



VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY, BURLA

Department of Metallurgy & Materials Engineering

LESSON PLAN- REFRACTORIES AND FURNACE

Subject Name : REFRACTORIES AND FURNACE

Credits : 3-1-0

Department : Metallurgy & Materials Engineering

Session : 2016-17 (Even Semester)

Level : Undergraduate (VI-Semester)

Course Instructor : Renu Prava Dalai

Category : Compulsory course for all B.Tech VI Semester students of MME Department.

Class Schedule			
Wednesday – B321	Thursday – B321	Friday – B321	Saturday – B321
10:30-11:20 AM	10:30-11:20 AM	8:50-9:40 AM	8:50-9:40 AM

Marks Distribution		
End Term	Mid Term	Assignments + Class Test
70	20	10
Total -100 Marks		

Required Text book

1. Cost-free, PowerPoint visuals & extended notes are furnished to students by Instructor
2. Fuels, Furnaces and Refractories by J.D. Gilchrist.
3. Fuels, Furnaces and Refractories by O. P. Gupta.

Renu prava Dalai
Course Coordinator

COURSE CONTENTS

Sl. No	TOPIC	HOURS
Module-I		
1.	Introduction of fossil fuels and their world wide reserves	1
2.	Primary and secondary fuels	1
3.	Coking and non-coking coals, Characterization of coal properties : caking and swelling indices	1
4.	Characterization of coal properties : calorific value	1
5.	proximate and ultimate analysis of coal	1
6.	Coal carbonization	1
7.	Effects of different parameters on the carbonization of coal	1
8.	Properties of coke, char and graphite	1
9.	Selection of coal for sponge iron making and thermal power plants	1
10.	Alternative sources of energy and their suitability for metallurgical and power industries	1
Module-II		
11.	Classification of refractories, raw materials	1
12.	Manufacture, testing and properties of heavy and special refractories	1
13.	Refractories: silica, siliceous-alumino-silicate	1
14.	High alumina, magnetisite	1
15.	Chrome, chrome-magnesite, dolomite	1
16.	Forsterite, chemically bonded basic, carbon and insulating refractories	1
17.	Special purpose oxides, carbide nitride refractories	1
18.	Binary phase diagrams of Al₂O₃-SiO₂, CaO - MgO, Cr₂O₃-MgO and MgO - SiO₂ systems	1
19.	Refractory mortars and cements, Refractory castables, selection of refractories for coke oven and Iron blast furnace	1
20.	Copper convertor, soaking reheating furnaces and heat treatment furnaces, electric arc furnaces.	1
Class Test-I		
Module -III		
21.	Classification of furnaces: basis and uses	1
22.	Mechanism of combustion	1
23.	Mechanism of combustion and Combustion calculation	1
24.	Ignition temperature	1
25.	Flames: Flame propagation, flame speed	1
26.	Inflammability limits	1
27.	Types of flames; premixed and diffusion flames and their characteristics.	1
Module -IV		

28.	Combustion control; variables of control, viz.: temperature, pressure and gas ratio control	1
29.	Combustion control; variables of control, viz.: temperature, pressure and gas ratio control Cont.....	1
30.	Theoretical, adiabatic & true flame temperature	1
31.	Available heat and factors affecting it	1
32.	Heat losses in furnaces	1
33.	Heat balance	1
34.	Heat balance and furnace efficiency	1
35.	Liquid fuel burners	1
36.	Gaseous fuel burners	1
37.	methods of atomization, types of liquid fuel burners	1
38.	Principle of design of burners	1
39.	Low pressure, high pressure and injection type gaseous fuel burners	1
40.	Low pressure, high pressure and injection type gaseous fuel burners cont.....	1
	Class Test-II	
	Total	40