GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2022 (COGC-2022)
Semester-IV

Course Title: Mining and Processing of Dimensional Stone
(Course Code: 4342205)

Diploma programme in which this course is offered	Semester in which offered
Mining Engineering	4th Semester

1. RATIONALE

The diploma holders in mining engineering will be responsible to manage all the dimensional stone mining operation. In additions to this they should also know the marketability of dimensional stone in any sphere of the work and keep environment safe from all mining operations and maintain comfortable working conditions. This subject provides them basic knowledge about occurrence and properties of various stones found in India and development of mine and procurement of various machineries used in stone mining industries.

2. COMPETENCY

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

i. Plan proper mining operation and select appropriate sizes of dimensional stone for a particular mining condition to improve marketability of stones.

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

i. Illustrate various properties of dimensional stones.
ii. Assess the different design and development of dimensional stones.
iii. Explain the use of difference machineries as per their applications in dimensionalstone mining.
iv. Explain the environmental impact due to mining and processing of dimensionalstones and describe the remedial measures.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T/2+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA*	ESE	CA	ESE	
3	-	-	4	30	70	00	00	100

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be

taken during the semester for the assessing the attainment of the cognitive domain UOs required for the attainment of the COs.
***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. UNDERPINNING THEORY

Unit	Unit Outcomes (UOs)	Topics and Sub-topics
Unit – I **Resources & Characterization of Dimensional Stones**	1a.Explain geological distribution of stone in India. 1b.Describe the Examination procedure of Physico-Mechanical properties of dimensional stones. 1c.State the selection of right type of stone for a particular purpose.	1.1 Resources of Marble, Granite, Slate,Sandstone and Limestone as Dimensional stones in India. 1.2 Geological, Mineralogical and Physico-Mechanical properties of dimensional stones. 1.3 Criteria for selection of dimensionalstone deposit.
Unit- II **Mining Operations**	2a.Explain the adoption of a particular method of mining for different stones. 2b.Describe the various activities of mining during extraction.	2.1 Conventional mining of Sandstone, Limestone, Marble and Granite, Mining Machineries: Diamond wire saw, Chain saw, Flam jet burner, Water jet technique, Derrick Crane, Hole finder system, etc. 2.2 Blasting techniques in dimensional stone mines, various types of explosive used, controlled blasting for providing horizontal & vertical cut.

Unit- III **Processing**	3a.Explain working of different machines, their problems and remedies. 3b.Explain different activities for dimensional stone required after mining. 3c.State the parameters selectionof right type of stones for right type of job.	3.1 Different machineries for processing:- Dressing, Sawing- Diamond gang saw, Circular saw, preparation, mounting of blade/ discs and segments. 3.2 Different activities for Dimensional stone :- Polishing-Manual and mechanical, various types of Polishing machine. Tile preparation, Automatic tiling Plant. 3.3 Abrasive- type, use and selection.
Unit- IV **Environmental Impact and Remedies**	4a.Describe the Environmental impact of mining and processing of dimensional stones. 4b.State the Secondary use of quarried land and Waste from the industry. 4c.List the steps to assess environment problems due to stone mining and describe the remedial measures.	4.1 Environmental impact of mining and processing of dimensional stones. 4.2 Secondary use of quarried land and waste from the industry.

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A	Total Marks
I	Resources & Characterization of Dimensional stones	10	4	6	00	18
II	Mining Operations	12	4	6	02	20
III	Processing	13	5	6	02	20
IV	Environmental impact and Remedies	07	2	5	00	12
Total		**42**	**15**	**23**	**04**	**70**

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

Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course: Students should conduct following activities in group and prepare reports of about 5 pages for each activity, also collect/record physical evidences for their (student's) portfolio which will be useful for their placement interviews:

Following is the list of proposed student activities like:

1. Student will explore internet by visiting websites of reputed mining companies and study the latest trends in dimensional stone mines.

2. Students may prepare report on latest trends in mining of different types of dimensional stones and present it in the class.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES

1. Arrange visit to nearby Dimensional Stone Mines and ask students to prepare a report on different aspects of it.

2. Show video films/pictures of different dimensional stone mines and different procedures/techniques used in these mines.

12. SUGGESTED MICRO-PROJECTS

a) Make a report on various properties of dimensional stones.
b) Case study of marble industries in India.
c) Market Survey of dimensional stones.
d) Make a PPT of Dimensional stone machineries and.
e) Case study of Environmental impact due to dimensional stone mining and Remedial measures.

13. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	Dimensional stone technology	S S Rathore, G S Bhardwaj & S C Jain	Himanshu Publication, Udaipur-Delhi
2	Mining Geology	Agor	Central techno publication

14. SOFTWARE/LEARNING WEBSITES (From Old Syllabus)

a) https://en.wikipedia.org/wiki/Dimension_stone
b) https://www.youtube.com/watch?v=Sa0Z0m4UmYo
c) https://www.slideshare.net/NuhuWyaJr/presentation-on-nigerian-dimension-stones
d) https://www.slideshare.net/mujibnagpuri/marble-processing

e) https://www.sciencedirect.com/

15. PO-COMPETENCY-CO MAPPING

Semester II	Mining and Processing of Dimensional Stone (Course Code:3352206)									
	POs and PSOs									
Competency & Course Outcomes	**PO 1** Basic & Discipline specific knowledge	**PO 2** Problem Analysis	**PO 3** Design/ development of solutions	**PO 4** Engineering Tools, Experimentation &Testing	**PO 5** Engineering practices for society, sustainability & environment	**PO 6** Project Management	**PO 7** Life-long learning	**PSO 1**	**PSO 2**	**PSO 3** (If needed)
Competency	Plan proper mining operation and select appropriate sizes of dimensional stone for a particular mining condition to improve marketability of stones.									
Course Outcomes										
CO a) Illustrate various properties of dimensional stones.	3	2	2	3	-	-	3	-	-	-
CO b) Assess the different design and development of dimensional stones.	3	2	-	1	3	-	3	-	-	-
CO c) Explain the use of difference machineries as per their applications in dimensional stone mining.	3	2	2	2	2	-	2	-	-	-
CO d) Explain the environmental impact due to mining and processing of dimensional stones and describe the remedial measures.	3	3	1	2	3	-	3	-	-	-

Legend: '**3**' for high, '**2**' for medium, '**1**' for low or '**-**' for the relevant correlation of each competency, CO, with PO/ PSO

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

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