Fuels Refractory and Furnaces - Video course

COURSE OUTLINE

- Conventional and newer sources of energy, Characterization of fuels: Analysis and calorific value with problems, Principles of conversion of fuels: Carbonization, Gasification and Hydrogenation, Principles of fuel combustion and Numerical problems.
- Classification of refractories and their service properties, Manufacture of common refractory like silica, alumina, fireclay, dolomite, magnesite.
- Types of furnaces and their role in high temperature applications, Fluid flow in furnaces: macroscopic energy balance and its application to Design of chimney and flow measuring devices
- Heat transfer in furnaces: Conduction, convection and radiation with suitable examples to design refractory lining, and heating of load through flame and convection.
- Flame temperature and heat utilization; concept of available heat and fuel consumption, Principles of waste heat recovery and design of heat exchangers and burners, Heat balance diagrams with illustrations, Fuel economy in industrial furnaces, Oxygen addition to combustion process, Energy efficient operation of furnaces with illustrations, Instrumentation and control in furnaces Concept of carbon credit (carbon-offset) and its relation with energy efficiency.

COURSE DETAIL

Sl. No	Topic	Lecture/s
1.	Conventional and newer sources of energy	1
2.	Characterization of fuels: Analysis and calorific value with problems	2
3.	Principles of conversion of fuels: Carbonization, Gasification and Hydrogenation	3
4.	Principles of fuel combustion and Numerical problems	3
5.	Classification of refractories and their service properties	2
6.	Manufacture of common refractory like silica, alumina, fireclay, dolomite, magnesite	2
7.	Types of furnaces and their role in high temperature applications	1

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Metallurgy and Material Science

Pre-requisites:

Thermodynamics course

Additional Reading:

1. R.Schumann: Met. Engg. Principles
2. P.Mullinger abd B. Jenkins: Industrial and Process furnaces
3. Butts: Metalurgical Engg. Problems

Coordinators:

Prof. Satish Ch. Koria
Department of Materials and Metallurgical EngineeringIIT Kanpur

8.	Fluid flow in furnaces: macroscopic energy balance and its application to Design of chimney and flow measuring devices	6
9.	Heat transfer in furnaces: Conduction, convection and radiation with suitable examples to design refractory lining, and heating of load through flame and convection	4
10.	Flame temperature and heat utilization; concept of available heat and fuel consumption	3
11.	Pinciples of waste heat recovery and design of heat exchangers and burners	3
12.	Heat balance diagrams with illustrations	2
13.	Fuel economy in industrial furnaces, Oxygen addition to combustion process, Energy efficient operation of furnaces with illustrations	6
14.	Instrumentation and control in furnaces	2
15.	Concept of carbon credit (carbon-offset) and its relation with energy efficiency	2
	TOTAL LECTURES INCLUDING PROBLEM SOLVING	42

References:

As such no text book is available. Lectures will be prepared from different sources.