

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

**COURSE CURRICULUM
COURSE TITLE: WHITE WARE
(Code: 3345204)**

Diploma Programme in which this course is offered	Semester in which offered
Ceramic Technology	4 th Semester

1. RATIONALE

A diploma ceramic engineer have to deal with drying and firing of white ware articles, they have to work with formulation, calculation of body and glaze mixture, property testing of raw materials and finished products. It is also foundation for next curriculum “Advance White Ware”. Hence the course has been design to develop these competencies and its associated cognitive, practical and effective domain learning out comes.

2. COMPETENCY

The course should be taught and curriculum should be implemented with the aim to develop required skills so that students are able to acquire following competency leading to the achievement of the following competency.

- **Plan and supervise production of white ware of required quality**

3. COURSE OUTCOME (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

- Identify White ware Products
- Prepare different types of glazes
- Remove defects

4 TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	200
3	0	4	7	70	30	40	60	

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit; ESE - End Semester Examination; PA - Progressive Assessment

5. COURSE DETAILS

Unit	Major Learning Outcomes (in cognitive domain)	Topics and Sub-topics
Unit – I Introduction	1a. Identify White ware Products. 1b. Classify White ware products.	1.1 General introduction of white wares. 1.2 Classification of white wares with their characteristics.
Unit – II Batch formulation and Calculation	2a. List out molecular formula of ceramic raw materials, 2b. Describe oxide supply 2c. Calculate Batch composition for body and glaze.	2.1 Molecular formula of various ceramic raw materials, 2.2 Oxide supply to the ceramic bodies, glazes and colours. 2.3 Methods of Batch calculations of various ceramic bodies and glazes i.e. batch recipe, chemical composition, molecular formula and vice-versa.
Unit – III Ceramic glaze and additives	3a. List out different raw materials and additives 3b. Prepare different types of glazes. 3c. Calculate glaze. 3d. Explain control properties. 3e. Describe glaze application methods.	3.1 Different raw materials and additives used in glaze. 3.2 Preparation of glaze and Use of various materials for glaze making. 3.3 Glaze calculation and formulations for glaze preparation. 3.4 Control of glaze properties. 3.5 Method of glaze application.
Unit – IV Properties and Tests	4a. Determine physical properties. 4b. Perform various tests. 4c. Determine drying & firing shrinkage.	4.1 Determination of tensile strength, water of plasticity and water absorption. 4.2 Method for determining modulus of rupture (MOR) test, crazing test and thermal shock resistance. 4.3 Determination of drying and firing shrinkage.
Unit – V Sorting of Various Defects	5a. List out various defects. 5b. Remove defects.	5.1 Detection of various defects. 5.2 Reasons and remedies of defects.
Unit – VI Application of White wares	6a. List out white ware products used in construction. 6b. List out white ware products used in home, industry area 6c. List out white ware products used in electrical field.	6.1 Products used in construction such as wall tiles, floor tiles and sanitary wares. 6.2 Products used in home and industrial applications. 6.3 Products used in electrical applications.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	4	4	3	0	7
II	Batch formulation and Calculation	9	3	6	5	14
III	Ceramic glaze and additives	8	4	5	5	14
IV	Properties And Tests	9	2	6	6	14
V	Sorting of Various Defects	7	1	3	3	7
VI	Application of Whitewares	5	3	6	5	14
Total Hrs		42	17	29	24	70

Legends: L -Lecture; T -Tutorial/Teacher Guided Student Activity; P -Practical; C - Credit; ESE-End Semester Examination; PA -Progressive Assessment

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (**outcomes in psychomotor and affective domain**) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical/Exercise (Outcomes' in Psychomotor Domain)	Approx Hours Required
1	II	Prepare white ware body of given composition.	8
2	III	Prepare earthenware glaze.	4
3	III	Prepare stoneware glaze.	4
4	III	Prepare porcelain ware glaze	4
5	III	Prepare ceramic stain.	4
6	III	Prepare coloured glaze and application on wares.	4

S. No.	Unit No.	Practical/Exercise (Outcomes' in Psychomotor Domain)	Approx Hours Required
7	IV	Determine water absorption of given sample.	4
8	IV	Determine drying and firing shrinkage of given sample.	6
9	IV	Determine Cold Crushing Strength of given sample.	4
10	IV	Determine Crazing test for wall tile sample.	4
11	IV	Determine Modulus of Rupture of given sample.	2
12	IV	Determine Whiteness test of given sample.	2
13	IV	Determine chemical durability of a given sample.	2
14	V	List out Various body and glaze defects of white ware products.	4
15	ALL	Industrial visit of pottery industry. 1. Prepare flow chart of Product preparation 2. Identify different suitable raw materials for Product. 3. Explain process used for Body and glaze making.. 4. Explain shaping process for articles. 5. Explain Drying and Firing process for articles. 6. Explain process for glaze application.. 7. Identify different defects from products.	8
Total Hours			64

8. SUGGESTED LIST OF STUDENT ACTIVITIES

- i. Visit to a nearest White ware industries.
- ii. Group discussion on Industrial Visit.
- iii. Collect samples of different White ware products.
- iv. List out different properties of White ware.
- v. Library survey on different types of White ware defects.

9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

Show video films/animations/photographs related to white ware production and their defects.

10. SUGGESTED LEARNING RESOURCES

A. List of Books

S. No.	Title of Books	Author	Publication
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

B. List of Major Equipment/Materials

- i. Ceramic Soft Materials and Hard Materials and additives
- ii. Different White ware samples for study of defects.
- iii. Weighing balance With weight box, Pans, Vernier scale, Measuring cylinder
- iv. Lab type Jaw Crusher, Edge Runner Mill, Disintegrators, Pulveriser.
- v. Lab type Blunger, Pot mill, Magnetic separator, Vibrating sieves
- vi. Lab type Hot air Oven, Electric Muffle Kiln
- vii. Lab type Universal testing machine, Refractometer

C. List of Software/Learning Websites

- i. <http://www.gobookee.org/elements-of-ceramics-f-h-norton/>
- ii. <http://www.cheminfonet.org/art/ceramics101.pdf>
- iii. http://en.wikipedia.org/wiki/Ceramic_engineering

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE**Faculty Members from Polytechnics**

- **Prof. B. B. Patel**, Lecturer L.E.College, Morbi
- **Prof. H. B. Dedania**, Retired Lecturer L.E.College, Morbi
- **Prof. S. Prasaad**, Retired Lecturer L.E.College, Morbi

Coordinator and Faculty Members from NITTTR Bhopal

- **Dr. Abhilash Thakur**, Associate Professor, Department of Applied Sciences
- **Dr. Bashirullah Shaikh**, Assistant Professor, Department of Applied Sciences