED LIST OF STUDENT ACTIVITIES:**

- i. Student should visit coal mine area and study nature of deposits and prepare maps.
- ii. Student should visit nearby mineral deposit /mine to study and report the nature and quantum of deposits.
- iii. Students should visit websites of important companies such Coal India, GMDC, Neyveli Lignite Corporation Limited etc.

**9. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)**

- i. Show videos/animation films.
- ii. Arrange site visits.
- iii. Give Internet based Assignments.
- iv. Give a topic of geology for Group Discussion.
- v. Give some special condition of geology for drawing a sheet to show all details including special features of the ground.

**10. SUGGESTED LEARNING RESOURCES:****A List of Books**

| S. No. | Title of Books  | Author                 | Publication         |
|--------|---|------------------------|---------------------|
| 1      | Geology of India & Burma                                  | M. S. Krishnan         | Latest publication  |
| 2      | Economic Geology  | Sen & Ghua             | Latest publication  |
| 3      | India Mineral Resources                                   | D. K. Banerjee.        | Latest publication  |
| 4      | Mineral Resources & India                                 | S. Krishna swamy       | Latest publication. |
| 5      | Geology of Gujarat  | G.S.I. Publication)    | G.S.I. Publication. |
| 6      | Ore deposits of India                                     | Gokhale & Rao.         | Latest publication. |
| 7      | Introductions to the Geology of coal & Indian coal fields | N.L.Sharma & Ram K.S.V | Latest publication  |
| 8      | Elements of Geological Maps                               | Chadha S. K            | Latest publication. |

**B. List of Major Equipment/Materials:**

- i. Geological models.
- ii. Various types of rocks specimen.
- iii. Brunton compass and clinometers.
- iv. Various types of structural models showing dip, strike, fault, fold etc.

**C List of Software/Learning Websites:**

- i. <http://en.wikipedia.org/wiki/Geology>
- ii. <http://geology.about.com/>
- iii. <http://geology.com/>
- iv. [www.youtube.com](http://www.youtube.com)
- v. [www.nptel.com](http://www.nptel.com)

**11. COURSE CURRICULUM DEVELOPMENT COMMITTEE****Faculty Members from Polytechnics:**

- **Prof. S.G Srivastav**, I/c HOD, Department of Mining Engineering, G. P. Bhuj.
- **Prof. R.G Prajapati**, Lecturer, Department of Mining Engineering, G.P. Bhuj.

**Coordinator and Faculty Members from NITTTR Bhopal**

- **Dr. K .K Jain**, Professor and Dean, department of Mechanical Engineering.
- **Dr. C. K. Chug**, Professor and Dean, department of Mechanical Engineering.