

STATE BOARD OF TECHNICAL EDUCATION, BIHAR
Scheme of Teaching and Examinations for
IV SEMESTER DIPLOMA IN CERAMIC ENGINEERING

(Effective from Session 2021-22 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per Week	EXAMINATION – SCHEME							Credits
				Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Geology for Ceramic Engineering	2013401	03	03	10	20	70	100	28	40	03
2.	Chemistry for Ceramic Engineering	2013402	03	03	10	20	70	100	28	40	03
3.	Chemical Engineering	2013403	03	03	10	20	70	100	28	40	03
4.	Pottery & Porcelain Technology-I	2013404	03	03	10	20	70	100	28	40	03
5.	Refractory Technology-I	2013405	03	03	10	20	70	100	28	40	03
		Total:- 15					350	500			15

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per Week	Hours of Exam.	EXAMINATION – SCHEME				Credits
					Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Ceramic Processes Workshop-II	2013406	04	03	15	35	50	20	02
7.	Ceramic Engineering Workshop Practice-II (Pottery & Refractory)	2013407	04	04	15	35	50	20	02
8.	Geology Lab	2013408	02	03	15	35	50	20	01
		Total:- 10					150		05

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME Periods per week	EXAMINATION – SCHEME				Credits
				Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	Ceramic Processes Workshop- I I (TW)	2013409	02	07	18	25	10	01
10	Ceramic Engineering Workshop Practice-II (Pottery & Refractory) (TW)	2013410	02	07	18	25	10	01
11.	Course Under Moocs /Swayam / Others	2013411	04	15	35	50	20	02
		Total:- 08				100		04
		Total Periods per week Each of duration One Hours = 33				Total:- 750		24

GEOLOGY

Subject Code 2013401	Theory			No of Period in one session : 60			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Geology is the science of Earth. The subject has been kept mainly to impart knowledge on Ceramic related Geological topics covering the history of Earth, plate tectonics, climates, rocks and minerals etc. These deals with Economic Geology besides various tests and equipment required to carry out those tests are also dealt within the subject.

Learning Outcome: At the end of this course, the students will be able to:

- Define geology and history of geology.
- Explain Earth structure and utility of geology in ceramic industry.
- Identify rocks and minerals using geological method.
- State different physical properties of rocks and minerals.
- Explain classification of geology.

Contents : Theory		Hrs	Marks
Unit -1	<u>INTRODUCTION:</u> Introduction with the definition of Geology, History of Geology, Earth Structure, Origin and Age of Earth, Branches of Geology and Utility of Geology in Ceramic Industries.	[10]	
Unit -2	<u>GEOLOGICAL MATERIALS:</u> Rocks: Definition, Classification of Rocks, Characteristics of Rocks and Rock Cycle. Mineral: Nomenclature and Classification, Crystal Structure, Hardness, Luster, Colour and Streak, Cleavage, Parting, Fracture and Tenacity and Specific Gravity etc. Mineral Classes covering Silicates.	[10]	
Unit -3	<u>PROPERTIES OF ROCKS AND MINERALS:</u> Physical Properties of Rocks and Minerals used in Ceramic Industries such as: Kaolin, Fireclay, Ball clay, Feldspar, Talc, Sillimanite, Kyanite, Andalusite, Bauxite, Topaz, Garnet, Limestone, Magnesite, Dolomite, Olivine, Zircon, Mica, Quartz, Steatite, Granite, Corundum and Diamond etc.	[08]	
Unit -4	<u>GEOLOGICAL METHODS:</u> Field Methods, Petrology, Structural Geology and Stratigraphy.	[08]	
Unit -5	<u>APPLIED GEOLOGY:</u> Economic Geology related to Ceramic Materials such as Clay, Quartz and Feldspar etc. Engineering Geology.	[07]	
Unit-6	<u>OPTICAL MINERLOGY:</u> Introduction, Petrological Microscope, Properties of Light, Refraction, Double Refraction, Polarized light, Nicole Prism, Observation of minerals and Procedure for the Identification of Minerals in section etc.	[10]	
Unit-7	<u>PLANETARY GEOLOGY, NATURAL HAZARDS, GEOLOGICAL SURVEY OF INDIA:</u> Planetary Geology of other Planets. Natural Hazards such as: Earthquake, Tsunami, Volcanoes and Avalanches etc. Geological Survey of India: Its Role and Function.	[07]	
Total		60	

Books Recommended:-

1.	Introduction of Physical Geology	-	A.K. Datta
2.	Optical Mineralogy	-	A.F. Rogers and P.F. Kerr

CHEMISTRY FOR CERAMIC ENGINEERING

Subject Code 2013402	Theory			No of Period in one session : 50			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

COURSE OBJECTIVE:

Chemistry is an important field in the study of Ceramic Engineering as it gives detailed information about the materials used in Ceramic as well as their physical and chemical properties. The concept of physical and industrial chemistry helps in applying the knowledge for manufacturing of ceramic products.

