

GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Ceramic Technology

Semester: 4

Subject Name: VITREOUS ENAMELS

Sr. No.	Course Content
1.	INTRODUCTION 1.1 History of enameling 1.2 Definition of enamels 1.3 Utility of enamels with special reference to enamels on metals 1.4 Types of enamel
2.	RAW-MATERIALS 2.1 Various raw materials used for enamellings 2.2 Classification of enamel making raw materials such as, Refractory materials, Fluxes, Colors, Opacifiers, Floating agents, Electrolytes, Milling of enamel raw materials
3.	PREPARATION OF METAL SURFACE FOR ENAMELLING 3.1 Various methods adopted for cleaning metal surfaces such as annealing scaling, chemical pickling, electrolytic cleaning 3.2 Various process of cleaning processes 3.3 Neutralization.
4.	BATCH COMPOSITION AND CALCULATION 4.1 The chemical composition of enamel 4.2 Empirical formula of enamel 4.3 Methods of calculation of ground coats and covered coats 4.4 Frit and fritting and frit making 4.5 The necessity and process of frit making
5.	PROCESS OF APPLICATION OF ENAMELS 5.1 Dry process enamels 5.2 Wet process enamels 5.3 Control of enamel slip 5.4 Methods of application of ground coats and cover coats 5.5 Details of various equipments used for the purpose 5.6 Drying of enamel coats.
6.	FIRING OF ENAMEL COATS 6.1 The types of furnaces used for enamellings 6.2 The effect of furnace atmosphere on enamel coats 6.3 Maintenance of temperature for firing enamel coats 6.4 The various defects occur during firing of enamel coats and their

	remedies
7.	PROPERTIES AND TESTS 7.1 Thermal properties of enamel 7.2 Thermal expansion and contraction of enamels 7.3 Thermal shock tests 7.4 Thermal conductivity 7.5 Optical properties of enamel such as gloss, color etc. 7.6 Adherence, hardness, elasticity, compressive strength, abrasion 7.7 Chemical properties and tests

LABORATORY EXPERIMENTS:

1.	Study of various Raw materials used in enamel
2.	Cleaning of metal surface for enamellings
3.	Preparation of ground coat enamel
4.	Preparation of cover coat enamel
5.	Application of enamel on metal surface
6.	Preparation of colored enamel
7.	Application of colored enamels on ware
8.	To study the various properties of enameled wares
9.	To study the defects occur in enameled wares with their remedies
10	Visit to enamel industry

Reference Books:

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| 1. | Porcelain Enamels | A. I. Andrews |
| 2. | Enamel Technology | V. V. Virgin |
| 3. | Elements of ceramics | F. H. Norton |
| 4. | Introduction to silicate | H. N. Bose industries |

