GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Ceramic Technology

Subject Code: DI04052051

Subject Name: Advance White Ware

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

Prerequisite:	**NA**
Rationale:	Diploma Ceramic engineers should be able to appreciate the texture effect in white ware products, special ceramic white wares, effect of heat on white wares etc. They have to deal with grain growth during sintering, vitrification process, ceramic colour and decoration for white ware bodies and kiln operations. Hence the course has been design to develop these skills and its associated cognitive, practical and effective domain learning out comes in students.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Describe the scope, applications and recent developments in advanced white ware.	U
02	Explain texture effects, slip properties and the impact of processing methods in white ware.	U
03	Select appropriate manufacturing processes for various special ceramic white wares.	A
04	Explain grain growth, sintering, vitrification and choose suitable firing methods.	A
05	Select raw materials, prepare ceramic colours and apply suitable decoration techniques.	A

**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
				Theory		Tutorial/ Practical		
L	T	PR	C	ESE(E)	PA(M)	PA(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
Unit–I Introduction	1a. Describe the scope of advance white ware. 1b. Discuss the applications of advanced ceramic wares in given situation. 1c. List out newly emerging advanced white ware products.	8	18%
Unit – II Texture Effect	2.1 Introduction 2.2 Texture effect in white wares 2.3 Function of quartz in white wares 2.4 Dewatering of porcelain slip 2.5 Practical control of slip properties, Effect of processing methods on the physical properties of ceramic white wares.	8	21%
Unit – III Special Ceramic White wares	3.1 Introduction 3.2 Specialization in the technology of special ceramic white wares-bone china wares, porcelain wares, chemical wares, sanitary wares, electrical wares and ceramic fibers 3.3 Manufacture process of special ceramic white wares 3.4 Increase in strength of porcelain insulators 3.5 Factors affecting breakdown of electric insulators, Low alkali porcelain as a resistor carrier	10	21%
Unit – IV Grain Growth, Sintering And Vitrification	4.1 Introduction 4.2 Method of grain growth 4.3 Method of sintering 4.4 Details about vitrification in ceramic whitewares 4.5 Factors affecting the vitrification 4.6 Method of biscuit firing and glost firing of ceramic wares	11	21%
Unit – V Ceramic Colours	5.1 Introduction 5.2 Raw materials used for manufacturing of ceramic colours. 5.3 Properties and function of raw materials used in manufacture of ceramic colours 5.4 Method of manufacture of ceramic colours and Factors affecting the properties of ceramic colours 5.5 Preparation of ceramic colours for decoration on ceramic articles 5.6 Factors affecting decoration	8	18%

Suggested Specification Table with Marks (Theory):

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	8	6	4	3	13
II	Texture Effect	8	4	3	7	14
III	Special Ceramic White wares	10	3	5	7	15
IV	Grain Growth, Sintering And Vitrification	11	3	5	7	15
V	Ceramic Colours	8	3	7	3	13
Total		**45**	**19**	**24**	**27**	**70**

Distribution of Theory Marks (in%)					
R Level	U Level	A Level	N Level	E Level	C Level
30%	58%	38%	-	-	-

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 Hand Book of Modern Pottery Manufacture	H.N.Bose	Ceramic Publishing House,Bhagalpur
2	Ceramic glazes	Kenneth shaw	Amsterdam, London, New York, Elsevier
3	Element of Ceramic	F.H.Norton	Addison-Wesley Pub. Co.

4	Ceramic White Wares	Sudhir Sen	Oxford & IBH Pulishing Co., New Delhi
5	Industrial Ceramics	Felix Singer , Sonja S. Singer	Springer Dordrecht

(b) Open source software and website:

a. http://www.gobookee.org/elements-of-ceramics-f-h-norton/
b. http://www.cheminfonet.org/art/ceramics101.pdf
c. http://en.wikipedia.org/wiki/Ceramic_engineering

Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Prepare samples of plaster of Paris mould.	I	6
2	Prepare different sanitary ware body.	III	8
3	Determine the effect of electrolyte and their behavior on clays.	II	4
4	Determine Cold Crushing Strength of given sample.	II	4
5	Determine Crazing test for wall tile sample.	II	4
6	Determine Modulus of Rupture of given sample.	II	4
7	Determine Whiteness test of given sample.	III	4
8	Determine chemical durability of a given sample.	III	4
9	Prepare ceramic stain.	III	6
10	Demonstrate the method of decorating ceramic wares.	III	6
11	Demonstrate the method of glaze application on ware.	IV	6
	Total		**30Hrs**

List of Laboratory/Learning Resources Required:

S. No.	Equipment Name with Broad Specifications	PrO.No.
1	Pot mill, Sieve shaker with sieve set	2,9
2	Digital weight balance	1-11
3	Universal testing machine	4,6
4	Autoclave testing machine	5

S. No.	Equipment Name with Broad Specifications	PrO.No.
5	Whiteness testing machine	7

Suggested Project List:

A suggestive list of Projects is given here. This has to match the competency and the COs. Similar micro- projects could be added by the concerned course teacher:

a) Prepare charts, PowerPoint presentation containing details of various raw materials.

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 about5 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) Encourage Students for creating and designing new products using waste materials.

c) Students are encouraged to register themselves invarious **MOOCs** suchas:**Swayam, edx, Coursera, Udemy**etc to further enhance their learning.

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