Learning Outcomes:

At the end of course, Students will be able to.

- (i) Understand the difference between ideal and real gases as well as properties and laws associated with them.
- (ii) Understand the terms associated with a chemical reaction and mechanism.
- (iii) Have knowledge about various chemical compounds widely used in ceramic industries.
- (iv) To know about different phases of compound and rules associated with it.
- (v) Apply the knowledge of chemistry in synthesis of ceramic compound and manufacturing of ceramic products.

Contents : Theory		Hrs	Marks
Unit -1	<u>GASES AND FUNDAMENTAL CONCEPT:</u> Ideal & Real gases. Different unit of gas constant Equation of state, Kinetic theory of gases. Chemical equilibrium Law of mass action, Relationship between K_p and K_c , Le-chattelier principle, pH value, Surface tension, Viscosity, Gibb's Phase rule, Component, Phase, Degree of freedom, one and two component system.	[15]	
Unit -2	<u>CHEMICAL KINETICS:</u> Rate of reaction, Order of reaction, molecularity of reaction, Integrated rate equation for zero order and first order reactions, Half-life period, Concept of activation energy	[10]	
Unit -3	<u>INDUSTRIAL CHEMISTRY:</u> Preparation, Properties and Uses of the Compounds used in Ceramic Industry. Sodium Carbonate, Sodium Silicate, Sodium Sulphate, Barium Carbonate, Calcium Carbonate, Calcium Sulphate. Plaster of Paris and Gypsum, Magnese Oxide, Zinc Oxide, Lead Oxide, Tin Oxide, Potassium Chromate and Dichromate, Potassium Permagnet Borax, Copper Sulphate, Cuprous and Cupric Oxide, Alumina, Ferrous Sulphate. Hardness of water, Types of hardness, Degree of Hardness, (In terms of $CaCO_3$), Unit of hardness Simple numerical problems, Estimation of Hardness by EDTA Method.	[25]	
Total		50	

Books Recommended:-

1.	Physical Chemistry	-	Puri and Sharma
2.	Physical Chemistry	-	Bahl and Tuli
3.	Inorganics Chemistry	-	Puri and Sharma
4.	Engineering Chemistry	-	O.P. Agrawal

CHEMICAL ENGINEERING

Subject Code 2013403	Theory			No of Period in one session : 60			Credits 03	
	No. of Periods Per Week			Full Marks				: 100
	L	T	P/S	ESE				: 70
	03	—	—	TA				: 10
				CT				: 20

RATIONALE:

This subject deals Chemical Engineering applied in Ceramic Industries and so it is an important subject. The students are required to know various aspects of operations carried out in Ceramic industries such as heat transfer, size reduction, mixing and drying etc. It is Chemistry based science with application technology.

Learning Outcome: At the end of this course, the students will be able to:

- Explain the basic of chemical engineering in ceramic industries.
- Perform size reduction and separation of different materials.
- Differentiate the conveyers application,
- Apply concepts of mixing and dewatering of different raw materials for modern ceramic products.
- Relate the concept of heat transfer in drying and firing of ceramic wares.

Contents : Theory		Hrs	Marks
Unit -1	<u>INTRODUCTION:</u> Definition of Chemical Engineering and Concept of Chemical Engineering applied to Ceramic.	[05]	
Unit -2	<u>FLOW OF FLUIDS:</u> General concept of Flow of Fluids, Types of Fluid Flow, Fluid Properties and Concept of Orifice and Ventury use in Flow of fluid etc.	[10]	
Unit -3	<u>SIZE PEDUCTION AND SEPARATION:</u> Size Reduction- Concept of Size Reduction and Rettinger's Law of Crusing Crushers such as: Jaw Crusher, Gyrotory Crusher, Disintegrator and Crushing Rolls etc. Grinders such as: Ball Mill, Pot Mill and Tube Mill etc. Size Separation Screens, Grizzlies, Trommels, Shaking Screens and Vibrating Screens etc.	[08]	
Unit -4	<u>CONVEYING:</u> Definition of Conveying, Type of Conveyors used: Belt Conveyor, Screw Conveyor, Elevator and Chain Conveyor etc.	[08]	
Unit -5	<u>MIXING:</u> -Role of Mixing, Equipment used for Mixing: Paddle Stirrer, Propeller, Kneader, Dry Mixer, and Muller Mixer etc.	[07]	
Unit -6	<u>DEWATERING:</u> Dewatering Concept in Ceramic Industry, Dewatering Equipment used: Plate and Frame Fitter Press etc.	[05]	
Unit -7	<u>DRYING:</u> Concept and Role of Drying, Drying Equipment used: Compartmental Dryer, Drum Dryer, Rotary Drier and Tunnel Dryer etc.	[07]	
Unit -8	<u>HEAT TRANSFER:</u> Conduction, Heat flow through composite wall, convection, radiation, double pipe heat exchanger.	[10]	
Total		60	

