

GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

**Course Title: Glass-1
(Code: 3335204)**

Diploma Programme in which this course is offered	Semester in which offered
Diploma Ceramic Technology	3rd semester

1. RATIONALE

Diploma ceramic students should Obtain Basic knowledge of Glass, Melting of glass and forming process of glass articles. It is essential foundation for next curriculum of Glass-2.

2. COMPETENCY

Plan for detail manufacturing of glass articles with safety.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
L	T	P		Theory Marks		Practical Marks		
			C	ESE	PA	ESE	PA	
3	0	2	5	70	30	20	30	150

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

4. COURSE DETAILS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Introduction of glass	1a. Define glass 1b. state Properties and use of glass 1c. List different types of glass.	1.1 Definition of glasses 1.2 General properties and uses of glass 1.3 Chemical composition of glass 1.4 Description in brief about different types of glass
Unit – II Raw materials	2a. List out different raw materials used in glass industry. 2b. Explain properties of different raw materials.	2.1 Details regarding various materials used in glass making 2.2 Classification of raw materials with their functions in glass making 2.3 Essential glass forming substances 2.4 Fluxes 2.5 Oxidizing agents 2.6 Reducing agents 2.7 Finishing agents 2.8 Coloring agents and cullets 2.9 Occurrences of various glass making raw materials in India 2.10 Properties of glass sands and other raw materials used in glass making 2.11 Grading and washing of sands used in glass making
Unit – III Batch mixing	3a. Perform Handling and mixing of raw materials for batch. 3b. Prepare Batch for glass.	3.1 Methods of batch preparation 3.2 Methods of batch mixing 3.3 Description of machines used for batch preparation and mixing 3.4 Processing of raw materials before batch making 3.5 Process of handling and mixing of raw materials
Unit – IV Glass melting	4a. Describe construction and function of different glass making furnaces. 4b. Explain melting of glass.	4.1 Introduction 4.2 Various types of furnaces used for glass melting 4.3 Construction and function of pot furnace 4.4 Construction and function of Tank furnace 4.5 Construction and function regenerative and recuperative type furnaces 4.6 Description regarding various parts of glass melting furnaces. 4.7 Details description regarding melting process of glass batches
Unit – V Manufacturing of glass articles	5a. Explain preparations of different shape of glass articles form molten glass.	5.1 Introduction 5.2 Description regarding manufacturing process of hollow wares by mouth blowing 5.3 Manufacturing of hollow ware articles by semi-automatic and automatic machines 5.4 Manufacturing of glass by drawing process. 5.5 Manufacturing process of plate glass and sheet glass. 5.6 Manufacturing process of glass cylinders.

Unit	Major Learning Outcomes	Topics and Sub-topics
		5.7 Manufacturing process of scientific glass apparatus by blowing on lamps. 5.8 Manufacturing process of container glass. 5.9 Manufacturing process of flat glass by manual pressing process & auto-machine process 5.10 Manufacturing process of sheet glass
Unit – VI POLLUTION CONTROL AND SAFETY	6a.Explain various reasons for pollution in glass industry. 6b.Explain care required during shaping of glass article.	6.1 Various reasons of pollution in glass industries. 6.2 Precautions required during melting and manufacturing process of glass articles.

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

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
1	Introduction of glass	4	3	3	0	6
2	Raw materials	9	3	5	5	13
3	Batch mixing	7	3	5	4	12
4	Glass melting	8	3	7	5	15
5	Manufacturing of glass articles	9	3	5	5	13
6	POLLUTION CONTROL AND SAFETY	5	3	4	4	11
Total		42				70

6. SUGGESTED LIST OF EXERCISES/PRACTICAL

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire the competency.

Following is the list of experiments for guidance.

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
1	2	Perform Dry sieve analysis of sand	2
2	2	Perform Wet sieve analysis of sand	4
3	3,4,5	Prepare glass batch for soda-lime glass	4
4	3,4,5	Prepare glass batch for opal glass	4

S. No.	Unit No.	Practical/Exercise	Apprx. Hrs. Required
5	3,4,5	Prepare glass batch of blue colour glass	4
6	3,4,5	Prepare glass batch of green colour glass	4
7	3,4,5	Prepare glass batch transparent glass	4
8	3,4,5	Perform the melting of prepared glass batches.	
9	ALL	Industrial visit of glass industries 1. Prepare flow chart of manufacturing process 2. Identify different suitable raw materials for Product. 3. Explain batch mixing and melting process 4. Explain shaping process of the glass product.	4

7. SUGGESTED LIST OF STUDENT ACTIVITIES

1. Collection of different glass raw materials use in glass making.
2. Collection of different types of glass samples.
3. Collection of different tube of glass manufacturing processes.

8. SUGGESTED LEARNING RESOURCES

1. <http://asaha.com/ebooks/glass-furnace.pdf>

(A) List of Books:

S. No.	Title of Books	Author	Publication
1	Glass Engineering Hand Book	E.B.Shand	McGraw-Hill book co.,
2	Glass manufactures Vol. I & Vol. II	F.V.Tooley	New York, N.Y., Ashlee Pub. Co.,
3	Morden Glass Practice	Samuel R. Schole	Amazone web site

B. List of Major Equipment/Materials

1. Different glass making Raw Materials
2. Tools sets for glass making.
3. Digital Weight Balance, Electric Oven
4. Electric sieve shaker machines with sieves
5. Electric muffle kiln
6. Lab type annealing Lehr

C. List of Software/Learning Websites

1. <http://pubs.usgs.gov/bul/0285n/report.pdf>
2. web.mst.edu/~brow/PDF_glassmaking.pdf
3. <http://ebookbrowse.com/glass-manufacturing-book-pdf-d18091452>

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

1. Shri B.B.Patel (Lecturer L.E.College, Morbi)
2. Shri H.B.Dedania (Retired Lecturer L.E.College, Morbi)
3. Shri S.Prasaad (Retired Lecturer L.E.College, Morbi)