Lesson Plan

Name of Faculty : VIVEKA NAND JHA

Discipline : CERAMIC ENGINEERING

Semester : FOURTH

Subject : GLASS TECHNOLOGY-1

Course Duration : 15 WEEKS

Work Load per week : Lecture – 3 Hrs Practical – 4 Hrs

Week	Lecture No	Topic	Practical No	Topic
1	1	Introduction to Glass : Origin of glass, fundamental concept of glassy state, definition of glass, General properties and uses	1	Determination of refractive index of glass
1	2	Classification of Glasses: Based on chemical nature: Soda lime, Lead Glass, Borosilicate glass	2	Determination of refractive index of glass
1	3	Based on field of applications: Sheet glass, plate glass		
2	4	Tempered Glass or toughened glass, Laminated Glass, Solar panel glass, bullet proof glass etc	1	Purification of sand
2	5	Properties & uses of Soda lime, Potash lime, Potash lead & Borosilicate glasses	2	Purification of sand
2	6	Raw materials for Glass Making Oxides: Classification of glass making oxides: Based on structure (Glass formers, modifiers and amphoteric)		
3	7	Based on chemical nature (Acidic, Basic, Neutral)	1	Sieve analysis of sand
3	8	Functions of glass making oxides	2	Sieve analysis of sand
3	9	Raw (Batch) materials of different oxides		
4	10	colorant and decolorants	1	Moisture estimation in raw materials
4	11	refining agents, Oxidising and reducing agents	2	Moisture estimation in raw materials
4	12	Cullet and its importance		

5	13	Chemical composition of different types of glasses (Sodalime, potash lime, lead glass, Borosilicate glass, float glass, bottle, Window glass etc.)	1	Removal of iron from sand
5	14	Chemical composition of different types of glasses (Sodalime, potash lime, lead glass, Borosilicate glass, float glass, bottle, Window glass etc.)	2	Removal of iron from sand
5	15	Chemical composition of different types of glasses (Sodalime, potash lime, lead glass, Borosilicate glass, float glass, bottle, Window glass etc.)		
6	16	Calculation of batch from glass composition and vice-versa. Empirical formula	1	Batch formulation of soda lime glass
6	17	Calculation of batch from glass composition and vice-versa. Empirical formula	2	Batch formulation of soda lime glass
6	18	Batch material, factors influencing choice of batch materials, their storage (silos, hopper), Weighing and mixing, importance of batch mixing and batch homogeneity		
7	19	Batch material, factors influencing choice of batch materials, their storage (silos, hopper), Weighing and mixing, importance of batch mixing and batch homogeneity	1	Mixing & melting of batch ingredients
7	20	Furnaces: Batch (Pot and Day tank) and continuous type, glass tank furnace (Cross fired furnace, End - fired furnace)	2	Mixing & melting of batch ingredients
7	21	Furnaces: Batch (Pot and Day tank) and continuous type, glass tank furnace (Cross fired furnace, End - fired furnace)		
8	22	Furnaces: Batch (Pot and Day tank) and continuous type, glass tank furnace (Cross fired furnace, End - fired furnace)	1	Drawing rods from molten glass
8	23	regenerators and recuperators	2	Drawing rods from molten glass
8	24	Parts of furnace: Crown, Throat ,Port, Fore hearth, flue system, chimney, draft, damper, batch charging, control of furnace temperature floaters		
9	25	Parts of furnace: Crown, Throat ,Port, Fore hearth, flue system, chimney, draft, damper, batch charging, control of furnace temperature floaters	1	Determination of density of glasses

9	26	Advantages & disadvantages of pot furnace, tank furnace, comparison between pot furnace & tank furnace	2	Determination of density of glasses
9	27	Advantages & disadvantages of pot furnace, tank furnace, comparison between pot furnace & tank furnace		
10	28	Different types of refractories used in glass industry	1	Examination of strain in glass
10	29	Fuels used for firing: NG, LPG, Furnace Oil, Diesel	2	Examination of strain in glass
10	30	Batch charging, Glass melting process, Tank temperature, Mechanism of melting, convection current, coloring & decolorization, refining & homogenizing, fining process. Use of electric boosters		
11	31	Batch charging, Glass melting process, Tank temperature, Mechanism of melting, convection current, coloring & decolorization, refining & homogenizing, fining process. Use of electric boosters	1	Determine the impact strength of glass
11	32	Batch charging, Glass melting process, Tank temperature, Mechanism of melting, convection current, coloring & decolorization, refining & homogenizing, fining process. Use of electric boosters	2	Determine the impact strength of glass
11	33	Glass Fabrication Process: hollow wares, sheet glass by drawing process		
12	34	float process, colburn process, fourcault process, pitsburg process	1	Examination of Common defects in glass, their sources and remedies
12	35	Plate glass manufacturing by continuous horizontal and vertical rolling process	2	Examination of Common defects in glass, their sources and remedies
12	36	Annealing (Removal of strain), factors affecting annealing process		
13	37	stress of glass, Strain in Glass: Types such as temporary & permanent strains and their sources	1	Examination of Common defects in glass, their sources and remedies
13	38	Physical properties of glass: Density, Porosity, Water absorption, Specific gravity and their determination process.	2	Examination of Common defects in glass, their sources and remedies
13	39	Mechanical Properties of glass: MOR test for sheet glass, crushing strength test of bottle glass, Impact strength test of sheet glass, elastic module, poisson ratio, hardness, bending test		

14	40	Thermal properties of glass: Glass transition temperature, thermal expansion, thermal conductivity, softening point of glass, Temperature vs viscosity, surface tension, annealing point	1	Determination of hardness of glass
14	41	Optical properties of glass: Transparency, absorption of light, Reflection, Refraction, Refractive index)	2	Determination of hardness of glass
14	42	Chemical Properties: Durability attack of acid, water & alkalis on glass		
15	43	Causes and remedies of defects in glass-forming defects, visual defects stones, cords, blister, seeds, bad colours etc), bad workman ship.	1	Determination of durability of glass
15	44	Causes and remedies of defects in glass-forming defects, visual defects stones, cords, blister, seeds, bad colours etc), bad workman ship.	2	Determination of durability of glass
15	45	Causes and remedies of defects in glass-forming defects, visual defects stones, cords, blister, seeds, bad colours etc), bad workman ship.		