Books Recommended:-

1	Introduction to Chemical Engineering	-	Bedger and Banchemo
2	Unit Operation	-	Mc Cabe and Smith

POTTERY AND PORCELAIN TECHNOLOGY – I

Subject Code 2013404	Theory			No of Period in one session : 60			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Pottery is an important Ceramic Engineering subject dealing with forming a clay body in to objects of required shape. This is an ancient art work which was made by potters using local clay available there. It has transformed in to modern pottery products with developed technological inputs.

Learning Outcome: At the end of this course, the students will be able to:

- Identify different whiteware products and their raw materials.
- Prepare different pottery and porcelain batch.
- Explain the properties of plaster of paris and mould making.
- Prepare glaze slip and perform its application.
- Prepare raw materials for shaping of article.
- Perform shaping and finishing of article.
- Describe construction and function of furnace for drying and firing.

Contents : Theory		Hrs	Marks
Unit -1	<u>INTRODUCTION:</u> Definition, History, Classification of Pottery and Porcelain, Products of Pottery.	[10]	
Unit -2	<u>RAW MATERIALS:</u> Pottery and Porcelain Raw Materials such as: Clay, Quartz, Feldspar, Whiting, Talc, Pyrophyllite, Nepheline, Syenite, Bone Ash, Kyanite. Colouring Materials and Ceramic Transfer papers etc.	[10]	
Unit -3	<u>BATCH CALCULATION:</u> Various type of Batch used in Pottery and Porcelain and Batch Calculation.	[10]	
Unit -4	<u>PLASTER OF PARIS:</u> Plaster Paris: Raw Material, Manufacture. Properties and Use.	[03]	
Unit -5	<u>GLAZES AND DECORATING:</u> Glazing: Types of Glaze, Raw Materials for Glaze, Colouring ingredients, Manufacture and Defects of Glaze. Decorating: Methods of Decoration and Glaze Application.	[07]	
Unit -6	<u>PROCESS OF MANUFACTURING:</u> Body Preparation: Crushing and Grinding, Clay Preparation, Blunging, Agitating, Ball Milling, Screening, Iron separation, Dewatering, Puging and Kneading etc. Drying and Firing: Drying Technology and Dryers used for Drying, Firing Technology and Kilns/Furnaces used for Firing. Inspection, Packing and Dispatch.	[20]	
Total		60	

BOOKS RECOMMENDED:

1. Elements of Ceramics
2. Ceramic Fabrication Process
3. Modern Pottery Manufacture
4. Ceramic Whitewares

- F.H. Norton
- W.D. Kingrey
- H.N. Bose
- Sudhir Sen

REFRACTORY TECHNOLOGY – I

Subject Code 2013405	Theory			No of Period in one session : 60			Credits 03
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	100	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Refractory Technology is an important subject which deals with heat resistant materials and products, refractory is an essential material used in all kind of furnaces and therefore knowledge of this technology is vital for the ceramic Engineers It also provides opportunity to know various Kilns/furnaces used in Ferrous and Non Ferrous industries besides its use in Ceramic industries.

Learning Outcome: At the end of this course, the students will be able to:

- Define refractory and state properties, uses of refractory.
- Explain classification of refractory.
- Identify different raw material with their properties for refractory.
- Explain different process for processing of raw materials.
- Explain construction and function of equipments used in refractory making.
- Identify different refractory products.
- Explain quality control and iso specification.

