

# Lesson Plan

Name of Faculty : Niraj Kumar Singh  
 Discipline : CERAMIC ENGINEERING  
 Semester : FOURTH  
 Subject : CERAMIC COATING TECHNOLOGY  
 Lesson Plan Duration : 15 WEEKS

Work Load (Lecture / Practical ) per week in hours : Lecture : 4 Practical NIL

Week	Theory		Practical	
	Lecture Day	Topic ( Including assignment/test )	Practical Day	Topic
1	1	Introduction to and Overview of subject		
1	2	Introduction of Glaze Definition of Glaze, Similarities & Dissimilarities between glaze and glasses		
1	3	Classification of glazes		
1	4	Definition and explanation of Raw glaze		
2	5	Explanation of fritted glaze, Lead glaze, Leadless glaze,		
2	6	Explanation of Vapour glaze, Opaque glaze		
2	7	Explanation of Matt glaze & Crystalline glaze		
2	8	Revision and assignment		
3	9	<ul style="list-style-type: none"> <li>• Raw Materials of glazes</li> <li>• Role of china clay, Bentonite, ball clay in glazes</li> </ul>		
3	10	<ul style="list-style-type: none"> <li>• Raw materials of Silica, quartz, flint, sand stone, silica sand</li> <li>• Role of silica in glazes</li> </ul>		
3	11	<ul style="list-style-type: none"> <li>• Definition of Flux</li> <li>• Different types of fluxes Soda feldspar, Potash feldspar, nepheline syanite</li> </ul>		
3	12	<ul style="list-style-type: none"> <li>• Cullet</li> <li>• Role of flux in glaze</li> </ul>		
4	13	<ul style="list-style-type: none"> <li>• Amphoteric Oxide (Alumina)</li> <li>• Role of Alumina in glaze</li> </ul>		
4	14	<ul style="list-style-type: none"> <li>• Alkalies materials used in glazes like Sodium Carbonate, Sodium Chloride, Sodium Nitride</li> </ul>		
4	15	<ul style="list-style-type: none"> <li>• Alkalies materials used in glazes like Sodium Hydroxide, Sodium Silicate fluoride, Potassium Carbonate, red lead</li> </ul>		

Week	Theory	Practical		
	Lecture Day	Topic ( Including assignment/test )	Practical Day	Topic
4	16	<ul style="list-style-type: none"> <li>Alkaline earth materials in glazes Barium Carbonate, Calcium Carbonate</li> </ul>		
5	17	<ul style="list-style-type: none"> <li>Alkaline earth materials in glazes Borax, Boric oxide</li> </ul>		
5	18	<ul style="list-style-type: none"> <li>Opacifiers Definition&amp; Role</li> <li>Types of opacifiers Tin oxide, Zirconia, Zircon</li> </ul>		
5	19	<ul style="list-style-type: none"> <li>Antimony oxide, Calcium fluoride</li> <li>Role of opacifiers</li> </ul>		
5	20	<ul style="list-style-type: none"> <li>Revision</li> </ul>		
6	21	<ul style="list-style-type: none"> <li>Assignment</li> </ul>		
6	22	<ul style="list-style-type: none"> <li>Different methods of preparation of glaze</li> <li>Raw and frit glaze preparation</li> </ul>		
6	23	<ul style="list-style-type: none"> <li>Sessional test 1 as per HSBTE academic calendar</li> </ul>		
6	24	<ul style="list-style-type: none"> <li>Selection of raw materials,</li> <li>Raw Glaze preparation composition</li> </ul>		
7	25	Raw Glaze preparation <ul style="list-style-type: none"> <li>batch preparation, mixing, grinding.</li> </ul>		
7	26	Frit Glaze Preparation <ul style="list-style-type: none"> <li>Definition of frit, importance of fritting</li> </ul>		
7	27	Preparation of frit Glaze <ul style="list-style-type: none"> <li>mixing ,Demagnetization</li> <li>Smelting</li> </ul>		
7	28	Preparation of frit Glaze <ul style="list-style-type: none"> <li>Quenching,Drying</li> </ul>		
8	29	Assignment		
8	30	Sessional test 2 as per HSBTE academic calendar		
8	31	Firing of glazed ware: Drying		
8	32	<ul style="list-style-type: none"> <li>Placing precautions of glazed ware before firing.</li> </ul>		
9	33	<ul style="list-style-type: none"> <li>Introduction to Glaze defects</li> <li>Types of glaze defects</li> </ul>		
9	34	<ul style="list-style-type: none"> <li>Crazing defect causes &amp; its remedies</li> </ul>		
9	35	<ul style="list-style-type: none"> <li>Peeling defect causes &amp; its remedies</li> </ul>		

