

# GUJARAT TECHNOLOGICAL UNIVERSITY

## Diploma in Ceramic Technology

### Semester: 3

**Subject Code**

**Subject Name** REFRACTORY-I

Sr. No.	Course content
1.	<b>INTRODUCTION :</b> 1.1 Brief history and scope of refractory industries in India. 1.2 Present status of refractory industries in India.
2.	<b>REFRACTORY RAW MATERIALS :</b> 2.1 Types of refractory raw materials. 2.2 Detail study of clayey refractory raw materials, such as fire clay, china clay etc. 2.3 Study of properties and uses of silica, illuminant, and a Lucite, cyanide, mullet and bauxite. 2.4 Study of physical properties of magnetite, dolomite, for striate, chromites, graphite etc.
3.	<b>PROPERTIES AND OCCURRENCES OF REFRACTORY RAW MATERIALS :</b> 3.1 Details of physical properties chemical composition, molecular formula of the refractory materials with their occurrences in Gujarat and Saurashtra regions. 3.2 Study regarding grog and its use in refractory making. 3.3 Manufacturing methods of grog. 3.4 Grading of grog and their use in refractory making
4.	<b>CLASSIFICATION OF REFRACTORIES :</b> 4.1 Introduction. 4.2 Study regarding natural and synthetic refractory. 4.3 Classification of refractory like acid, basic and neutral refractory on the basis of chemical and mineralogical characteristics of raw materials. 4.4 A preliminary idea of synthetic or super refractory such as silicon carbide, fused alumina, fused magnetite, mullets, magnesia alumina, spinal etc.
5.	<b>PROCESSING OF RAW MATERIALS :</b> 5.1 Methods of crushing and grinding of refractory materials. 5.2 Brief details of machines used for crushing and grinding of refractory materials such as disintegrator, edge runner, pan roller, ordinary pug mill, de-airing pug mill elevators. etc. 5.3 Methods of mixing, aging and preparation of batch composition.
6.	<b>SHAPING METHODS OF REFRACTORIES :</b> 6.1 Various methods of shaping of refractory. 6.2 Formulation of body mixture for making of different types of refractory. 6.3 Shaping process of bricks, saggars and crucibles such as hand molding, pressing, extrusion and casting. 6.4 Properties control of refractory during shaping.

<b>7.</b>	<b>DRYING :</b> 7.1 General principles of drying. 7.2 Methods of drying refractory products. 7.3 Use of various types of dryers to dry the refractory products.
<b>8.</b>	<b>FIRING :</b> 8.1 General principles of firing of refractory. 8.2 Stages of firing of refractory products. 8.3 Brief details regarding kilns used for firing refractory bricks. 8.4 Methods of loading of refractory bricks for firing. 8.5 Effects of heat on silica and fire clay.
<b>9.</b>	<b>PROPERTIES AND TESTS OF REFRACTORIES :</b> 9.1 Study regarding physical properties of different types of refractory bricks. 9.2 Study in detail about other properties like porosity, permeability, specific gravity, bulk density etc. 9.3 Study in details about the size and tolerances. 9.4 Visit of refractory industries to obtain detail ideas regarding manufacturing of refractory.

### **LABORATORY EXPERIMENTS:**

1. To Prepare fire bricks & cut in to various shapes.
2. To Prepare I.S. 6 bricks containing 32% of alumina.
3. To Prepare I.S. 7 bricks with 28% Al<sub>2</sub>O<sub>3</sub> content.
4. To Prepare I.S. 8 bricks containing 42% Al<sub>2</sub>O<sub>3</sub>.
5. To determine the moisture content of a given sample of refractory.
6. To determine porosity of given sample of refractory.
7. To determine the bulk density of given refractory brick.
8. To determine water absorption of a given refractory sample.
9. Project report of industrial visit of refractory industries.

### **Reference Books:**

1. Refractory M.L.Mishra
2. Refractory Rashid cheti
3. Refractory F.H.Norton
4. Refractory Materials A.B.Searle