

Fuels Furnaces and Refractories

(No. of Credits: 4)

Unit-I: Introduction to Fuels technology Classification of fuels, Origin and classification of coal, Analysis of Coal Proximate and ultimate analysis, Pulverized fuels, Principle of Carbonization, Manufacture of Metallurgical coke, Properties of Metallurgical Coke, Testing of Coke

Unit-II: Principles of production of fuel oils from crude, Manufacture, properties and uses of a) Producer gas b) Water gas Properties and uses of Blast furnace gas and coke oven gas, cleaning of Blast furnace gas.

Unit-III: Steady State Heat Transfer: Importance of Heat transfer, conduction through plane, cylindrical, Spherical and compound walls, shape factor and effect of variable thermal conductivity.

Unit-IV: Furnaces: Characteristic features of vertical shaft furnaces, reverberatory furnaces, Arc and Induction furnaces. Tube and muffle type resistance furnaces, continuous furnaces, Sources of heat losses in furnaces and heat balance

Unit-V: Pyrometry: Thermo electric pyrometry, peltier and Thomas e.m.f's . Thermo-electric power of thermocouples, Required properties of thermocouples, Noble and base metal thermocouples, Thermo-pile, Measurement of e.m.f by Milli-voltmeters and potentiometers, Thermometer; optical and radiation pyrometer.

Unit-VI: Refractories: Desirable properties of Refractories, Methods of classification, Modes of failure of refractories in service and their prevention, Manufacturing methods and properties of Fireclay, Silica Magnesite and Chrome-Refractories, Testing of Refractories, Applications of refractories in the metallurgical industries.

Reference Books:

1. Furnaces, Fuels and refractories: O.P.Gupta.
2. Fuels, Furnaces, Refractories & Pyrometry-A.V.K. Surya Narayana.
3. Fuels, Furnaces and refractories: J.D. Gilchrist
4. Pyrometry - W.P. Wood and J.M. Cork