GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester-II

Course Title: Ceramic Work Shop
(Course Code: 4325201)

Diploma programme in which this course is offered	Semester in which offered
Ceramic Technology	Second

1. RATIONALE

Diploma Ceramic Engineers are expected to work most in Ceramic Industries. They deal with production of Ceramic Products. This course intends to impart basic know-how of various equipments and their use in manufacturing Process. Ceramic Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the Ceramic industries. This course intends to impart basic know-how of various equipments and their use in different Sections of manufacturing. Since, they should be familiar of different equipments like ball mill, pot mill, magnetic separator, filter press, pug mill, potter's wheel, and jigger and jolly. Manufacture some items by using pop mould, plastic clay. Workshop practice is also important since only practice can make the man perfect. The students are advised to undergo each skill experience with remembrance, understanding and application with special emphasis on attitude of enquiry to know why and how for the various instructions and practices imparted to them in this course.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Create ceramic article models using the basic ceramic workshop tools, machines and clay.**

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:

a) Use ball mill, Pot mill for Mixing and Grinding.
b) Operate, pug mill for Dearing and homogeneous mixing.
c) Prepare two pieces and three-piece moulds of Plaster of Paris.
d) Operate Potter wheel, jigger and jolly in relevant applications.
e) Prepare handmade models of ceramic articles.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (CI+T/2+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
CI	T	P	C	CA	ESE	CA	ESE	
0	0	4	4	0	0	25	25	50

(*):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: ***CI****-Class Room Instructions;* ***T*** *– Tutorial/Teacher Guided Theory Practice;* ***P*** *- Practical;* ***C*** *– Credit,* ***CA*** *- Continuous Assessment;* ***ESE*** *-End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) that are the sub-components of the COs. *Some of the* ***PrOs*** *marked* ***'*'*** *are compulsory, as they are crucial for that particular CO. These PrOs need to be attained at least at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'.*

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Prepare various types of model using plastic clay.		06
2	Prepare crucibles from silica and alumina powder		06
3	Prepare one piece mould by the help of plaster of Paris.		06
4	Prepare Two piece moulds by the help of plaster of Paris.		06
5	Prepare the sample of slurry using pot mill.		04
6	Prepare button from different clays.		06
7	Prepare brick using hand molding process.		06
8	Prepare brick using pressing process.		06
9	Employ/demonstrate the magnetic separation of iron bearing particles.		04
10	Study operation of jaw crusher, roller crusher, edge runner mill to reduce particle size.		06
11	Study operation of filter press for removing water from slip.		04
12	Study operation of de-airing pug mill for homogeneous mixing of clay body.		04
13	Study operation of potter's wheel for making small pottery articles.		04
14	Study operation of jigger and jolly for making plates.		06
	Minimum practical Exercise required#		**56**

Note

i. *More* ***Practical Exercises*** *can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match theCOs.The above table is only a suggestive list.*

ii. *The following are some* ***sample*** *'Process' and 'Product' related skills(more may be added/deleted depending on the course) that occur in the above listed* ***Practical Exercises*** *of this course required which are embedded in the COs and ultimately the competency..*

S. No.	Sample Performance Indicators for the PrOs	Weight age in %

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1	Prepare of experimental setup	20
2	Prepare various ceramic articles models by hand	30
3	Prepare plaster of Paris moulds	20
4	Study operations of various equipments used in ceramic industries.	30
Total		**100**

6. MAJOR EQUIPMENT/ INSTRUMENTS AND SOFTWARE REQUIRED

These major equipment/instruments and Software required to develop PrOs are given below with broad specifications to facilitate procurement of them by the administrators/management of the institutes. This will ensure conduction of practical in all institutions across the state in proper way so that the desired skills are developed in students.

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Digital Balance weighing capacity up to 5kg. (accuracy +/- 1gm)	1,2,3,4,5,6,7,8
2	Rapid pot mill double jar mill grinding capacity 1000ml.	1-10 (All)
3	Filter press slurry holding capacity 200 liters/hr	6,7,8,11,12,13,14
4	Pug mill batch capacity 10kg.	5,8,9,10
5	Potter's wheel with 10" wheel diameter.	13
6	Jigger and jolly with 12" wheel head.	14
7	Cylindrical Magnetic s separator length 12" and diameter 2"	1,2,3,5,9,11,12, 13,14
8	Hot air oven Temperature Ambient up to 250 °C	1,2,3,4
9	Furnace working temperature 800-1000°C	1,2
10	Hydraulic Button press machine	6

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above mentioned COs and PrOs. More could be added to fulfill the development of this competency.

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Practice environmental friendly methods and processes.

The ADOs are best developed through the laboratory/field based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.

iii. 'Characterization Level' in 3rd year.

8. 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 small reports (of 1 to 5 page for each activity). For micro project report should be as per suggested format, for other activities students and teachers together can decide the format of the report. Students should also collect/record physical evidences such as photographs/videos of the activities for their (student's) portfolio which will be useful for their placement interviews:

a) Prepare charts for various equipments.
b) Collect data for principal and functions of various ceramic equipments from internet.
c) Give seminar on any relevant topics
d) Library survey to study about the basics of ceramics.
e) Industrial visit to observe the working and manufacturing process.

9. SUGGESTED LEARNING RESOURCES

S. No.	Title of Book	Author	Publication with place, year and ISBN
1	The Ceramics Bible	Louisa Taylor	Chronicle Books; Illustrated ISBN-13 : 978-1452101620
2	Industrial Ceramics	Sonia S. Singer, Felix Singer	Springer Netherlands ISBN : 978-94-017-5257-2
3	Pottery for Beginners	Kara Leigh Ford	Page Street Publishing ISBN-10 : 1645673022
4	Ceramic Materials	C. Barry Carter	Springer ISBN-10 : 9781461435228

10. SUGGESTED LEARNING WEBSITES

a) https://en.wikipedia.org/wiki/Pottery
b) https://ceramicartsnetwork.org
c) http://en.wikipedia.org/wiki/ceramic
d) https://sacmi.com/en-US/ceramics

11. PO-COMPETENCY-CO MAPPING

Semester II	Ceramics Workshop (Course Code: 4325201) 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 ***Create ceramic article models using the basic ceramic workshop tools and clay***	3	3	3	2	2	3	3	3	3	
Course Outcomes CO a) Use pot mill for grinding and mixing.	2	2	1	1	1	2	1	2	2	
CO b) operate pug mill for homogeneous mixing.	2	1	1	1	1	1	1	1	1	
CO c) prepare two piece and three piece moulds of plaster of paris.	3	3	3	2	2	2	3	3	3	
CO d)operate potter wheel, jigger and jolly in relevant application.	3	2	2	1	2	2	2	3	3	
CO e)Prepare hand models of ceramic articles.	3	2	2	1	1	2	3	3	2	

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

12. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

S. No.	Name and Designation	Institute	Contact No.	Email
1	Jyothi H.Koti and lecturer	**L.E.Colllege(Diploma),Morbi**	**7359664653**	**jyothikoti.lec@gmail.com**
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