

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: CERAMIC TECHNOLOGY							SEMESTER: 4 TH					
SL NO	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
			L	T	P	INTERNAL EXAM			END SEM EXAM	TERM WORK	PRACTICAL EXAM	TOTAL MARKS
						TA	CT	Total				
THEORY												
1.	ETT 421	APPLIED ELECTRONICS AND CONTROL	4	-	-	10	20	30	70			100
2.	CTT 401	CERAMIC SCIENCE-II	4	-	-	10	20	30	70			100
3.	CTT 402	TECHNOLOGY OF REFRACTORY	4	-	-	10	20	30	70			100
4.	CTT 403	CERAMIC KILN, FURNACE AND FUELS	4	-	-	10	20	30	70			100
5.	CTT 404	COMPUTER APPLICATION IN CERAMIC INDUSTRY	4	-	-	10	20	30	70			100
PRACTICAL/TERM WORK												
6.	ETP 421	APPLIED ELECTRONICS AND CONTROL LAB	-	-	4					25	25	50
7.	CTP 401	FUEL TESTING LAB	-	-	3					25	25	50
8..	CTP 402	CERAMIC WORKSHOP II LAB	-	-	5					25	25	50
9.	CTP 403	CERAMIC TESTING II LAB	-	-	5					25	25	50
10.	CTP 404	TECHNICAL SEMINAR			2					25	25	50
GRAND TOTAL			20		19	40	80	120	380	125	125	750

Total Contact hours per week: 39
Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test
Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

APPLIED ELECTRONICS AND CONTROL

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	ETT 421	Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Objectives :

On completion of this course, students will be able to develop understanding and use of

1. Special Semiconductor devices
2. Opto – electronic supply
3. Regulated power supply
4. Principles of digital electronics
5. Sensors and transducers
6. Microprocessor
7. PLC

Distribution of Periods

UNIT-1	Special Semiconductor Devices	06
UNIT-2	Opto-Electronic Devices	03
UNIT-3	Regulated Power supply	09
UNIT-4	Principles of Digital Electronics	08
UNIT-5	Sensors and Transducers	15
UNIT-6	Microprocessors	12
UNIT-7	PLC	07
	Total	60

UNIT-1 SPECIAL SEMICONDUCNTOR DEVICES

Explain Characteristics, Principle of operation and applications of

- 1.1 PET
- 1.2 MOSFET
- 1.3 UJT
- 1.4 SCR
- 1.5 TRIAC
- 1.6 DIAC

UNIT -2 OPTO-ELECTRONIC DEVICES

Explain the operation and use of

- 2.1 LED
- 2.2 LCD
- 2.3 Opto-Coupler
- 2.4 LASER

UNIT-3 REGULATED POWER SUPPLY

- 3.1 Explain the function of ordinary DC power supplier
- 3.2 Classify different units of DC series voltage regulators

- (i) Sampling units
- (ii) Reference units
- (iii) Comprising units
- (iv) Amplifier units
- (v) Control units
- (vi) Complete series & shunt voltage regulators

3.3 Explain the operation of switching mode power supply (AC & DC)

UNIT – 4 PRINCIPLES OF DIGITAL ELECTRONICS

- 4.1 Explain types of flip – Flop and its use
- 4.2 Describe briefly about memory element
- 4.3 Explain the function of shift registers
- 4.4 Describe the function and use of Mod – 10 and ring counter.

UNIT – 5 SENSORS AND TRANSDUCERS

- 5.1 Describe Sensors for sensing pressure, temperature, moisture humidity, flow, level.
 - (i) Explain temperature measurement using Resistance Thermometer, Thermocouple, Thermister.
 - (ii) Explain Pressure measurement using manometer, U – tube, Elastic type Pressure gauge (Bourdon tube, diaphragm, bellows etc.)
 - (iii) Classification of flow – meter, Variable – head flow – meter, principle of operation advantage and disadvantage of orifice plate, venture tube nozzles.
- 5.2 Describe the function of Limit switch. Proximity Switch. Alarm annunciation and its use.

