



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Mining Engineering

Course / Subject Code: DI01022011

Course / Subject Name: Mining Geology

w. e. f. Academic Year:	2024-25
Semester:	1 <sup>st</sup>
Category of the Course:	PCC-01

<b>Prerequisite:</b>	Basic knowledge of earth science
<b>Rationale:</b>	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.

## Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Analyze earth formation, weathering, and natural forces for causes, effects, and products.	R, U, N
02	Identify various types of geological disturbances.	R, U, A
03	Analyze different rocks formations, structures, and textures.	R, U, A, N
04	Examine properties of minerals, their distribution and economic significance.	R, U
05	Evaluate hydrology, classify groundwater, understand aquifers' geological role.	R, U, E

\*Revised Bloom's Taxonomy (RBT)

## Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR		Theory		Tutorial / Practical		
			ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)		
3	0	2	4	70	30	20	30	150



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## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Introduction to Geology and Physical Geology:</b> 1.1 Origin of Earth and Internal structure of Earth 1.2 Geology and its branches, benefits of geology in Mining Industry. 1.3 Weathering, its types and different processes. 1.4 Introduction of works of winds, stream, sea & glaciers. 1.5 Volcanoes: types, causes, effects and its products.	07	19%
2.	<b>Primary and Secondary structures:</b> 2.1 Define: Outcrop, in crop, Bedding, dip, strike and contours. 2.2 Geological folds: origin, parts of fold and its classification. 2.3 Geological joints: origin and its classification. 2.4 Faults in geology - origin, parts of fault and its classification. 2.5 Different types of unconformities	10	20%
3.	<b>Petrology:</b> 3.1 Rock & its types, basic formation process of rocks and examples of various types of rocks. 3.2 Igneous rocks- its structures & textures. 3.3 Sedimentary rocks - its structures & textures. 3.4 Metamorphic rocks- its structures & textures.	10	22%
4.	<b>Minerology:</b> 4.1 Minerals - Physical & chemical properties. 4.2 Distribution of minerals in India. 4.3 Economic importance of minerals.	09	19%
5.	<b>Hydrogeology:</b> 5.1 Hydrological cycle: process involved in the cycle 5.2 Hydrological properties of rocks – permeability, porosity and specific yield, 5.3 Groundwater, Sub-surface classification of ground water and description of groundwater as Erosional and Depositional agent 5.4 Classification of aquifers.	09	20%
	<b>Total</b>	<b>45</b>	<b>100</b>



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## Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
40%	30%	15%	10%	5%	--

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

## References/Suggested Learning Resources:

### (a) Books:

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	A Text book of Geology	G.B. Mahapatra	CBS Publishers and Distributors Pvt. Ltd. ISBN:- 81-239-0013-9
2	Principles of Engineering Geology	K. M. Bangar	Standard Publishers Distributors ISBN:- 81-8014-115-2
3	Engineering & General geology	Parbin Singh	S.K Kataria & Sons ISBN- 9788188458516
4	Engineering Geology and Rock Mechanics	Dr. B. P. Verma	Khanna Publishers ISBN:- 978-93-87394-15-5
5	Text Book of Physical Geology	G.B. Mahapatra	CBS Publishers and Distributors Pvt. Ltd. ISBN:- 81-239-0110-0

### (b) Open-source software and website:

1. <http://emg.geoscienceworld.org/content/current>
2. [http://en.wikipedia.org/wiki/Mineral\\_exploration](http://en.wikipedia.org/wiki/Mineral_exploration)
3. <https://nptel.ac.in/courses/123/105/123105007/>
4. <https://en.wikipedia.org/wiki/Petrology>
5. Website - <https://micromyearth.com/> URL: - <https://visible-geology.appspot.com/>
6. website- [vlab.co.in](http://vlab.co.in), URL:- <https://mg-nitk.vlabs.ac.in/>

## Suggested Course Practical List:

Sr. No.	Practical list	Unit No.	No. of Hours
1	Identify various geological structures	1, 2	4
2	Plot different landforms from given contours	2	4
3	Draw Longitudinal profile of given contours	2	6
4	Identify different minerals based on Physical Properties	4	6
5	Locate various types of mineral occurrences on map	4	6



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Sr. No.	Practical list	Unit No.	No. of Hours
6	Plot sub-surface Hydrological profile	5	4
<b>Total</b>			<b>30</b>

## List of Laboratory/Learning Resources Required:

Sr. No.	Name of Resources required	Practical No.
1	Virtual labs for Mining Geology ( <a href="https://mg-nitk.vlabs.ac.in">https://mg-nitk.vlabs.ac.in</a> )	1,2,3,4
2	Virtual labs: <a href="https://micromyearth.com/geology-resources/geology-labs">https://micromyearth.com/geology-resources/geology-labs</a>	1,2,3,4
3	Models of Fold, Fault and Joints	2 & 3
4	Set of different Mineral Samples.	4
5	Moh's Scale Hardness Testing Box	4
6	Graph paper, political map, colors and basic stationary	2,3,4,5

## Suggested Project List:

1. Build a Chart showing advancement in geological activity.
2. **Primary structure:** Build a model of primary structure.
3. **Secondary structure:** Build a model of secondary structures.
4. Practice stimulation and Plotting of Longitudinal profile of various geological disturbances and structures.
5. Prepare a report showing various structures and its detailing. Website - <https://micromyearth.com/> URL: - <https://visible-geology.appspot.com/>
6. Study and report preparation of plotting of various structures by using Virtual Labs by Ministry of Education, website- [vlab.co.in](http://vlab.co.in), URL:- <https://mg-nitk.vlabs.ac.in/>
7. Visit to nearby geological site and study various aspects related to environment and sustainable development and prepare a report of it.
8. Prepare a chart showing Hydrological cycle.



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## **Suggested Activities for Students:**

1. Prepare report on various issues related to geological activities.
2. Prepare specification table for different types of minerals and rocks.
3. Prepare clay models of various geological disturbances.
4. Give seminar on any relevant topic.
5. Publish a research paper on themes related to geological advancement.
6. Submit a report on visit to a geological site.
7. Undertake micro-projects.
8. Practice various lab models on virtual labs.

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