

**GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT**  
**Course Curriculum**  
**MINING GEOLOGY- I**  
**(Code: 3332203)**

Diploma Programme in which this course is offered	Semester in which offered
Mining Engineering	3rd Semester

### 1. RATIONALE:

The Mining Engineering are involved in the mine development, supervision of mining operations, etc. Being Mining Diploma graduate, he/she should be able to identify various minerals, their recovery process, utility, occurrences, origin, etc. They should also identify and differentiate various kinds of rocks, their formation, joints, folds and problems. This course attempts to teach knowledge of geology required for mining, and hence it is a core course for all mining engineers.

### 2. COMPETENCY: (Programme Outcome according to NBA Terminology):

The course should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency:

- **Supervise Mine Development and Mining Operations based on knowledge and skills of Mining Geology**

### 3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				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

#### 4. COURSE DETAILS

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA)	Topics and Sub-topics
<b>Unit – I : General Geology</b>	1.a Describe Geology and its importance in mining. 1.b Describe solar system. 1.c Explain origin, age & interior of the earth.	1.1 Geology: definition, Branches 1.2 Importance of Geology for Mining. 1.3 Brief introduction of solar system. 1.4 Origin of Earth-Classification and various theories related to this. 1.5 Explanation from history & organic evaluation, rate of sedimentation, salinity of sea water, rate of cooling, radiometric dating.
<b>Unit – II : Physical Geology</b>	2.a Explain Weathering & its types. 2.b Explain different types of soils..	2.1 Physical & Chemical Weathering. 2.2 Soil profile, soils types, like Residual and Transported soil. 2.3 Introduction of works of wind, stream, sea & Glaciers. 2.4 Introduction of volcanoes & Earth quakes.
<b>Unit – III : Primary Structures</b>	3a. List different types of primary structures & textures & its significance.	3.1 Definition, classification into Major & Minor types 3.2 significance of studying all such primary features 3.3 Why they are called Top & Bottom? 3.4 Description of different important primary features.
<b>Unit – IV : Attitude of Beds Advance Form Controls</b>	4a. Explain Dip, Strike & types of both.	4.1 Define-strike, Dip, angle of dip, & direction of dip, initial dip, True dip & apparent dip.
<b>Unit – V : Secondary Structures</b>	5.a Explain Different types of geological Disturbances. 5.b Describe three dimensional diagrams of folds. 5.c Explain geological joints. 5.d Explain Faults in Geology	5.1 Geological folds: origin, categories of folds, parts of folds, Nomenclature of different folds 5.2 Description with three dimensional diagrams. Preconsolidation of folds in the field, on geological Map, Underground. 5.3 Geological joints: description of some important joints. 5.4 Faults in Geology: Distinction between joints & fault, origin, classification, Description of important faults with three dimensional figures. 5.5 Different types of Unconformity- Definition with three dimensional sketches.

Unit	Major Learning Outcomes (Course Outcomes in Cognitive Domain according to NBA)	Topics and Sub-topics
<b>Unit – VI : Crystallography &amp; Mineralogy</b>	6a. Explain Classification & Physical properties of different minerals.	6.1 Definition of crystal & Mineral 6.2 Classification of crystal systems & classification of Minerals 6.3 Physical properties of Minerals 6.4 Description of important Rock forming & Economic Minerals in terms of their physical properties & chemical composition.
<b>Unit – VII : Petrology</b>	7.a Describe different types of rocks. 7.b Explain formation and characteristics of Igneous Rocks. 7.c Explain formation, Different classes, and characteristic properties of sedimentary rocks. 7.d Explain occurrences of various rocks in India. 7.e Explain Characteristic & properties of metamorphic rocks.	6.1 Kinds of Rocks: description & comparison of Igneous, sedimentary, Metamorphic rocks 6.2 Igneous Rocks: Mode of formation, classification, Characteristics, properties. Effect of igneous injections on sedimentary rocks like coal seams. 6.3 Sedimentary Rocks: Formation, Different classes, characteristic properties of sedimentary rocks. 6.4 Metamorphism & Metamorphic rocks: Characteristic & properties. 6.5 Important Igneous, sedimentary & metamorphic rocks : Megascopic studies only, their uses of & occurrence in India with particular reference to lignite, lime stone, Multi metal & other major minerals occurring in Gujarat & other major mineral deposits of India.