Week			Practical	
	Lecture Day	Topic ( Including assignment / test )	Practical Day	Topic
9	36	<ul style="list-style-type: none"> <li>• Crawling defect causes &amp; its remedies</li> </ul>		
10	37	<ul style="list-style-type: none"> <li>• Pin hole causes and its remedies</li> </ul>		
10	38	Revision		
10	39	Sessional test 2 as per HSBTE academic calendar		
10	40	Decorations : Introduction <ul style="list-style-type: none"> <li>• Types : Under glaze, in glaze &amp; on glaze</li> </ul>		
11	41	Decoration methods <ul style="list-style-type: none"> <li>• Painting , Stamping</li> </ul>		
11	42	<ul style="list-style-type: none"> <li>• Stenciling, Screen printing</li> </ul>		
11	43	Revision		
11	44	Assignment		
12	45	Enamels : Introduction <ul style="list-style-type: none"> <li>• Definition</li> </ul>		
12	46	<ul style="list-style-type: none"> <li>• Classification of Enamels</li> <li>• Types of enamels</li> </ul>		
12	47	Base Metal preparation <ul style="list-style-type: none"> <li>• Cleaning by organic detergent</li> <li>• Cleaning by Chemical method</li> </ul>		
12	48	<ul style="list-style-type: none"> <li>• De greasing by heating me</li> <li>• Pickling</li> </ul>		
13	49	Preparation of Enamel <ul style="list-style-type: none"> <li>• Composition, Batching</li> </ul>		
13	50	<ul style="list-style-type: none"> <li>• Grinding , Milling additives</li> </ul>		
13	51	Ground coat and cover coat		
13	52	Application of enamel <ul style="list-style-type: none"> <li>• Dipping , Spraying</li> </ul>		
14	53	Revision		
14	54	Defects in Enamel <ul style="list-style-type: none"> <li>• Under fired defect and its causes</li> <li>• Rolling defect and its causes</li> </ul>		
14	55	<ul style="list-style-type: none"> <li>• Scaling defect and its causes</li> <li>• Chipping defect and its causes</li> </ul>		
14	56	<ul style="list-style-type: none"> <li>• Pinholes defect and its causes</li> <li>• Crazeing &amp; its causes</li> </ul>		
15	57	Revision		
15	58	Assignment		
15	59	Sessional test 3 as per HSBTE academic calendar		
15	60	Specific Problems and Last year question papers		

## Lesson Plan

Name of Faculty : SATENDER VASHISHTHA

Discipline : CERAMIC ENGINEERING

Semester : 4th

Subject : CEMENT TECHNOLOGY

Lesson Plan Duration : 15 WEEKS

Work Load ( Lecture /Practical ) per week in hours : Lecture : 3 Practical 4

Week	Theory		Practical	
	Lecture Day	Topic ( Including assignment/test )	Practical Day	Topic
1	1	Definition and Classification of cements	1	Determination of fineness of cement
1	2	Different types of cements Portland cement, Pozzolona cement	2	Determination of fineness of cement
1	3	Quick setting cement, Rapid hardening cement, Low heat cement		
2	4	High alumina cement, White & coloured cement	3	Determination of water cement ratio
2	5	Oil well cement, Iron ore cement, Water proof cement	4	Determination of water cement ratio
2	6	Sulphate resisting cement, Acid proof cement		
3	7	slag cement, Hydrophobic cement	5	Determination of initial setting time of cement
3	8	Assignment of chapter 1	6	Determination of initial setting time of cement
3	9	Raw material for cement manufacturing		
4	10	Selection of raw material	7	Determination of final setting time of cement
4	11	Proportionality of raw material	8	Determination of final setting time of cement
4	12	Calcareous material for cement		
5	13	Argillaceous materials for cement	9	Determination of initial setting time of Plaster of Paris
5	14	Additives in cement	10	Determination of initial setting time of Plaster of Paris
5	15	Cement manufacturing by dry process		
6	16	Cement manufacturing by wet process	11	Determination of final setting time of Plaster of Paris
6	17	Assignment of chapter 2	12	Determination of final setting time of Plaster of Paris
6	18	Sessional test 1 as per HSBTE academic calendar		
7	19	Effect of raw materials and constituents on the properties of cement	13	Determination of soundness of cement by Le Chatteliers apparatus
7	20	Calculations of raw mix	14	Determination of soundness of cement by Le Chatteliers apparatus