UNIT – 6 MICROPROCESSOR

- 6.1 Describe introduction to Intel 8085
- 6.2 Explain register organization of 8085
- 6.3 Introduction sets of 8085
- 6.4 Describe assembly language concepts
- 6.5 Describe preparation small programmers using 8085
- 6.6 Explain the use of
 - (i) Data bus
 - (ii) Address bus
 - (iii) Control bus
 - (iv) Interrupt time line
 - (v) Multi – planning busses.

UNIT – 7

- 7.1 Explain basic structure and operation of PLC
- 7.2 Describe simple ladder logic
- 7.3 Right simple ladder programme (implementing only OR, AND, NOR & NAND logic.)

LEARNING RESOURCES:

- 1. Integrated Electronics, analog and Digital systems by J. Millman & Christos C. Halkius.
- 2. Electronic Devices and Circuits by Motor Shed.
- 3. Electronic Device and Circuits by G. K. Mithal
- 4. Power Electronics by Rashid
- 5. Digital Circuits & Systems by doughals 1: Hall Mc. Graw Hill Publications
- 6. Digital Electronics by Gaur

7. Digital Systems Design by Mano
8. Microprocessor by Gaonkar
9. Microprocessor by B. Ram
10. Industrial Electronics by Paul B. Zaber
11. Mechanical Measurement & Measuring Circuit by S. Khedkar
12. Instrumentation by Nakara Choudhury.
13. Industrial electronics by S. N. Biswas
14. Mechanical and Industrial Measurement by R. K. Jain
15. Electrical and Electronic Instrumentation by A. K. Sawhney
16. Industrial Instrumentation by Fibrace
17. Industrial Electronics by G. K. Muhal

CERAMIC SCIENCE-II

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTT 401	Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Objectives : After completion of course study will be able to :

1. Know detail on atomic structure and periodic table.
2. Understand chemical bonding, crystallography.
3. Understand Phase transformation.
4. Know properties of ceramic material.
5. Understand Microstructure of ceramic product.
6. Know effect of Temperature on ceramic materials .

Sl. No.	Major Topics	Periods
1	Atomic Structure	05
2	Chemical Bonding	05
3	Crystallography	10
4	Diffusion Micro structure n & Phase Transformation	05
5	Effect of Temperature	10
6	Properties of Ceramic materials	15
7	Micro structure	10

COURSE CONTENTS

1.0 ATOMIC STRUCTURE AND PERIODIC TABLE.

- 1.1 Fundamental concept on Atomic Structure & Electronic Configuration of Atoms.
- 1.2 Discuss the importance of the periodic table

2.0 CHEMICAL BONDING

- 2.1 Define Chemical Bonding
- 2.2 State and explain different types of bonds like Ionic covalent metallic, vander walls and Hydrogen bond
- 2.3 Bond energy and Bond strength.
- 2.4 State and explain different physical properties based on chemical bonding.

3.0 CRYSTALLOGRAPHY

- 3.1 Define Crystal system
- 3.2 Explain different types of crystal system
- 3.3 Define Crystal Defects
- 3.4 State different types of crystal defects
- 3.5 Draw the following structure of :
 - a. NaCl
 - b. CsCl

- c. Clay
 - d. Silicate structure
- 4.0 DIFFUSION & PHASE TRANSFORMATION (Fundamental idea only)**
- 4.1 Diffusion
 - 4.2 Fick's law of Diffusion
 - 4.3 Sintering & Grain Growth
 - 4.4 Factors affecting sintering & vitrification
 - 4.5 Phase Transformation
 - 4.6 Define Nucleation and grain growth
- 5.0 EFFECT OF TEMPERATURE**
- 5.1 State the effect of temperature on Silica, Zircon, Magnesite, Clay, Alumino silicate mineral, Dolomite, Chromites and Graphite, etc.
 - 5.2 Describe the different changes during firing of Ceramic.
 - 5.3 Pyro chemical changes in triaxial bodies
- 6.0 PROPERTIES OF CERAMIC MATERIALS**
- 6.1 State and explain following properties of ceramic material in brief
 - a. Mechanical
 - b. Electrical
 - c. Optical
 - d. Thermal
 - e. Magnetic
 - 6.2. Comparison of ceramic with polymer & metals.
- 7.0 MICRO STRUCTURE**
- 7.1 Define Micro Structure & its characteristics
 - 7.2. Various techniques of studying microstructure
 - 7.3 Describe different types of Microscopes like:
 - a. Mineralogical Micro Scope
 - b. Electron Microscope
 - 7.4 Describe the process to prepare a specimen to study microstructure of typical ceramic materials and products.
 - 7.5 Micro Structure of various white wares and refractory products.
 - 7.6 Development of microstructure in relation to sintering and control of microstructure.

