

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36) INTRODUCTION TO GLASS & CERAMIC TECHNOLOGY-II SUBJECT CODE: 2143603 B.E. 4th 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. Studied subject GC-01 (Introduction to Glass & Ceramic Technology-I).

Rationale: The main objective of this subject is to offer an overview over the fundamentals and basics of glass and ceramic materials, the raw materials, their availability, their properties, their beneficiation processes, process of recovery. Also, the students should have an overview over basic geology and Mineralogy so that they can understand the genesis of various raw materials being used in Glass and Ceramic products.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M) PA ALA		PA (V) ESE OEP		PA (I)		
4	0	0	4	70	20	10	0	0	0	100

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Natural raw materials: Structure & properties of silicates, different clays, mica, talc, sillimanite. Properties of non – plastic materials, Polymorphic forms of SiO ₂ & their transformation. Properties, composition, thermal effects, uses of natural materials such as pyrophyllite, talc, sillimanite minerals, zircon etc.	08	20
2	Plastic raw materials: Classification of clay, composition, particle size & shape of clays, flocculation & deflocculation, plasticity etc. Major deposits of clays for ceramic industry.	08	20
3	Refractory materials: Properties & deposits of materials such as Bauxite, Magnesite, Dolomite, Limestone, Graphite etc.	08	20
4	Fluxing agents: Composition, availability & properties of different fluxing agents such as Nepheline, Syenite, Bone ash, Wollastonite etc.	08	10
5	Synthetic raw materials: Properties, characteristics, importance & synthesis of important raw materials such as Al ₂ O ₃ , TiO ₂ , Barium titanate, Sodium aluminum silicate, ZrO ₂ , Fumed silica etc.	08	20
6	Importance Physical properties: Particle shape, size, porosity, density & other physical properties.	5	10

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks				
R Level	U Level	A Level	N Level	E Level
60	10	10	10	10

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

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

Reference Books:

1. Elements of ceramics ,Norton F.H, Longman higher education, 2nd Ed, 2001
2. Introduction to ceramics, Barsoum, Institute Of Physics Publishing (gb) 2002
3. Introduction to Ceramics, Kingery W.D., Wiley New York :, 2nd Ed, 1976
4. Material Science,Smith, Mcgraw Hill Higher Education, 4th Ed,2005
5. Industrial ceramics, Singer & Singer, Oxford &Ibh (From Technip), 1st Ed.,2008
6. Textbook of physical Geology,Mukherjee, CBS Publishers & Distributors-New Delhi 1stEd.,2011
7. Textbook of Mineralogy, Tyrrel,W, , CBS Publishers & Distributors, 4th Ed.,2006
8. Textbook of Geology, J B Mahapatra, CBS Publishers & Distributors, 2nd Ed. ,2008

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, researchwork with related technical subjects.
5. To build a bridge between theoretical and practical concept used in industry

List of Open Source Software/learning website:

- 1) Website of Indian Institute of ceramics & of Indian Ceramic Society
- 2) Delnet

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. The best three works should submit to GTU.