Lesson Plan

Name of Faculty : M.M.EQBAL
Discipline : Ceramic Engg.
Semester : 3rd
Subject : **FUELS AND FURNACES**
Lesson Plan Duration :
Work Load (Lecture /Practical) per week in hours: Lecture : 4 Practical 2

Week	**Theory**		**Practical**	
	Lecture Day	**Topic (Including assignment/test)**	**Practical Day**	**Topic**
1st	1	Introduction of Fuel	1	To determine the moisture content of a solid fuel.
	2	Classification of fuels - Solid, Liquid and Gaseous fuels with examples.	2	To determine the moisture content of a solid fuel.
	3	Theory of C o m b u s t i o n Actual air required for combustion,.		
	4	Theoretical and excess air.		
2nd	5	Simple problems related to combustion	3	To determine the moisture content of a solid fuel.
	6	Revision and assignment of Unit 1	4	To determine the moisture content of a solid fuel.
	7	Solid Fuel General properties, varieties of solid fuel (wood, coal, saw dust, charcoal)		
	8	Coal and Coke, Classification of coal,		
3rd	9	Properties of coal and coke.	5	To determine the calorific value of coal by bomb calorimeter.
	10	Spontaneous combustion, its causes and remedy.	6	To determine the calorific value of coal by bomb calorimeter.
	11	Combustible and Non-combustible constituents, Ignition temperature.		
	12	Pulverised coal and its utilisation.		
4th	13	Testing of fuels - Proximate analysis (like moisture, ash, volatile matter, fixed carbon content)	7	To determine the calorific value of coal by bomb calorimeter.
	14	Testing of fuels - Proximate analysis (like moisture, ash, volatile matter, fixed carbon content)	8	To determine the calorific value of coal by bomb calorimeter.
	15	Ultimate analysis (Carbon, Hydrogen, Nitrogen, sulphur, Oxygen)		
	16	Ultimate analysis (Carbon, Hydrogen, Nitrogen, sulphur, Oxygen)		

5th	17	Orsat analysis	9	To determine the flash point and fire point of liquid fuel.
	18	Determination of calorific value by Bomb Calorimeter.	10	To determine the flash point and fire point of liquid fuel.
	19	Revision and assignment of Unit 2		
	20	Liquid Fuels -Indian resources of crude oil, liquid petroleum products - petrol, kerosene		
6th	21	Fuel oil and coke, properties of various petroleum products.	11	To determine the flash point and fire point of liquid fuel.
	22	Testing of liquid fuels, octane and cetane number,	12	To determine the flash point and fire point of liquid fuel.
	23	Calorific value		
	24	flash point and fire point,		
7th	25	viscosity determination	13	Determination of viscosity of oil by Redwood viscometer or Torsion viscometer.
	26	Burner for liquid fuels (atomizer, cup & cone burner, squirrel gauge).	14	Determination of viscosity of oil by Redwood viscometer or Torsion viscometer.
	27	Burner for liquid fuels (atomizer, cup & cone burner, squirrel gauge).		
	28	Storage and handling practices in industry.		
8th	29	Types of Gaseous fuels (Natural, producer, water, carburretted water gas, coke oven gas, blast furnace gas, Refinery gas).	15	Demonstration of working of furnace and kiln.
	30	Composition, calorific value and uses of producer gas	16	Demonstration of working of furnace and kiln.
	31	Composition, calorific value and uses of water gas		
	32	Composition, calorific value and uses of Natural gas		
9th	33	Composition, calorific value and uses of LPG	17	Proximate analysis of solid fuel.
	34	Burners for gaseous fuels	18	Proximate analysis of solid fuel.
	35	Suppliers of fuels.		
	36	Revision & Assignment of Unit-3		
10th	37	Furnaces -Definition of furnace.	19	Proximate analysis of solid fuel.
	38	Furnaces: Classification of furnaces based on Heat Source, Mode of operation, Method of Handling	20	Proximate analysis of solid fuel.

	39	Furnaces: Classification of furnaces based on Heat Source, Mode of operation, Method of Handling		
	40	Material, types of Fuel used, types of firing & Type of Heat Recovery.		
11th	41	Furnace atmosphere, Regenerators and recuperators	21	High temperature measurement by infrared gun or optical pyrometer.
	42	description of muffle furnace	22	High temperature measurement by infrared gun or optical pyrometer.
	43	description of tank furnace,		
	44	description of blast furnace		
12th	45	Description of electrical furnace and annealing furnace.	23	High temperature measurement by infrared gun or optical pyrometer.
	46	Kilns:- Definition of kiln, Classification of kilns,	24	High temperature measurement by infrared gun or optical pyrometer.
	47	Batch Kilns -Description of Updraught, Downdraught (Round and rectangular),		
	48	description of Shuttle kiln,		
13th	49	Continuous Kilns: Fundamentals of continuous kilns	25	Draw the wiring diagram of typical temperature controller used for lab furnace
	50	construction, working and firing circuits of tunnel kiln, roller kiln, and maintenance.	26	Draw the wiring diagram of typical temperature controller used for lab furnace
	51	Muffle kilns: Muffle tunnel kiln, principle of working, advantages of muffle type tunnel kiln.		
	52	Factors affecting furnace efficiency. Safety measures to be taken while working with furnace environments		
14th	53	Revision & Assignment of Unit-4	27	Illustrate working of the temperature controller (as a switch) used in your lab model furnace/drier
	54	Furnace and Kiln Accessories Brief explanation about fire box, chimney, crown, damper and stack.	28	Illustrate working of the temperature controller (as a switch) used in your lab model furnace/drier
	55	Definition, type and mechanism of draught and dampers. Kiln furniture and accessories.		

	56	Pyrometery and Pyroscope Need for temperature measurement in kiln.		
15	57	Introduction to pyroscopes, such as seger cones, Behaviour of cones, holdcrafts bar, bullers ring.	29	Identify the inside temperature of furnace by observing the inside color.
	58	working and uses of seger cones, Behaviour of cones, holdcrafts bar, bullers ring.	30	
	59	Introduction to Pyrometers and various types of pyrometers.		
	60	Optical, Radiation, Infrared, Resistance.		
16	61	Thermocouple pyrometer (thermo electric pyrometers) General principle	31	Identify the inside temperature of furnace by observing the inside color.
	62	Types of thermocouple : chromel - Alumel, Platinum - Rhodium etc., Indicators, recorders	32	Identify the inside temperature of furnace by observing the inside color.
	63	Advantage of thermo electric method of measuring temperature.		
	64	Revision & Assignment of Unit-5		