



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3163619

Semester – VI

Subject Name: Whitewares-I

Type of course: Chemical Technology

Prerequisite: The students should have a clear concept on basic chemistry, geology and Mineralogy that will help them to have an easy grasp of the subject.

Rationale: The main objective of this subject is to offer an overview over the fundamentals and basics of whitewares materials, their manufacturing processes, the raw feed materials for batch preparation, their availability, their properties, their beneficiation processes, process of recovery and their application.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Scope of whitewares products in India & its classification and its use in various fronts. Details of various types of raw materials including synthetic materials.	10
2	Body preparation including all the unit operations and fabrication processes Transport, Storage, Batching, Body compositions, Wet-Process - Crushing, Grinding, Screening, Magnetic separation, Agitators, Aging, Slip treatment, Spray drying.	10
3	Drying - Types of water present, Factors affecting drying (internal & external factors), Convection, Radiation, High frequency heating.	05
4	Glazing - Purpose & advantages of glazing, Raw glazes, Fritted glazes, Special glazes, Fusibility of glazes, Opacity & opacifiers, Stains, Colloidal colours, Different colouring oxides, Empirical formula of glazes, Glaze defects, Glazing techniques	10
5	Testing of whitewares bodies Firing: Factors determining firing schedule, Effect of heat on whitewares bodies, Formation of different phases at different temperatures, Final phases of porcelain bodies, Analysis of microstructure.	10
6	Characteristics, Different types of Kiln Furniture, Cordierite, SiC based Kiln Furniture, Silicon nitride bonded SiC kiln furniture, Low thermal mass Kiln car.	05

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
19	36	13	11	11	10

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)



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Reference Books:

1. Ceramic Whitewares – Dr. Sudhir Sen
2. Industrial Ceramics – Singer & Singer
3. Fine Ceramics – F.H. Norton.
4. The Technology of Ceramics and Refractories – P.P. Budnikov

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To express their technical knowledge over fundamentals of the subject.	30
CO-2	To choose batch composition for different glasses and ceramic products.	28
CO-3	To be able to utilize their knowledge and skills for the preparation of other related highly technical subjects in the Glass & Ceramic Technology course curriculum	27
CO-4	To be able to apply this knowledge in their higher study, research work with related technical subjects.	5
CO-5	To build a bridge between theoretical and practical concept used in industry.	5
CO-6	To investigate deep into the research scope over the glass materials, their fabrication and various properties	5

List of Experiments:

1. Preparation of a general Whiteware Body
2. Milling of raw materials, measurement of slip properties, green body preparation, slip casting,
- 3 Preparation of glazes & application of glaze on body and firing.
4. Determination of water absorption, True density, Bulk density & Modulus of rupture of various fired whiteware bodies
5. Determination of thermal shock resistance of fired whitewares bodies
- 6 Measurement of glaze thickness by Penetrometer.
- 7 Determination of acid solubility of ceramic body & glaze.
- 8 Determination of alkali solubility of ceramic body & glaze.

List of OEPs :

1. Industrial practices for preparation of whitewares bodies
2. Industrial practices for drying of whitewares bodies
- 3 Industrial practices for glazing of triaxial bodies
4. Industrial practices for detection of drying and glazing defects
5. Industrial practices for testing of glazes

References:

List of Open Source Software/learning website:

- 1) Literature available on internet
- 2) Glass & Ceramic dictionaries



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- 3) Delnet
- 4) Literature available under R&D in Ceramic & Glass industry.
- 5) Ceramic & Glass journals