AMCT-24 CALCULATIONS IN CERAMICS

OBJECTIVE

To enable the students to have a basic knowledge about the methods of calculating the various ceramic properties.

OUTCOME

On completion of the course the students are expected to

- Have learnt the basic methods of calculating the properties of ceramic raw materials.
- Have learnt to calculate the properties of ceramic bodies.
- Have learnt to calculate the properties of suspensions.
- Have learnt to formulate glaze batches by varying the parameters.
- Have learnt to formulate glass batches.

UNIT I ULTIMATE & RATIONAL ANALYSIS

Ultimate analysis, proximate analysis, rational analysis of clay, stone and feldspar -mica convention – substitution of clays in body recipes – triangular plot.

UNIT II DETERMINATION OF PHYSICAL PROPERTIES

Shrinkage – Drying, Firing, Total, Volume, Moisture content – relationship between percentage moisture content and volume shrinkage - loss on ignition –density - specific gravity – effect of porosity on the function of ceramic materials – pore structure density – apparent volume – true volume – apparent solid volume, porosity – apparent, true, sealed pores.

UNIT III CALCULATIONS OF BODY & SUSPENSIONS

Density of a slip – calculations relating to mixtures of solid particles and water –dilution problems – Brongniarts Formula – dry measurement, wet measurement –effect of specific gravity – density of the body slip – dimensions of the mixing ark –adjustments to the wet recipe – addition of body stain.

UNIT IV GLAZE CALCULATIONS

Molecular weights – formula and use of chemical equations – oxides – percentage composition and formula – calculation of a recipe from a simple glaze formula – given the recipe of a glaze calculate the formula – synthesis of a fritted glaze – given the recipe calculate the formula for a fritted glaze – calculation of the percentage composition of the mill batch.

UNIT V GLASS CALCULATIONS

Determination of molecular formula of glass from chemical composition of the glass and from glass batch – determination of batch from molecular formula of glass – determination of batch from the given chemical composition.

TEXT BOOKS

1. R.Griffiths & C.Radford, Calculations in Ceramics, Johns Hill, 1965.
2. A.I.Andrews, Ceramic Tests and Calculations, John Wiley & Sons, 1928.

REFERENCES

1. Hiraoki Yanagida, The Chemistry of Ceramics, John Wiley and Sons, 1996.
2. Terpstra, Ceramic Processing, Chapmann and Hall, 1995.
3. Tooley F.V, Handbook of Glass Manufacture, Vol I&II, Ogden Publishing Co., NY, 1960.
4. Alexis G.Pincus, Melting Furnace Operation in the Glass Industry, Magazines for Industry Inc., NY, 1980.
5. R.Charan, Handbook of Glass Technology.