7	21	Thermo chemistry of clinker formation		
8	22	sequence of reaction during mixing, firing, grinding and water mixing	15	Preparation of cement mortar cubes
8	23	hydration of portland cement	16	Preparation of cement mortar cubes
8	24	setting and hardening of Portland cement		
9	25	Physical properties of portland cement.	17	Determination of tensile strength of lime mortar cubes
9	26	Mechanical properties of portland cement.	18	Determination of tensile strength of lime mortar cubes
9	27	Assignment chapter 3		
10	28	Lime and other building materials Different classes of lime	19	Determination of compressive strength of cement mortar cubes 7 days
10	29	Sessional test 2 as per HSBTE academic calendar	20	Determination of compressive strength of cement mortar cubes 7 days
10	30	properties of lime and other building material		
11	31	Uses of lime and other building material	21	Determination of compressive strength of cement mortar cubes 14 days
11	32	Assignment chapter 4	22	Determination of compressive strength of cement mortar cubes 14 days
11	33	Gypsum Setting time and hardening of Gypsum		
12	34	Uses of Gypsum	23	Determination of compressive strength of cement mortar cubes 28 days
12	35	Plaster of paris Setting time and hardening of plaster of paris	24	Determination of compressive strength of cement mortar cubes 28 days
12	36	Setting and Hardening of plaster of paris.		
13	37	Uses of Plaster of paris	25	Determination of compressive strength of lime mortar cubes
13	38	Assignment chapter 5	26	Determination of compressive strength of lime mortar cubes
13	39	Testing Water consistency		
14	40	Initial setting time & final setting time of cement	27	Chemical analysis of cement
14	41	Fineness & soundness of cement	28	Chemical analysis of cement
14	42	Health and Safety Measures taken in cement industries		
15	43	Precautions for environmental pollution	29	Repetition
15	44	Assignment chapter 6	30	Repetition
15	45	3 <sup>rd</sup> sessional Test as per hsbte academic calendar		

## Lesson Plan

Name of Faculty : V.N.Jha

Discipline : Ceramic Engineering

Semester : 4<sup>TH</sup> Sem.

Subject : **GLASS TECHNOLOGY - I**

Lesson Plan Duration : 15 WEEKS

Work Load ( Lecture /Practical ) per week in hours : Lecture:3 hours

Practical : 4 HOURS

Week	Theory		Practical	
	Lecture Day	Topic ( Including assignment/test )	Practical Day	Topic
1 <sup>ST</sup>	1	Introduction of Glass	1	Processing of Raw Material- Preparation of sand from quartz
	2	Origin of glass	2	Processing of raw material- preparation of sand from quartz
	3	Fundamental concept of glassy state		
2 <sup>nd</sup>	4	Definition of glass	1	Purification of sand
	5	Component of glass	2	Purification of sand
	6	Glass making oxides like acidic oxide, basic oxide		
3 <sup>rd</sup>	7	Intermediate oxides and their properties and its functions	1	Sieve analysis of sand
	8	Intermediate oxides and their properties and its functions	2	Sieve analysis of sand
	9	Assignment of chapter 1		
4 <sup>th</sup>	10	Chemical characteristics of glass	1	Moisture estimation in raw materials
	11	Physical characteristics of glass	2	Moisture analysis in raw materials
	12	Principle of glass making		
5 <sup>th</sup>	13	Batch material	1	Removal of Iron from sand
	14	Storage, mixing and conveying of batch material	2	Removal of Iron from sand
	15	factors influencing choice of batch materials, Cullet		
6 <sup>th</sup>	16	Assignment of chapter 2	1	Revision
	17	Sessional test 1 as per HSBTE academic calendar	2	Revision
	18	Chemical composition of different types of glasses		
7 <sup>th</sup>	19	Chemical composition of different types of glasses	1	Batch formulation
	20	Calculation of batch from glass composition and vice-versa	2	Batch formulation
	21	Calculation of batch from glass composition and vice-versa		

