

OBJECTIVE

To enable the students to have a complete knowledge on the basics of geology, mineralogy and different raw materials used commonly in ceramic industries.

OUTCOME

On completion of the course the students are expected to

- Have studied the basics of rock formation, its types, and mineral formation and its physical and optical properties.
- Have learnt about clay formation, clay minerals and types of clays.
- Have studied the different types of fluxes and their characteristics.
- Have learnt the types of silicate minerals, their properties and uses.
- Have an understanding on other ceramic raw materials, their properties and uses.

UNIT I GENERAL GEOLOGY AND MINEROLOGY

Rocks – formation, characteristics, classification into igneous, sedimentary and metamorphic.
Minerals – formation, relation of mineral deposit to igneous activity, chemical and physical properties like composition, colour, streak, luster, fracture, cleavage, hardness, density and tenacity, elements of optical mineralogy.

UNIT II PLASTIC MATERIALS

Clay minerals. Clay structures – kaolinite and montmorillonite groups. Geology of clay deposits. Classification of clays – china clay, ball clay, fire clay, building clay etc. Beneficiation of clays. Clay properties – charged nature, cation exchange capacity, flow behaviour, plasticity, effect of heating. Mica, talc, pyrophyllite and wollastonite group – physical and chemical properties.

UNIT III FLUXES

Occurrence, properties and uses of natural fluxes – feldspar group, nepheline syenite, Cornish stone, lithium containing minerals. Bone ash – preparation, properties and uses.

UNIT IV SILICA AND SILICATE MATERIALS

Silica – occurrence, structure, polymorphic transformation, physical and chemical properties.
Silicate minerals – quartz, sillimanite, kyanite, andalusite – properties and uses.

UNIT V OTHER RAW MATERIALS

Bauxite, magnesite, dolomite, chromite, limestone, rutile, zircon, beryllia minerals, alumina, slag and ashes, cullet – occurrence, properties and uses.

TEXT BOOKS

1. Parbin Singh, Engineering and General Geology, S.K.Kataria and Sons, New Delhi, 2001.
2. Worrall W.E, Ceramic Raw Materials, Pergamon Press, NY, 1992.

REFERENCES

1. Norton F.H, Fine Ceramics: Technology and Applications, McGraw-Hill Co., NY, 1978.
2. Wilson M.J, Clay Mineralogy, Chapman and Hall, 1955.
3. Deer W.A, Howie R.A and Zussman J, Rock Forming Minerals, Longmans, London, 1967.
4. Ryan .W, Properties of Ceramic Raw Materials, Pergamon Press, 2nd Edn., 1978.