Contents : Theory		Hrs	Marks
Unit -1	<u>INTRODUCTION:</u> Definition, History, Concept and Role of Refractory.	[05]	
Unit -2	<u>CLASSIFICATION OF REFRACTORY:</u> Based on Chemical Composition: Acidic, Basic and Neutral Refractory. Based on Manufacturing Method: Shaped and Unshaped (Monolithic). Based on Fusion Temperature: Normal, High and Super Refractory.	[05]	
Unit -3	<u>RAW MATERIALS:</u> Refractory Raw Materials such as: Fire Clay, Alumina, Kyanite, Sillimanite, Andalusite, Bauxite, Quartzite, Magnesite. Chromite, Dolomite, Forsterite, Zircon and Silicon Carbide etc. Their Properties uses and Occurrence.	[12]	
Unit -4	<u>PLANT AND MACHINERY:</u> Crusher and Grinder: Jaw Crusher, Cone Crusher Disintegrator, Impact Mill and Ball Mill etc. Other Machinery: Vibrating Screen, Magnetic Separator, Pug Mill, Mixer, Screw Press, Toggle Press and Hydraulic Press etc.	[12]	
Unit -5	<u>DRYER AND KILN:</u> -Dryer: Function of Drier, and Type of Dryer Such As Batch and Continuous Dryers. -Kiln: Function of Kiln, Type of Kilns such as: Up Draft Kiln, Down Draft Kiln, Chamber Kiln, Tunnel Kiln, Rotary Kiln, and Shaft Kiln etc.	[10]	
Unit -6	<u>PRODUCTS:</u> Refractory Bricks and Shapes, Crucible, Glass Pots, Saggars, Furnace Blocks Muffles, Sagger Cones, Burner Blocks and Silicon Carbide Troughs etc.	[10]	
Unit -7	<u>QUALITY CONTROL:</u> Concept of Quality Control and I S O Specifications.	[06]	
Total		60	

BOOKS RECOMMENDED:

- | | |
|--|---------------|
| 5. Refractories and Their Manufacture, Properties and Uses | - M.L .Mishra |
| 6. Handbook on Refractories | - D.N.Nandi |
| 7. Refractories | - F.H.Norton |
| 8. Technology of Ceramic and Refractories | -P.P.Bunikov |
| 9. Steel Plant Refractory | -J.H.Chesters |

CERAMIC PROCESSES WORKSHOP-II

Subject Code 2013406	Practical			No of Period in one session:90			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	90	
	—	—	04	Internal	:	50	
				External	:	15	
				:	35		

RATIONALE:

The rationale behind this subject is to familiarize the Ceramic students with various process techniques adopted in Industries and Laboratories in making different Ceramic Products,

Learning Outcome: At the end of this course, the students will be able to:

Perform kneading operation in mixing of batches for body preparation.

Apply decoration by carving on the ceramic wares.

Analyze different process used in ceramic body manufacturing.

Perform sol-gel, ceramic coating in advance ceramic product.

	Contents(Practical)	Hrs	Marks
Unit-1	Kneading, wedging, carving, fluting, brushing, Lithography, salt glazing, ash glazing etc.	[20]	
Unit-2	Chemical bonding, electro casting, vitrification etc.	[20]	
Unit-3	Float glass process, Injection moulding, turning on CNC m/c	[20]	
Unit-4	Advanced ceramics processing for carbon, oxide ceramics, optical ceramics, electro-ceramics, Bio and medical ceramics, Ceramic coating, sol-gel, combustion engine parts, ball bearings etc.	[30]	
	Total	90	

BOOKS RECOMMENDED:

1	The Ceramics Bible	-	Louisa Taylor
2	Advanced Ceramics	-	Shingeyuki Somiva
3	Ceramic Fabrication Processes	-	W.D. Kingery

CERAMIC ENGINEERING WORKSHOP PRACTICE – II

(POTTERY AND REFRACTORY) LAB

Subject Code 2013407	Practical			No of Period in one session : 60			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

RATIONALE:

This Workshop Practice has been kept to teach Practical method of making Pottery and Refractory Products using the required raw materials. Use of various machinery used for the purpose are also taught and practiced while making the products.

Learning Outcome: At the end of this course, the students will be able to:

- Select the raw materials for making pottery and refractory.
- Prepare and use plaster of paris and rubber mould.
- Perform shaping operation from different technique.
- Apply drying and firing technique for pottery and refractory ware.
- Produce refractory bricks by hand moulding.