Learning Resources :

- 1. Introduction to Ceramics by W.D. Kingery
- 2. Material Science by V. Ragavan
- 3. Material Science and Engineering By N. Gupta and R.C. Gupta.
- 4. Material Science by F. D. Gyanm.
- 5. Industrial ceramic by Singer & Singer.
- 6. Physical ceramic for engineers by V. Vlack

TECHNOLOGY OF REFRACTORY

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTT 402	Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Objectives :

After completion of the course the students will be able to

1. Understand various types of refractories their classification and their manufacturing process.
2. Know testing of Refractories in details.
3. Understand the causes of failure of refractories.
4. Understand refractories, cement and monolithic and their application in metal extraction.
5. To know about insulating brick and fibrous refractories materials and their application.
6. Know specifications of refractories as per B.I.S.

Sl.No.	Major Topic	Periods
1.	Refractories, classification & raw materials	05
2.	Acid Refractories and Basic Refractories	15
3	Neutral Refractories & other refractories	20
4	Testing of Refractories	10
5	Failure of Refractories	05
6	Monolithic Refractories	05

COURSE CONTENTS

1.0 REFRACTORIES, CLASSIFICATION & RAW MATERIALS

- 1.1 Introduction to Refractories
- 1.2 Define Refractories
- 1.3 State the importance of refractory
- 1.4 Classify refractories
- 1.5 Raw materials for refractory, Natural & Synthetic raw materials.

2.0 ACID AND BASIC REFRACTORY (Manufacturing, properties and uses)

- 2.1 Acid Refractories
 - (a) Fire clay Refractories
 - (b) Silica Refractories & Semi Silica refractory.
 - (c) Sillimanite refractory, Kyanite and other alumino silicate refractories
- 2.2 Define Basic Refractories & preparation properties uses of following refractories in brief.
 - (i) Magnesite refractories
 - (ii) Chrome based refractories
 - (iii) Dolomite refractories
 - (iv) Forsterite Refractories

3.0 NETURAL AND OTHER REFRACTORIES

- 3.1 Discuss preparation, properties and uses of following refractories in brief:-
 - (i) Graphite refractories
 - (ii) Zirconia refractories
 - (iii) Silicon Carbide Refractories
 - (iv) Spinal Bricks
- 3.2 Fusion cast refractories – properties and application
- 3.3 Insulation refractory bricks -properties, uses and manufacturing.
- 3.4. Carbon containing Refractory:- Manufacturing, Properties and Uses.
Magnesia – Carbon Refractory
Alumina – Magnesia – Carbon Refractory
Alumina – Carbon Refractory
- 3.5. Refractory hollow ware:- stopper, Nozzle, Pipes and Crucibles, Muffle, Glass Pot etc.
- 3.6 Fibrous Refractory materials & their applications.

4.0 TESTING OF REFRACTORIES:

- 4.1 Physical Test Of Refractories
- 4.2 Testing of Castables
- 4.3 Dimension of Various Refractories.
- 4.4. PCE & RUL of refractory.
- 4.5 BIS Specification for Various Refractories.

5.0 FAILURE OF REFRACTORIES

- 5.1 Various factory responsible for failure of refractories.
- 5.2 Various methods of repairing in hot atmosphere in furnace.

