

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN CERAMIC TECHNOLOGY
SEMESTER: V

Subject Name: **Advance Refractory**

Sr. No.	Course Content
1.	Introduction: 1.1 Introduction 1.2 Problems of refractory industries in India 1.3 Critical assessment of the problems regarding raw materials and firing at high temperature
2.	Micro Structure and its Relation to Properties of Refractory Materials: 2.1 Introduction 2.2 Different application of refractory materials 2.3 Details of thermo-chemical reaction in fire bricks 2.4 Study of alumina-silica phase diagram and other related refractory system.
3.	Methods of Manufacture: 3.1 Introduction. 3.2 Various methods of manufacture of refractories 3.3 Manufacture method of refractory bricks, refractory blocks, muffles, saggars and other kiln furniture. 3.4 Manufacture methods of glass house pots, crucible and ladle refractories. 3.5 Sizing of grog and their use 3.6 Details about chemical bonds and other bonds used in refractory industries.
4.	Compounding of Refractory Bodies: 4.1 Introduction 4.2 Consideration of various factors during compounding of refractory bodies 4.3 Effect of raw materials used on refractory properties 4.4 Effect of method of manufacture on properties of finished products 4.5 Effect of shaping method on finished products
5.	Chemical and Mechanical Analysis of Refractory Raw Materials and their Products: 5.1 Introduction

	5.2 Details of chemical analysis of refractory raw materials and their products 5.3 Details of mechanical analysis of refractory raw materials and their products.
6.	Oxide Refractories: 6.1 Introduction 6.2 Brief idea of oxides refractories 6.3 Brief idea of carbide refractories 6.4 Brief idea of nitride refractories
7.	Testing of Properties: 7.1 Methods of obtaining fusion point (P.C.E.) 7.2 Factors influencing the load bearing capacity of refractory bricks. 7.3 Load bearing test, creep, hot MOR etc. 7.4 Theory of spalling 7.5 Details of shear and Tensile stresses 7.6 Effect on bricks structure of spalling 7.7 Details of expansion of silica minerals
8.	Uses: 8.1 Introduction 8.2 Refractories in ferrous metal industries 8.3 Refractories in non-ferrous metal industries 8.4 Refractories in nuclear power productions 8.5 Refractories in glass industries 8.6 Refractories in cement industries 8.7 Brief idea for pollution control and safety

Laboratory Experiments:

1. Preparation of fire bricks and cutting in to Various shape
2. Determine the Apparent porosity of the given sample of the Refractory bricks
3. Determine the Apparent Sp.Gr. of given sample of refractory
4. Determine the Bulk density of the given sample of refractory
5. Determine the cold crushing strength of the given Refractory sample
6. Determination of pyrometric cone equivalent or softening point of the given refractory
7. Preparation of acid resistance bricks
8. Preparation of insulating bricks
9. Determination of R.U.L. of given sample
10. Sieve analysis of Grog
11. Study of statistical quality control technique for brics.

Reference Books:

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|----|--------------------------|-------------------|
| 1. | Refractory | F.H.Norton |
| 2. | Refractory | M.L.Mishra |
| 3. | Industrial ceramics | Singer & Singer |
| 4. | Steel plant Refractories | J.H.Chesters |
| 5. | Refractory Materials | A.B.Searle |
| 6. | Oxide Refractories | Alper & Mc Nalley |