Contents : Practical		Hrs	Marks
Unit -1	<u>POTTERY:</u>	[05]	
	Such as for: Terra Cotta, and Earthenware etc.		
Unit -2	<u>CASTING SLIP MAKING:</u> Raw material selection, mixing, Casting Slip making, Pouring in the Mould, Taking out the Casted ware for inspection and finishing etc.	[05]	
Unit-3	<u>MAKING OF PLASTER OF PARIS:</u> Making of Plaster of Paris by Gypsum.	[05]	
Unit-4	<u>MAKING OF MOULD:</u> Mould making by using the Plaster of Paris and Making of Rubber Mould.	[10]	
Unit-5	<u>SHAPING OF POTTERY BY HAND MOULDING AND SLIP CASTING ETC.</u> Shaping of Pottery by using : Manual Process Potter's wheel, Jigger Jolly, Pug Mill, Pressing and Casting etc.	[10]	
Unit-6	<u>PREPARATION OF FRIT AND GLAZE:</u> Selection and Batch Making of Frit, Making of Frit in Smelter, Quenching of molten Frit in water, Taking out and drying and storing in store for use. Glaze Making for application on Pottery wares. Use of Ceramic Transfer Papers Pottery wares.	[10]	
	<u>REFRACTORY:</u>		
Unit-1	<u>RAW MATERIAL PREPARATION:</u> Preparation of Plastic and Non Plastic Clay and Fire Clay etc. for making Refractory Bricks.	[05]	
Unit-2	<u>SHAPING OF REFRACTORY BY: HAND MOULDING, PRESSING AND CASTING:</u> Shaping of Refractory Bricks and Shapes by: <ul style="list-style-type: none"> - Hand Moulding. - Tamping. - Pressing. - Casting. 	[10]	
Unit-3	<u>MAKING OF SAGGER:</u> <ul style="list-style-type: none"> - By Hand Moulding. - By Pressing. 	[10]	
Unit-4	<u>MAKING OF MUFFLES:</u> <ul style="list-style-type: none"> - By Manual Process. - By Pressing. 	[05]	

Unit-5	<u>DRYING OF REFRACTORY:</u> - By natural Process. - By using Dryer.	[05]	
Unit-6	<u>FIRING OF REFRACTORY:</u> Firing of Refractory Bricks and Shapes in a Furnace/Kin.	[10]	
	Total	90	

BOOKS RECOMMENDED:

1. The Craft of Ceramics
2. Ceramic Fabrication Process
3. Monolithic Refractories

- Geza de Vegh and Albert Mandi
- W.D.Kingrey
- Subrata Banerjee

GEOLOGY LAB

Subject Code 2013408	Practical			No of Period in one session : 90			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
			External	:	35		

RATIONALE:

This Geology Lab has been kept to familiarize the students with rocks and minerals used in Ceramic Industry. Also they carry out various lab practices to identify raw materials. They know about various equipment used to conduct experiments in Geology Lab.

Learning Outcome: At the end of this course, the students will be able to:

- Identify different ceramic raw materials.
- Operate steel yard balance.
- Determine specific gravity of different raw materials.
- Demonstrate petrological microscope.

Contents : Practical		Hrs	Marks
Unit -1	<u>IDENTIFICATION OF ROCKS AND MINERALS SUCH AS:</u> Basalt, sand stone, kaolin, Quartz Feldspar, Calcite, Beryl, Bauxite, Lime Stone, Hematite and Magnesite etc.	[30]	
Unit -2	<u>DETERMINATION OF SPECIFIC GRAVITY USING STEEL YARD BALANCE FOR:</u> Quartz, Feldspar, Calcite, Bauxite, Lime Stone, Magnesite and Hematite etc.	[25]	
Unit -3	<u>MINERALOGICAL ANALYSIS:</u> Study of Petrological Microscope with respect to: Parts, Components and their Functions. Working Principle. Preparation of Slides For analysis.	[25]	
Unit -4	<u>BLOW PIPE ANALYSIS OF:</u> Gypsum, Calcite and Beryl etc.	[10]	
Total		90	

Books Recommended:-

1	Introduction of Physical Geology	-	A. K. Datta
2	Optical Mineralogy	-	A. F. Rogers & P. F. Kerr

CERAMIC PROCESSES WORKSHOP-II (TW)

Subject Code 2013409	Term Work			No of Period in one session:50			Credits 01
	No. of Periods Per Week			Full Marks			
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	

RATIONALE:

The rationale behind this subject is to familiarize the Ceramic students with various process techniques adopted in Industries and Laboratories in making different Ceramic Products,

Learning Outcome: At the end of this course, the students will be able to:

- Perform kneading operation in mixing of batches for body preparation.
- Apply decoration by carving on the ceramic wares.
- Analyze different process used in ceramic body manufacturing.
- Perform sol-gel, ceramic coating in advance ceramic product.