8 <sup>TH</sup>	22	Calculation of batch from glass composition and vice-versa	1	Mixing and melting of batch ingredients
	23	phase equilibrium studies.	2	Mixing and melting of batch ingredients
	24	phase equilibrium studies.		
9 <sup>th</sup>	25	Assignment of chapter 3	1	Revision
	26	Furnaces for glass making-batch and continuous type,	2	Revision
	27	glass tank furnace		
10 <sup>TH</sup>	28	pot furnace	1	Drawing rods from molten glass
	29	regenerators and recuperators	2	Drawing rods from molten glass
	30	Sessional test 2 as per HSBTE academic calendar		
11 <sup>th</sup>	31	regenerators and recuperators	1	Determination of density of glass
	32	flue system, chimney draft	2	Determination of density of glass
	33	melting batch charging		
12 <sup>th</sup>	34	tank temperature, control of furnace temperature floaters	1	Revision
	35	Assignment of chapter 4	2	Revision
	36	Properties of glass- Density, thermal expansion		
13 <sup>th</sup>	37	Viscosity, surface tension	1	Preparation of soda lime
	38	optical properties, moisture content	2	Preparation of soda lime
	39	elastic module, Poisson's ratio		
14 <sup>th</sup>	40	impact strength, hardness	1	Preparation of silica glass
	41	brittleness	2	Preparation of silica glass
	42	Bending test		
15 <sup>th</sup>	43	Assignment of Chapter 5	1	Revision
	44	Revision	2	Revision
	45	Sessional test 3 as per HSBTE academic calendar		

### Lesson Plan

Name of Faculty : Niraj Kumar Singh  
 Discipline : CERAMIC ENGINEERING  
 Semester : 4th  
 Subject : CERAMIC REFRACTORY TECHNOLOGY-I  
 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	2	Determination of specific gravity of refractory materials
1st	3	Classification of refractories		
2nd	4	Raw materials -Fire clay, Sillimanite ,Kyanite, Andalusite	3	Determination of specific gravity of refractory materials
2nd	5	Bauxite, Quartzite	4	Determination of specific gravity 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	factors affecting the selection of raw material	7	Determination of porosity of different refractories
4th	11	occurrence of raw material		
4th	12	manufacturing units in India	8	Green & sinter density determination of ceramic sample
5th	13	Assignment of Chapter-1	9	Green & sinter density determination of ceramic sample
5th	14	Testing of refractoriness- Refractoriness	10	Green & sinter density determination of ceramic sample
5th	15	Refractoriness under load, Expansion characteristics		
6th	16	Thermal chock resistance, Permeability	11	Study of density variance with pressure



6th	17	Porosity, Density	12	Study of density variance with pressure
6th	18	Sessional test 1 as per HSBTE academic calendar		
7th	19	Compressive and tensile strength	13	Study of density variance with pressure
7th	20	Thermal conductivity	14	Determination of permanent linear change of different bricks
7th	21	Cold crushing strength		
8 <sup>th</sup>	22	Slag resistance	15	Determination of permanent linear change of different bricks
8 <sup>th</sup>	23	Permanent linear change	16	Determination of permanent linear change of different bricks
8 <sup>th</sup>	24	Assignment of Chapter-2		
9 <sup>th</sup>	25	Manufacturing properties & uses of Alumina refractory	17	Determination of permanent linear change of different bricks
9 <sup>th</sup>	26	Silica refractory	18	Determination of modules of rupture of different bricks
9 <sup>th</sup>	27	Magnesite refractory		
10 <sup>th</sup>	28	Sessional test 2 as per HSBTE academic calendar	19	Determination of modules of rupture of different bricks
10 <sup>th</sup>	29	Semi-Silica refractory		
10 <sup>th</sup>	30	Fire Clay refractory	20	Determination of modules of rupture of different bricks
11 <sup>th</sup>	31	Carbon and Graphite refractories	21	Determination of modules of rupture of different bricks
11 <sup>th</sup>	32	Chromite refractory	22	Determination of cold crushing strength of different bricks
11 <sup>th</sup>	33	Chrome- Magnesium refractory		
12 <sup>th</sup>	34	Dolomite refractories	23	Determination of cold crushing strength of different bricks
12 <sup>th</sup>	35	Fusion-cast refractories	24	Determination of cold crushing strength of different bricks
12 <sup>th</sup>	36	Mullite refractory		
13 <sup>th</sup>	37	Sillimanite refractory	25	Determination of cold crushing strength of different bricks
13 <sup>th</sup>	38	Revision, Assignment of Chapter-3	26	Determination of effects of coarse grog on clay
13 <sup>th</sup>	39	Phase diagrams of raw materials		
14 <sup>th</sup>	40	Phase diagrams of raw materials	27	Determination of effects of coarse grog on clay
14 <sup>th</sup>	41	Controlling Temp	28	Determination of effects of medium grog on clay
14 <sup>th</sup>	42	Firing temp		
15 <sup>th</sup>	43	Revision	29	Determination of effects of medium grog on clay
15 <sup>th</sup>	44	Assignment of Chapter-4	30	Determination of effects of fine grog on clay
15th	45	Sessional test 3 as per HSBTE academic calendar		

