Lesson Plan

Name of Faculty : Niraj Kumar Singh
Discipline : CERAMIC ENGINEERING
Semester : 4th
Subject : REFRACTORY TECHNOLOGY
Lesson Plan Duration : 15 WEEKS
Work Load (Lecture /Practical) per week in hours : Lecture : 3 (Theory) 4 (Practical)

Week	**Theory**		**Practical**	
	Lecture Day	**Topic (Including assignment/test)**	**Practical Day**	**Topic**
1st	1	Definition of refractories	1	Determination of specific gravity of refractory materials.
1st	2	Classification of refractories based on chemical nature (acidic, basic, neutral)	2	Determination of specific gravity of refractory materials
1st	3	Classification of refractories based on method of manufacture (shaped and unshaped), based on refractoriness (Super, High, medium and low heat duty) Special refractories with examples.		
2nd	4	Raw materials such as Fire clay, Sillimanite, Kyanite, Andalusite,	3	Determination of specific gravity of refractory materials
2nd	5	Bauxite, Quartzite	4	Determine porosity of refractory materials
2nd	6	Magnesite, Chromite		
3rd	7	Dolomite, Zircon, Forsterite	5	Determination of porosity of different refractories.
3rd	8	Properties of materials	6	Determination of porosity of different refractories
3rd	9	factors affecting the selection of raw material		
4th	10	occurrence of raw material	7	Refractoriness determination (pyrometric cone equivalent) of different bricks. (Video Demonstration/Online/lab performance)
4th	11	manufacturing units in India		
4th	12	Assignment of Chapter- 1	8	Refractoriness determination (pyrometric cone equivalent) of different bricks. (Video Demonstration/Online/lab

				performance)
5th	13	Physical properties: Porosity, bulk density	9	Green & sinter density determination of ceramic sample
5th	14	permeability, water absorption, specific gravity,	10	Green & sinter density determination of ceramic sample
5th	15	Chemical properties: Slag resistance and acid resistance		
6th	16	Mechanical properties: Compressive strength, bending strength, tensile strength	11	Particle size determination of refractory raw materials by sieve analysis.
6th	17	cold crushing strength, fracture toughness and abrasion resistance	12	Particle size determination of refractory raw materials by sieve analysis.
6th	18	Sessional test 1 as per HSBTE academic calendar		Preparation of refractory sample by dry press or moulding
7th	19	Thermal properties**:** Thermal expansion	13	Preparation of refractory sample by dry press or moulding
7th	20	Permanent linear change, thermal conductivity, and	14	Firing of sample at appropriate temperature
7th	21	thermal expansion and spalling resistence,		Firing of sample at appropriate temperature
8th	22	Refractoriness	15	
8th	23	Refractoriness under load	16	Determination of permanent linear change of different bricks. (Video Demonstration/Online/Lab performance)
8th	24	Assignment of Chapter-2		Determination of permanent linear change of different bricks. (Video Demonstration/Online/Lab performance)
9th	25	Manufacturing properties & uses of Alumina refractory	17	
9th	26	Silica refractory, Magnesite refractory	18	Determination of cold crushing strength of different bricks

9th	27	Fire Clay refractory		Determination of cold crushing strength of different bricks
10th	28	Sessional test 2 as per HSBTE academic calendar	19	
10th	29	Carbon and Graphite refractories		
10th	30	Chromite, Chrome- Magnesium, Magnesium-Chrome refractories,	20	Determination of cold modules of rupture of different bricks.
11th	31	Dolomite refractories	21	Determination of cold modules of rupture of different bricks.
11th	32	Mullite refractory	22	
11th	33	Sillimanite		
12th	34	Fused cast - their properties and uses	23	Determination of single refractory piece by water absorption test: i. Apparent porosity
12th	35	Fusion-cast refractory	24	Determination of single refractory piece by water absorption test: i.Apparent porosity
12th	36	Phase rule,		
13th	37	Phase equilibrium in a single component system, Phase equilibrium diagrams for Silica.	25	Determination of single refractory piece by water absorption test: ii. Bulk density
13th	38	Two Component systems: phase compositions for important ceramic systems Al2O3-SiO2 and MgO-SiO2.	26	Determination of single refractory piece by water absorption test: ii. Bulk density
13th	39	The application of phase diagrams in refractories		
14th	40	Monolithic Refractories : Definition	27	Determination of single refractory piece by water absorption test: iii. Apparent specific gravity
14th	41	Explanation of types: Castables, Patching and ramming mixes,	28	Determination of single refractory piece by water absorption test:

				iii. Apparent specific gravity
14th	42	Gunning mixes, Refractory mortar, Ceramic fibre,		
15th	43	Glass wool – manufacturing, properties and uses,	29	Determination of single refractory piece by water absorption test: iv. Percentage of water absorption
15th	44	Advantages of monolithic refractories over shaped refractories.	30	Determination of single refractory piece by water absorption test: iv. Percentage of water absorption
15th	45	Application of refractories in steel Indutsry		