	Contents(Practical)	Hrs	Marks
Unit-1	Kneading, wedging, carving, fluting, brushing, Lithography, salt glazing, ash glazing etc.	[20]	
Unit-2	Chemical bonding, electro casting, vitrification etc.	[20]	
Unit-3	Float glass process, Injection moulding, turning on CNC m/c	[20]	
Unit-4	Advanced ceramics processing for carbon, oxide ceramics, optical ceramics, electro-ceramics, Bio and medical ceramics, Ceramic coating, sol-gel, combustion engine parts, ball bearings etc.	[30]	
Total		90	

BOOKS RECOMMENDED:

1	The Ceramics Bible	-	Louisa Taylor
2	Advanced Ceramics	-	Shingeyuki Somiva
3	Ceramic Fabrication Processes	-	W.D. Kingery

CERAMIC ENGG. WORKSHOP PRACTICE – II (POTTERY AND REFRACTORY) – (TW)

Subject Code 2013410	Term Work			No of Period in one session : 50			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	Internal	:	50	
	—	—	03	External	:	15	
						35	

RATIONALE:

This Workshop Practice has been kept to teach Practical method of making Pottery and Refractory Products using the required raw materials. Use of various machinery used for the purpose are also taught and practiced while making the products.

Learning Outcome: At the end of this course, the students will be able to:

- Select the raw materials for making pottery and refractory.
- Prepare and use plaster of paris and rubber mould.
- Perform shaping operation from different technique.
- Apply drying and firing technique for pottery and refractory ware.
- Produce refractory bricks by hand moulding.

Contents : Practical		Hrs	Marks
	<u>POTTERY:</u>		
Unit -1	Such as for: Terra Cotta, and Earthenware etc.	[03]	
Unit -2	<u>CASTING SLIP MAKING:</u> Raw material selection, mixing, Casting Slip making, Pouring in the Mould, Taking out the Casted ware for inspection and finishing etc.	[03]	
Unit-3	<u>MAKING OF PLASTER OF PARIS:</u> Making of Plaster of Paris by Gypsum.	[10]	
Unit-4	<u>MAKING OF MOULD:</u> Mould making by using the Plaster of Paris and Making of Rubber Mould.	[03]	
Unit-5	<u>SHAPING OF POTTERY BY HAND MOULDING AND SLIP CASTING ETC.</u> Shaping of Pottery by using : Manual Process Potter's wheel, Jigger Jolly, Pug Mill, Pressing and Casting etc.	[03]	
Unit-6	<u>PREPARATION OF FRIT AND GLAZE:</u> Selection and Batch Making of Frit, Making of Frit in Smelter, Quenching of molten Frit in water, Taking out and drying and storing in store for use. Glaze Making for application on Pottery wares. Use of Ceramic Transfer Papers Pottery wares.	[03]	
	<u>REFRACTORY:</u>		
Unit-1	<u>RAW MATERIAL PREPARATION:</u> Preparation of Plastic and Non Plastic Clay and Fire Clay etc. for making Refractory Bricks.	[03]	
Unit-2	<u>SHAPING OF REFRACTORY BY: HAND MOULDING, PRESSING AND CASTING:</u> Shaping of Refractory Bricks and Shapes by: - Hand Moulding. - Tamping. - Pressing. - Casting.	[03]	
Unit-3	<u>MAKING OF SAGGER:</u> - By Hand Moulding. - By Pressing.	[03]	
Unit-4	<u>MAKING OF MUFFLES:</u> - By Manual Process. - By Pressing.	[03]	

Unit-5	<u>DRYING OF REFRACTORY:</u> - By natural Process. - By using Dryer.	[03]	
Unit-6	<u>FIRING OF REFRACTORY:</u> Firing of Refractory Bricks and Shapes in a Furnace/Kin.	[10]	
	Total	50	

BOOKS RECOMMENDED:

1	The Craft of Ceramics	-	Geza de Vegh and Albert Mandi
2	Ceramic Fabrication Process	-	W.D.Kingrey
3	Monolithic Refractories	-	Subrata Banerjee

COURSE UNDER MOOCS /SWAYAM / OTHERS – (TW)

Subject Code 2013411	Term Work			No of Period in one session : 50			Credits 02
	No. of Periods Per Week			Full Marks			
	L	T	P/S	Internal	:	15	
	—	—	04	External	:	35	