### Lesson Plan

Name of Faculty : MD. MANAZIR EQBAL/ ASHWANI KUMAR

Discipline : CERAMIC ENGINEERING

Semester : FOURTH

Subject : CERAMIC WHITEWARE TECHNOLOGY-1

Lesson Plan Duration : 15 WEEKS

Work Load ( Lecture/Practical ) per week in hours : Lecture : 4 Practical 2

Week	Theory		Practical	
	Lecture Day	Topic ( Including assignment/test )	Practical Day	Topic
1	1	Introduction and classification	1	Introduction of all practicals of ceramic whiteware technology.
1	2	Division and brief history	2	Study of effect of electrolytes on different clays.
1	3	Brief history of whiteware technology		
1	4	Scope and division of Pottery		
2	5	Terracotta, Earthen ware	1	Dictation & theoretical background of pint weight method practical
2	6	Stone ware	2	Determination of dry content by pint weight method
2	7	Porcelain ware		
2	8	Assignment of Chapter-1		
3	9	Introduction to raw materials	1	Dictation & theoretical background casting slip with a body suitable for making (a) white ware (b) Earthenware
3	10	Naturally occurring raw materials-Clay	2	Preparation of casting slip with a body suitable for making (a) white ware (b) Earthenware
3	11	Quartz		
3	12	Napthelene cyanide		
4	13	Talc Sillimanite	1	Dictation & theoretical Study of heating & cooling schedule
4	14	Kyanite, Andalusite	2	Study of heating & cooling schedule.
4	15	Zircon, Bone-ash		
4	16	Gypsum, Plaster of Paris		
5	17	Synthetically prepared materials- Alumina	1	Dictation & theoretical drying shrinkage of clay body
5	18	Zirconia, Beryllia	2	Determination of drying shrinkage of clay body.
5	19	Assignment of Chapter-2		
5	20	Processes- Crushing and grinding		
6	21	Mixing, Agitating	1	Dictation & theoretical firing shrinkage of clay body
6	22	Sessional test 1as per HSBTE Calendar	2	Determination of firing shrinkage of clay body.
6	23	Magnetising, Sieving		
6	24	Assignment of Chapter-3		
7	25	Fabrication or Shaping Methods	1	Dictation & theoretical water of Plasticity of clay
7	26	Study of slip casting	2	Determination of water of Plasticity of clay.

7	27	Pressure fabrication		
7	28	Hot pressing		
8	29	Plastic forming		Dictation & theoretical loss on Ignition
8	30	Dry pressing		Determination of loss on Ignition
8	31	Isostatic pressing		
8	32	Jiggering & jollying		
9	33	Extrusion		Dictation & theoretical fineness of various raw materials used for whiteware bodies
9	34	Injection moulding, Throwing		Determination of fineness of various raw materials used for whiteware bodies
9	35	Finishing operation		
9	36	Sponging, smoothing, Fitting		
10	37	Joining or stickup		Dictation & theoretical water absorption
10	38	Sessional test-2 as per HSBTE academic calendar		Determination of water absorption
10	39	Theoretical concept about slip casting		
10	40	Zeta potential		
11	41	Double layer formation		Dictation & theoretical specific gravity of suitable solution
11	42	Role of electrolytes, deflocculants		Determination of specific gravity of suitable solution
11	43	Assignment of Chapter-4		
11	44	Removal of water		
12	45	Factors affecting drying		Dictation & theoretical making of a cup by casting method
12	46	Types of driers-batch & continuous		Making of a cup by casting method
12	47	Hot flow, Steams pipes		
12	48	Chamber driers & tunnel driers		
13	49	Defects in drying		Dictation & theoretical making of plate by Jiggering method
13	50	Assignment of Chapter-5		Making of plate by Jiggering method
13	51	Effect of heat on clay, qutarz		
13	52	Effect of heat on Feldspar, Barium carbonate.		
14	53	Effect of heat on Talc, Bentonite,		Dictation & theoretical study of defects in drying process in dry oven
14	54	Effect of heat on ceramic bodies		Study of defects in drying process in dry oven
14	55	Firing of bone-china bodies		
14	56	Different types of firing kilns		
15	57	Shuttle kiln, Down draft kiln		Revision of practical
15	58	Continuous kiln		
15	59	Assignment of Chapter-5		
15	60	Sessional test -3 as per HSBTE academic calendar		