6.0 MONOLITHIC REFRACTORIES

- 6.1 Castables ,their types, manufacturing process and uses.
- 6.2 Plastic masses,Ramming Masses,Gunning Masses,Spraying Masses,Patching Masses.
- 6.3 Refractory Cement and mortars and their uses.

Learning Resources :

- 1. Refractories : production & Properties by J.H. Chester.
- 2. Refractories by Chesti
- 3. Refractories their manufacturing properties & uses by M.L. Mishra
- 4. Technology of ceramics & refractories by P.P. Budnikov
- 5. Refractories by NANDI
Refractory – F.H. Norton

CERAMIC KILN, FURNACE AND FUELS

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTT 403	Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Objectives :

After completion of the course, the students will be able to:

1. Understand types of fuels required for ceramic industry.
2. know in detail of various solid, liquid and gaseous fuels & their application.
3. Know the construction & operation of various ceramic kilns.
4. Know various types of metallurgical furnaces; their construction & operation.
5. understand general idea on pyrometer and pyroscope.

Sl.No.	Major Topic	Periods
1.	Introduction to fuels and combustion	10
2.	Solid Fuels, Liquid Fuels & Gaseous Fuels	20
3	Ceramic kilns	15
4	Metallurgical furnaces	10
5	Introduction to Pyroscope and Pyrometer	05

COURSE CONTENT

1.0 INTRODUCTION TO FUEL & COMBUSTION

- 1.1. State and explain introduction to solid, liquid and gaseous fuels
- 1.2. Explain Non-conventional source of energy for burning ceramic kiln
- 1.3. State and explain combustion of fuels
- 1.4. Combustion calculation
- 1.5. Terms & Definition relating to fuel testing.

2.0 SOLID, LIQUID AND GASEOUS FUELS:

- 2.1 State various types of solid fuels.
- 2.2 Classify solid fuels.
- 2.3. Describe methods of formation of coal.
- 2.4. State & explain the properties of coal.
- 2.5. Describe in detail how coke is prepared in coke oven.
- 2.6. State the properties of coke.
- 2.7. Describe the procedure for storage of coal.
- 2.8. State the reasons for washing of coal.
- 2.9. Describe briefly the gradation of coal, selection of coal for different use.
- 2.10 Testing of solid fuel.
- 2.11 Classify liquid fuels.
- 2.12 Describe the process of refining crude petroleum product.
- 2.13 State and explain the properties of various liquid fuels and petroleum by products.
- 2.14 State the advantages of liquid fuels over solid fuels.
- 2.15 Testing of liquid fuels
- 2.16 Furnace oil & storage of liquid fuel
- 2.17 Classify gaseous fuel.

- 2.18 State and explain the properties of various gaseous fuels and their application in industries & Blast Furnace Gas, Coke oven gas, BOF Gas, Coal Gas, Oil Gas.
- 2.19 Explain in details the manufacturing method of producer gas.
- 2.20 List the advantages of gaseous fuel over liquid and solid fuel.
- 2.21 Describe the manufacturing methods of biogas.
- 2.22 Testing Gaseous fuel.
- 2.23 Rocket Fuel and nuclear fuel.

3.0 **CERAMIC KILNS**

- 3.1. Define kiln, furnace and oven
- 3.2. Classify ceramic kiln in details
- 3.3. Describe the construction operation of the following kilns in details :-
 - a) Down Draft kiln
 - b) Up draft kiln.
 - c) Chambr kiln
 - d) Tunnel kiln & Roller Hearth kiln
 - e) Muffle kiln
 - f) Shaft Kiln
 - g) Glass Pot furnace
 - h) Glass Tank furnace
 - i) Electric furnace for glass melting
 - j) Rotary kiln
 - h) Coke Oven
- 3.4. List the advantages of continuous kiln over periodic kiln
- 3.5. Describe various type of kiln furniture used in ceramic kilns
- 3.6. Describe various types of furnaces and kiln accessories used in kiln operation.

