GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Bachelor of Engineering

Level: UG

Branch: Mining Engineering

Subject Code: BE03022041

Subject Name: Mining Geology-I

w. e. f. Academic Year:	2024-25
Semester:	3
Category of the Course:	BSC

Prerequisite:	Nil
Rationale:	Mining Geology-I is the basic study of earth and briefs about various minerals and their properties. It also covers the knowledge about structural geology which helps in mining activities. Geological information are very helpful to mining engineers for finding the best way of mineral extraction and planning.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT level
1	To understand the physical properties of minerals and to identify them.	Understand
2	Knowing about internal structure of earth and geomorphic processes.	Understand
3	To know the structural geology and its impact	Apply

Teaching and Examination Scheme:

Teaching - Learning Scheme (in Hours per Semester)					Total Credits = TH/30	Assessment Pattern and Marks					Total Marks
						Theory		Tutorial / Practical			
L	T	P	PBL*	TH		ESE (E)	PA (M)	PA/ (I)	PBL (I)	ESE (V)	
45	0	30	45	120	04	70	30	20	30	50	200

Where L = Lecture, T= Tutorial, P= Practical, TW/SL = Term-Work / Self-Learning, TH = Total Hours, ESE = End-Semester Examination, PA = Progressive Assessment

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Earth Science & Engineering Geology:- Earth Science and its branches, Origin of Earth. Earth as a planet in the Solar System, Internal Structure of the Earth. Introduction to geological Engineering, Branches of geology, scope of geology in Mining engineering. The theory of Plate tectonics, Continental drifts, Mid-	04	09

	oceanic ridges. Island archs, Applications of the Plate tectonic theory.		
2.	Degradational Geomorphic Processes: Weathering its type and agent. Erosion, Denudation and Soil profile. Geological work of river, glaciers, wind, sea and Ground water.	13	29
3.	Mineralogy: Physical properties of minerals. Brief introduction of following mineral families:- Quartz, Feldspar, Mica, Olivine, Pyroxene, Amphibole , Garnate, Physical properties of following rock forming minerals :- Quartz crystal, Jasper, Chert, Biotite, Muscovite, Orthoclase, Plagioclase, Microcline, Augite, Hornblande, Tourmaline, Nepheline, and Corundum. Physical properties of following industrial minerals:- Talc, Gypsum, Fluorite, Apatite, Beryl, Barite, Kyanite, Graphite. Physical properties of following ore minerals: Magnetite, Hematite, Galena sphalerite, Chalcopyrite, Bauxite, Chromite, Wolframite, Pyrolusite, Psilomelence, Pyrite and Pyrrhotite.	13	29
4.	Structural Geology: Bedding plane, Dip and Strike, Folds, Faults and unconformity: terminology classification and identification in the field and map. Geological maps and cross sections.	10	23
5.	**Elements of remote sensing & GIS**. Aerial photo-interpretation for geological exploration in major Engineering projects. Application of RS & GIS in mining engineering. Geological mapping and preparation of Cross Sections, Subsurface exploration with pitting, trenching, shaft sinking and aditing.	5	10
	Total	**45**	**100**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
25	**20**	**20**	**20**	**15**	**-**

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

References/Suggested Learning Resources:

1. A Textbook of Engg. & General Geology, Parbin Singh
2. Engineering Geology, K.M.Bangar
3. Engineering Geology, R.S.Kurmi
4. Physical Geology, Tyrell
5. Textbook of Geology, Dutta

List of Experiments:

(1) Laboratory Samples of various Rocks and Minerals.
(2) Laboratory models for various Geological structures.
(3) Laboratory models for various Geological diturbances.
(4)Geological Maps, sections and charts.
(5) Geological Time Scale of the Earth.
(6) Study of Aerial photography in searching minerals.

*List of suggested activities for Problem Based Learning:

Sl. No.	Name of the activity	No. of hours	Evaluation Criteria
1.	Industry/Research laboratory visit	Visit = 5hrs., Report preparation = 5hrs. Total = 10hrs.	Based on report submitted. Report should contain observations and calculations based on industry/ lab data.
2.	Technical Video based learning related to the subject	Duration of video = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Report /presentation based on the video learning outcomes.
3.	Assignment writing. Numericals based assignment is preferable.	5 assignments of 4hrs. each. Total = 20hrs.	Based on the correctness of submittedassignment.
4.	Problem solving/Coding using C, C++, MATLAB, Python, SCILAB,modeling and Analysis software or any other software	5 small coding-based assignment of 2hrs. each. Total = 10hrs.	Based on the coding solution submitted.
5.	Self-learning online course	Minimum duration of the course should be 10hrs.	Examination based assessment at the end of course. Based on the certificate produced.
6.	Identification and solution of Complex problem	Maximum 2 problems. Study of the problem and solution finding, Total = 10hrs.	Based on the depth of the solution submitted.
7	Videos on Industrial safety/Disaster Management aspects based on subject	Duration of video = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Based on quiz/report submitted
8	Technical paper reading and summarization of research papers based on relevant subject	5 research papers = 20 hrs.	Summarize research paper and evaluation critical parameters

9.	Poster/chart/power point preparation on technical topics	Duration = 6 hrs.	Based on poster/chart preparation and presentation skills
10	Working/non-working model on technical topics	Working = 12 hrs. Non- working = 8 hrs.	Based on inter department/external evaluation
11	Industrial exposure for 2-3 days to observe and provide tentative solutions on society/environment/health/sustainability/any other issue	Duration = 15 hrs. for industrial exposure Problem identification and tentative solution = 10 hrs. Total = 20 hrs.	Based on evaluation of critical problems and solutions
12	Group Discussion on emerging/trending technical topics based on subject	Duration = Min. 1 hr.per subject. Max. 3 hrs. per subject	Based on performance in group discussion, technical depth, knowledge etc.
13.	Real world case studies-based learning	Duration of data collection/study = 5hrs. Report preparation = 5hrs. Total = 10hrs.	Based on in-depth study, technical depth, data collected, fact finding, etc.
14.	Application/Software development	Duration = 10 hrs.	Depending on the complexity of the Application/Software
15.	Research paper publication	Duration = 10 hrs.	Based on submission of proof of publication
16.	Upgradation/Reverse engineering studies of existing equipment of the laboratory	Duration 10 hrs.	Based on the performance of the equipment
17.	Expert lecture/session	Duration 3 hrs. For attending the lecture/session– 2 hrs. and for report writing 1 hr.	Based on the proof of attendance and report submitted
18.	Annotated Video Explanation of Concept/Problem	10h (Preparation + Recording + Submission)	Based on accuracy of explanation, clarity, and presentation style.
19.	Patent Search and Innovation Gap Identification	10h (Search + Report)	Based on number of relevant patents analyzed and identification of innovation scope.

Note:

- All the suggested activity should be related to the subject.

- The number of hours are suggestive. Faculty can sub-divide the number of hours based on the activity. However, total number of hours is fixed.
- Rubrics for the evaluation can be prepared by the faculty.
- Subject teacher can add the relevant activities other than those listed above, with the consent of head of the department and DQAC.
- All records pertaining to the evaluation and assessment of self-learning activities must be properly maintained and preserved at the institute level. These records should be made available to the university upon request.
- Institutes are encouraged to utilize digital platforms, such as Microsoft Teams, for effective record-keeping and to ensure transparency in the evaluation and assessment of self-learning activities.

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