

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)

SUBJECT NAME: WHITEWEARS-I (DE-VII)

SUBJECT CODE: 2173604

B.E. VII SEMESTER

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 and GC06.

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	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA(V)		PA (I)	
					PA	ALA	ESE	OEP		
4	0	3	7	70	20	10	20	10	20	150

L-Lectures; T-Tutorial/TeacherGuidedStudentActivity;P-Practical;C-Credit;ESE-EndSemesterExamination; PA-Progressive Assessment, ALA- Active Learning Assignment, OEP- Open Ended project

Content:

Sr. No.	Topic	Teaching Hrs	Module Weightage (%)
1	Scope of whiteware products: Scope of whiteware products in India & its classification and its use in various fronts. Details of various types of raw materials including synthetic materials.	10	25
2	Different processes of Body preparation: 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	25
3	Drying & Glazing: Drying - Types of water present, Factors affecting drying (internal & external factors), Convection, Radiation, High frequency heating. 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	25

4	Testing of glazes. Firing : Factors determining firing schedule, Effect of heat on whiteware bodies, Formation of different phases at different temperatures, Final phases of porcelain bodies, Analysis of microstructure.	10	25
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Suggested Specification table with Marks (Theory):

Unit No	Unit Title	Distribution of Theory Marks					
		R Level	U Level	A Level	N level	E level	Total
1	Scope of whiteware products	6	10	6	1.5	1.5	25
2	Different processes of Body preparation	5	12	5	1.5	1.5	25
3	Drying & Glazing	5	12	5	1.5	1.5	25
4	Testing of glazes, Firing	5	12	5	1.5	1.5	25

Legends: R: Remembrance; U: Understanding; A: Application and above Levels (Revised Bloom's Taxonomy References: Text/ Ref. Books), N: Numerical, E: Evaluation

References:

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:

1. To express their technical knowledge over fundamentals of the subject
2. To choose batch composition for different glasses and ceramic products.
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
4. To be able to apply this knowledge in their higher study, research work with related technical subjects.
5. To build a bridge between theoretical and practical concept used in industry.

List of Experiments:

1.	Preparation of a general Whiteware Body
2.	Milling of raw materials, measurement of slip properties, green body preparation, slip casting, pressing, drying & firing.
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 whiteware 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.

Open Ended Project fields:-

Students are free to select any area of science and technology based on chemical technology applications to define Projects.

Some suggested projects are listed below:

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

List of Open Source Software/learning website:

1. Literature available on internet
2. Glass & Ceramic dictionaries
3. Delnet
4. Literature available under R&D in Ceramic & Glass industry.
5. Ceramic & Glass journals

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.