4.0 **FURNACES (Introduction only)**

- 4.1 Classification of Furnaces.
- 4.2 Furnace used in steel plant & their classification.
- 4.3 Fuels used in steel plant furnaces & their characteristics.
- 4.4 Sketch the following furnaces showing various sections.
 - a) Blast furnace.
 - b) Cupola
 - c) Open hearth furnace
 - d) Ladle refining furnace
 - e) Basic Oxygen Furnace etc.
 - f) Electric Arc Furnace.

6.0 **PYROSCOPE AND PYROMETER**

- 6.1 Define pyroscope and pyrometer
- 6.2 Discuss various types of pyroscope.
- 6.3 Describe various types of cones used in ceramic kiln firing.
- 6.4 State the requirements of pyroscope and pyrometer in kiln firing.
- 6.5. Describe various pyrometers used in ceramic kiln firing.

Learning Resources :-

1. Fuels and Combustion by S.Sarkar
2. Fuels Solid, liquid & gaseous by J.S.S. Brame & King.
3. Fuels furnace refractory by Gupta.
4. Furnace – By Trink
5. Industrial Ceramic by singer and signer

COMPUTER APPLICATION IN CERAMIC INDUSTRY

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTT 404	Semester	4 th
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	Class Test:	20
Tutorial:		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

Objectives: After completion of this course, student will be able to:

1. Know the basic fundamentals on computer application
2. Know the use of computer in ceramic industries
3. Know computer design in various ceramic products
4. know robotics application in ceramic industries

Sl No	MAJOR TOPIC	PERIODS
1	INTRODUCTION TO BASIC COMPUTER APPLICATION	10
2	COMPUTER LANGUAGE	15
3	COMPUTER COMMUNICATION	10
4	COMPUTER APPLICATION IN CERAMIC PRODUCT MAKING	15
5	ROBOTICS (General idea only)	10

COURSE CONTENT:

- 1.0 INTRODUCTION TO BASIC COMPUTER APPLICATION
 - 1.1 Basic computer application in industries
 - 1.2 Operating system fundamentals
- 2.0 COMPUTER LANGUAGE
 - 2.1 Fundamental ideas on programming languages
 - 2.2 Application of computer languages in ceramic manufacturing
 - 2.3 Work processing using MS-Word
 - 2.4 Data manipulation using MS-Excel
 - 2.5 Presentation using MS-Powerpoint
 - 2.6 Computer virus
- 3.0 COMPUTER COMMUNICATION
 - 3.1 Communication protocol
 - 3.2 Internet basics
 - 3.3 Web page & idea about HTML & dream weaver

4.0 COMPUTER APPLICATION IN CERAMIC PRODUCT MAKING

- 4.1 Use of CAD in ceramic design
- 4.2 Basic ideas on CAM
- 4.3 Computer application inventory management & manpower management in ceramic industry .
- 4.4 Concept of interfacing for monitoring & control of temperature , Pressure, productivity ,heat flow
- 4.5 Use of flow chart histograms

5.0 ROBOTICS (General idea only)

- 5.1 Robot anatomy
- 5.2 Robot configuration
- 5.3 Robot control system
- 5.4 Robot programming & language
- 5.5 Application of robotics in ceramic manufacturing
 - a. In white ware industry
 - b. In glass industry
 - c. In refractory industry
- 5.6 Use of ceramic components in computer manufacturing

BOOKS:

- 1 Automation , production & computer integrated manufacturing by Michell P. Grover
- 2 Computer fundamental by V. Rajaramana
- 3 Let us see by Yasvant Kanitkar
- 4 Computer genesis , programming and application by N. Subhramaniyan
- 5 Principles of electronic ceramic by L. L. Hench & West
- 6 Introduction to technical ceramics by B. E. Waye

Learning Resources:

Sl No	Author	Title of book	Publisher
1.	Michell P. Grover	Automation , production & computer integrated manufacturing	
2.	V. Rajaramana	Computer fundamental	
3.	Yasvant Kanitkar	Let us see	
4.	N. Subhramaniyan	Computer genesis , programming and application	
5.	L. L. Hench & West	Principles of electronic ceramic	
6.	B. E. Waye	Introduction to technical ceramics	