### 5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1.	General Geology	04	2	4	4	10
2.	Physical Geology	04	2	4	4	10
3.	Primary Structure	03	2	2	2	06
4.	Attitude of beds	03	2	2	2	06
5.	Secondary Structures	08	2	4	4	10
6.	Crystallography & Min.	10	3	5	6	14
7.	Petrology	10	3	5	6	14
<b>Total</b>		<b>42</b>	<b>16</b>	<b>26</b>	<b>28</b>	<b>70</b>

### 6. SUGGESTED LIST OF EXERCISES/PRACTICAL:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of practical skills (**Course 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 course outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of **Programme Outcomes/Course Outcomes in affective domain** as given in a common list at the beginning of curriculum document for this programme. Faculty should refer to that common list and should ensure that students also acquire those Programme Outcomes/Course Outcomes related to affective domain.

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs. Required
1	II.	Observe samples of minerals and study and record their physical properties.	04
2	IV.	Determining the Specific Gravity of Minerals by various methods	02
3	VII.	Observe samples of igneous Rocks with Tabular Classification Megascopically and record their properties.	04
4	VII.	Observe samples of sedimentary Rocks with Tabular Classification Megascopically and record their properties.	04
5	VII.	Observe samples of Metamorphic Rocks Megascopically and record their properties.	04
6	VI.	Study and Identify important Rock forming Minerals in Hand Specimen	04

S. No.	Unit No.	Practical/Exercise (Course Outcomes in Psychomotor Domain according to NBA Terminology)	Approx. Hrs. Required
7	VI.	Observe samples of important Economic Minerals in Hand Specimen	04
8	V.	Draw sketch of model showing different types of Faults, Folds and their relations to photography.	02
Total			28

## 7. SUGGESTED LIST OF STUDENT ACTIVITIES:

- i. Report Writing
- ii. Mini Projects.
- iii. Field Visit (nearby mines)

## 8. SPECIAL INSTRUCTIONAL STRATEGIES (If Any)

- i. Video Film on Origin of Earth and development of Earth's crust.
- ii. Group Discussion
- iii. Model Studies

## 9. SUGGESTED LEARNING RESOURCES

### (A) List of Books:

S. No.	Title of Books	Author	Publication
1.	General & Engineering Geology	Parbin Singh	SK Kataria & Sons
2.	Engineering Geology	K. M. Banger	Standard Publications, New Delhi
3.	Engineering Geology	R. S. Khurmi	Dhanpat Rai & Co. (P) Ltd.
4.	Rutley elements of Mineralogy	H. H. Read	Thomas Murby & Co. London
5.	Principle of Petrology	Tyrell	Chapman and Hall Publication
6.	Physical Geology	Dutta	Macmillan Publishers Ind. Ltd.
7.	Textbook of Geology	G.B.Mahapatra	CBS Publishers And Distributors
8.	Igneous & Metamorphic rocks	Berry \ Mason	Hoffman Laboratory, Harvard University, Cambridge,
9.	Structural Geology	M. P. Billings	Prentice-Hall Publication

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

- i. Mineral & Rock Model and Formation Specimen
- ii. Petro graphic microscope and films

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

- i. [http://en.wikipedia.org/wiki/Fold\\_\(geology\)](http://en.wikipedia.org/wiki/Fold_(geology))
- ii. <http://geology.com/>
- iii. <http://cgm.ncode.in/SitePages/Home.aspx>
- iv. <http://mining.crusherplants.com/project/geology-equipment.html>
- v. <http://emg.geoscienceworld.org/content/currentwww.garmin.com>
- vi. <http://www.scribd.com/doc/33735339/Sedimentary-Structures-Syn-Depositional>

**10. COURSE CURRICULUM DEVELOPMENT COMMITTEE****Faculty Members from Polytechnics**

- **Prof. S.G. Srivastav**, I/c HOD, Department of Mining Engineering, G.P. Bhuj
- **Prof. P.Y. Trivedi**, Lecturer, Department of Mining Engineering, G.P. Bhuj
- **Prof. M .V. Ramanuj**, Lecturer, 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 Pathak**, Professor. Dept. of Civil and Environment Engineering
- **Prof. P. Verma**, Professor and Co-ordinator for State of Chattishgarh,