



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052061

Subject Name: Structural Clay Products

<b>w.e.f. Academic Year:</b>	2025-26
<b>Semester:</b>	4 <sup>th</sup>
<b>Category of the Course:</b>	Professional Elective - I

<b>Prerequisite:</b>	Basic knowledge of ceramic raw materials and their properties required before to learn this course.
<b>Rationale:</b>	Diploma Ceramic engineer have to deal with the terracotta material along with method of manufacture of terra cotta products, sanitary wares, defects and remedies and tiles. Hence the course has been design to develop these competencies and its associated cognitive, practical and effective domain learning out comes.

### Course Outcome:

After Completion of the Course Student will able to:

No	Course Outcomes	RBT Level
01	Select suitable raw materials for terracotta products and perform test for it.	U,A
02	Select suitable manufacturing technique for terracotta products.	U,A
03	Select suitable manufacturing process for tile and sanitary ware.	U,A
04	Identify various defects of traditional ceramic and suggest their remedies.	U

\*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		C	Theory		Tutorial/ Practical	
			ESE(E)		PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052061

Subject Name: Structural Clay Products

## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
Unit-I Terracotta products	1.1 Types of terracotta. 1.2 Building bricks, roofing tiles & hollow bricks 1.3 Raw materials used for body preparation 1.4 General properties 1.5 shape, colour, strength, resistance to weathering and colour on firing 1.6 Specification and tests of terracotta products.	06	14%
Unit – II Manufacturing method of terracotta products.	2.1 Method of manufacture for common building bricks, face bricks, blue bricks, paving bricks, sand lime bricks,. 2.2 Method of aging, pugging and souring, various methods of shaping. 2.3 Methods of drying of products and firing techniques 2.4 Kilns used for firing terracotta products	10	22%
Unit – III Tiles	3.1 Introduction of tiles. 3.2 Manufacture of various tiles such as roofing tiles, drain tiles, hollow tiles, etc. 3.3 Raw materials used for various tiles. 3.4 Method of body preparation for various Tiles. 3.5 Methods of shaping of various tiles.	10	22%
Unit –IV Sanitary ware	4.1 Types of sanitary wares, earthen wares and stoneware sanitary wares. 4.2 Details of fire clay sanitary wares and vitreous sanitary wares. 4.3 Raw materials used for manufacture of fire clay sanitary wares, earthenware and vitreous sanitary wares. 4.4 Manufacturing process of various types of sanitary ware.	10	22%
Unit– V Defects and Remedies	5.1 Defects occurred in various types of traditional ceramics such as Pinholes, bubbles, cracks, bloating, crawling, rolling of glaze, shivering, crazing and Dunting, black spots and warpage etc. 5.2 Remedies of various defects occurring in various types of traditional ceramics	09	20%



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052061

Subject Name: Structural Clay Products

## Suggested Specification Table with Marks (Theory):

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Terracotta Products	6	2	4	4	10
II	Manufacturing method of terracotta products.	10	2	5	8	15
III	Tiles	10	2	5	8	15
IV	Sanitary ware	10	2	5	8	15
V	Defects and remedies	9	2	5	8	15
<b>Total</b>		<b>45</b>	<b>10</b>	<b>24</b>	<b>36</b>	<b>70</b>

Distribution of Theory Marks(in%)					
R Level	U Level	A Level	N Level	E Level	C Level
14%	35%	51%	-	-	-

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	Introduction to Ceramics: Fabrication, Characterizations, and Applications	Chandan Das (Author) , Sujoy Bose (Author)	Taylor & Francis Ltd and CRC Press,2024 ISBN:- 9780367750572
2	Heavy clay Technology	F.W.Clews	Academic Press Inc,1969 ISBN:- 9780121763503
3	Fine ceramics	F.H.Norton	McGraw-Hill Inc.,US ,1970 ISBN :- 9780070475373
4	Ceramic glazes	C.W.Parmelee	CBI Publishing Co Inc.U.S , ISBN:- 9780843606096



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052061

Subject Name: Structural Clay Products

## (b) Open source software and website:

1. [https://www.ellementry.com/collections/material-terracotta?srsltid=AfmBOoppzBZjLUvS5BRlqJcB3\\_L4NfpWZsYLFvydJIAPyLS6Y6112HYA](https://www.ellementry.com/collections/material-terracotta?srsltid=AfmBOoppzBZjLUvS5BRlqJcB3_L4NfpWZsYLFvydJIAPyLS6Y6112HYA)
2. <https://www.craftmaestros.com/crafts/terracotta.html?srsltid=AfmBOopcwGN0aMg6BujQIJA6wQrFEAIXJyRTJcNc4-VqAZWUK8xwgfN>
3. <https://mitticool.com/>
4. <https://www.ipsceramics.com/>
5. <https://www.slideshare.net/slideshow/6-processing-of-ceramics-26129717/26129717>
6. <https://www.britannica.com/technology/traditional-ceramics>
7. <https://digitalfire.com/glossary/ceramic+glaze+defects>

## Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Determine the moisture content of given raw materials.	I	2
2	Determine the drying shrinkage of given clay sample.	I	4
3	Determine the water of plasticity of given clay sample.	I	4
4	Determine the loss on ignition test of given raw materials.	I	4
5	Prepare common brick body of given composition by hand molding method.	II	4
6	Prepare Tile body of given composition by pressing method.	III	4
7	Prepare sewage pipe of given composition by extrusion method.	II	4
8	Prepare sanitary ware body of given composition by slip casting method.	IV	4
9	List out various body defects in tile and sanitary ware body.	V	2
10	List out various glaze defects in tile and sanitary ware body.	V	2
17	Visit to a tile or sanitary ware industry and prepare a report.	I to V	4
<b>Minimum Practical Exercises required #</b>			<b>30 Hrs.</b>

## List of Laboratory /Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Digital weight balance	1 to 8
2	Muffle Dryer	2 to 8
3	Hand mould	5
4	Tile pressing machine	6



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052061

Subject Name: Structural Clay Products

S. No.	Equipment Name with Broad Specifications	PrO.No.
5	Lab type pug mill	7
6	Plaster of Paris mould set for casting	8

## Suggested Micro- Project List:

Suggestive lists of the Projects are given here. These have to match the competency and the Cos.

Similar micro- projects could be added by the concerned course teacher:

- 1) Collect different ceramic products sample and identify terracotta, stone ware, earthen ware and porcelain ware group.
- 2) Prepare a chart or report on manufacturing process of different ceramic products.
- 3) Prepare a report on body and glaze defects of ceramic products.

## Suggested Activities for Students:

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 perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

- a) Undertake micro-projects in team/individually.
- b) Visit to Roofing tiles Industry and prepare a report
- c) Visit to Red bricks Industry and prepare a report
- d) Visit to sewage pipe Industry and prepare a report
- e) Visit to glaze tiles Industry and prepare a report
- f) Visit to sanitary wares Industry and prepare a report
- g) Give seminar on any relevant topic.
- h) Collect defected ceramic samples and identify various defects.
- i) Students are encouraged to register themselves in various **MOOCs** such as: **Swayam, edx, Coursera, Udemy** etc to further enhance their learning.

\*\*\*\*\*