APPLIED ELECTRONICS AND CONTROL LAB

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	ETP 421	Semester	4 th
Total Period:	60	Examination	4 hrs
Lab. periods:	4 P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25

1. Study of different types of thermometer
2. Study of different types of Pressure Gauge
3. Study of Orifice Plate, Venturi meter, nozzles
4. Implementation of AND, OR, NAND, NOR, XOR, NOT gates and verification truth table.
5. Verification of R-S flip – flop and J-K-flops.
6. Verification of performance of Mod-10 Counter
7. 4-bit up/down counters.
8. Study of 8085 based Microprocessor Kit.
9. Simple programs using 8085 microprocessor kit.
10. Study the performance of electronic on – off temperature controller.

FUEL TESTING LAB

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTP 401	Semester	4 th
Total Period:	45	Examination	4 hrs
Lab. periods:	3 P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25

MINIMUM SIX NUMBER OF JOBS TO BE PRACTICED BY THE STUDENT

1. Determine of proximate analysis of coal
 - (a) Moisture content.
 - (b) Volatile matters, Ash content.
 - (c) Fixed carbon content etc.
2. Determination of calorific value of solid and liquid fuel.
3. Determination of viscosity of liquid fuels.
4. Determination of Density of liquid fuels.
5. Determination of flash point of liquid fuels.
6. Study of ORSAT apparatus.
7. Determination of fusion point of coal ash.
8. Study of thermo-couples pyrometer
9. Study of the operation of optical and radiation Pyrometers.
10. Study of Pyroscope such as segar cone & Orton cone etc.

CERAMIC WORKSHOP II LAB

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTP 402	Semester	4 th
Total Period:	75	Examination	4 hrs
Lab. periods:	5 P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25

MINIMUM TWELVE NUMBER OF JOBS FROM BOTH SECTION SHOULD BE PRACTICED BY THE STUDENT

(SECTION –A)

1. Preparation of refractory mixture for making the following standard bricks.
1. Acid Bricks - Fireclay bricks by hand molding process
2. Basic Bricks - Dolomite, Magnesite Preparation of body composition
3. Neutral Bricks - fused Alumina
4. Preparation of Saggar body composition & making of Sagger by hand moding
5. Preparation of insulation bricks
6. Preparation of refractory cements and mortars.
7. Preparation of refractory crucibles.
8. Study of various refractory shapes used in furnace lining.
9. Preparation of cement castables
10. Preparation of ramming masses.
11. Firing of Fire clay bricks.
12. Preparation of Grog.

(SECTION – B)

1. Preparation of Cement concrete products.
2. Ferro cement Water Tank making
3. Ferro cement Roofing Sheet making
4. Concrete Block making
5. Preparation of Mosaic tiles.

7. Chalk crayons making
8. Preparation of cement clinker
9. Grinding of cement clinkers with other additives for making various types of cement

CERAMIC TESTING II LAB

Name of the Course: Diploma in CERAMIC TECHNOLOGY			
Course code:	CTP 403	Semester	4 th
Total Period:	75	Examination	4 hrs
Lab. periods:	5 P/W	Term Work	25
Maximum marks:	50	End Semester Examination:	25

MINIMUM TEN NUMBERS OF JOBS TO BE PRACTICED BY THE STUDENTS

A. TESTING OF REFRACTORIES

1. Grading of grog for refractories
2. Determine the physical properties refractory products.
3. Determine C.C.S.
4. Determine thermal expansion
5. Determine permeability
6. Determine PCE value
7. Testing of Castable refractories
8. Determine PLCR
9. Study of Mineralogical Microscope.
10. Preparation of sample to study under micro scope.

B. TESTING OF CEMENT

1. Determine consistency of cement.
2. Determine initial and final setting time of cement
3. Determine compressive strength of cement mortar.
4. Determine Tensile strength of cement concrete and mortar
5. Determine expansion of cement
6. Determine particle size of cement