Lesson Plan

Name of Faculty : SATENDER VASHISHTHA
Discipline : CERAMIC ENGINEERING
Semester : 5th
Subject : REFRACTORY APPLICATIONS
Lesson Plan Duration : 16 WEEKS
Work Load (Lecture /Practical) per week in hours: Lecture: 03 Practical: 0

Theory		
Week	**Lecture Day**	**Topic (Including Lectures, Assignment & Sessional Test)**
1	1	**UNIT-I** **Refractory Products** Bricks and other shapes, Crucibles, Saggers, Cordierite Kiln furniture
1	2	Furnace Blocks Muffles, Segar Cones, Burner Blocks and Silcon Crabide Troughs.
1	3	**Special Refractories:** Silicon Carbide, and insulation Refractory - manufacturing process, properties & applications.
2	4	**Cermets** – Special Characteristics, Types, Composition and properties.
2	5	Manufacturing method and applications of cermets
2	6	**Monolithic Refractories:** Definition, Types: Castables (conventional castables, low cement castables, ultralow cement castables, flow cement castables) and Advantages of monolithic /castables refractories.
3	7	Classification of unshaped refractories: Pre-cast Pre-fired Refractories (PCPF), preparation of castables.
3	8	**Refractory mortars:** Raw materials required, additives required, preparation of refractory mortar.
3	9	***Revision, discussion, doubt clearing & Assignment for Unit-1***
4	10	**UNIT-II** **Refractories in iron making process**: **Coke Oven:** Role of coke in iron making process, Importance of silica, fireclay refractory in wall and doors of coke oven battery
4	11	Desirable properties of coke oven refractory. Role of calcined limestone and dolomite in steel making process,
4	12	Types of refractory in lime and dolomite kilns.
5	13	Elementary idea of preparation of cast Iron.
5	14	**Blast Furnace:** Application of refractory in different zones of blast furnace, stove and cast house area.
5	15	Role of carbon block in the hearth of blast furnace, Concept of grouting for periodic repair of tap hole.
6	16	Refractories used in DC Arc Furnace, Torpedo Ladle/Transfer Ladle.
6	17	***Revision, discussion, doubt clearing & Assignment for Unit-2***
6	18	Revision of Unit-1 & 2 for 1st Sessional Test
7	19	1st Sessional Test
7	20	**UNIT III** **Refractories used in steel making process** **Basic Oxygen Furnace:** BOF steel making process and slag formation.
7	21	Concept of requirement of different types of refractory in impact zone, metal zone, slag zone and tap hole area.
8	22	**Electric Arc Furnace:** Lining pattern and type of refractory used in EAF steel making.
8	23	Role of gunning and patching mass for hot repair.

8	24	Refractories in basic and open hearth furnace.
9	25	Refractories in Soaking pits, Reheating furnace.
9	26	Continuous casting tundish refractory, Slide gate refractory
9	27	Explain mono block shroud, sub entry Nozzle, Stopper, well block and purging.
10	28	***Revision, discussion, doubt clearing & Assignment for Unit-3***
10	29	Revision of Unit- 2 & 3 for 2nd Sessional Test
10	30	2nd Sessional Test
11	31	**UNIT IV** **Application of refractories in other industries:** **Glass tank Furnaces**: (Understand structure of tank furnace, Refractory selection for Crown, Super Structure, Side walls, Bottom paving, Safety layer, Insulation)
11	32	Refractories used in glass tank furnace , Mechanism of refractories corrosion, Wear of glass contact area, Damage of refractories at upper structure.
11	33	**Cement and Lime industries:** Cement Rotary kiln ,Lime Calcining kiln
12	34	**Pottery Industries Types of kiln:** I) Tunnel Kiln ii) Shuttle Kiln
12	35	***Revision, discussion, doubt clearing & Assignment for Unit-4***
12	36	**UNIT V** **Total Refractory Management:** Concept, importance, Understand the general Safety precautions to be taken during refractory erection.
13	37	Common factors affecting refractory life – improper heating, excess holding, lancing and other process parameters.
13	38	Phase Diagram Studies and Thermal Properties of Refractories: Hot MOR, Permanent linear change, Thermal Conductivity, Spalling Resistance, Creep Test.
13	39	**Utilization of industrial wastes –** grog, blast furnace slag, fly ash in making refractories
14	40	***Revision, discussion, doubt clearing & Assignment for Unit-5***
14	41	Revision of Unit- 4 & 5 for 3rd Sessional Test
14	42	3rd Sessional Test
15	43	**Revision and doubt clearing class for Unit-1**
15	44	**Revision and doubt clearing class for Unit-2**
15	45	**Revision and doubt clearing class for Unit-3**
16	46	**Revision and doubt clearing class for Unit-4**
16	47	**Revision and doubt clearing class for Unit-5**
16	48	**Preparatory test for HSBT Exam**