

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR 3rd Semester CERAMIC TECHNOLOGY (wef 2019-20)

Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional:	End Sem Exams	Exams (Hours)	Total
Theory									
Th.1		Elementary Mechanical Engineering	4	-	-	20	80	3	100
Th.2		Chemistry of ceramic material	4	-	-	20	80	3	100
Th.3		Ceramic Manufacturing Process	4	-	-	20	80	3	100
Th.4		Raw Material For Ceramic Making	4	-		20	80	3	100
Th.5		Environmental studies	4	-		20	80	3	100
		<i>Total</i>	20	-		100	400	-	500
Practical									
Pr.1		Work Shop Practice-II	-	-	4	25	25	3	50
Pr.2		Ceramic Workshop-I	-	-	6	50	50	3	100
Pr.3		Ceramic Testing-I	-	-	6	50	50	3	100
		Student Centred Activities(SCA)		-	3	-	-	-	-
		<i>Total</i>	-	-	19	125	125	-	250
		Grand Total	20	-	19	225	525	-	750

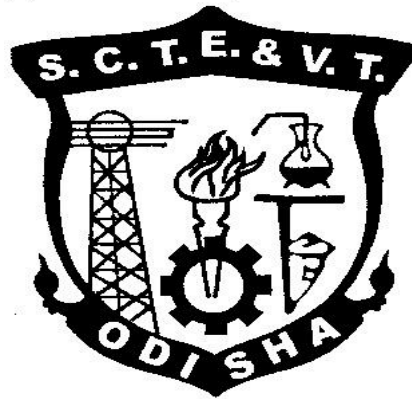
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%

SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc., Seminar and SCA shall be conducted in a section.

There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional: Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester

CURRICULLUM OF 3RD SEMESTER
For
DIPLOMA IN CERAMIC TECHNOLOGY
(Effective FROM 2019-20 Sessions)



**STATE COUNCIL FOR TECHNICAL
EDUCATION & VOCATIONAL TRAINING,
ODISHA, BHUBANESWAR**

ELEMENTARY MECHANICAL ENGINEERING (Th-01)

(COMMON TO METALLURGY AND CERAMIC)

Name of the Course: Diploma in Ceramic Technology			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination ::	80

A. RATIONALE:

Metallurgical Engineering and Ceramic are intimately related with certain areas of mechanical engineering. It is therefore, essential for a metallurgical engineer and a ceramist to have basic knowledge of mechanical engineering.

B. OBJECTIVES:

After the completion of this subject students will have knowledge about:

1. Shear Force, bending moment and stresses on different types of load.
2. Links kinematic chain and different types of mechanism.
3. Working of belt, ropes and chain drives, brakes and dynamomentans.
4. Basic principles of thermodynamics and steam tables.
5. Functions and types of boiler and turbines with idea on steam condensers.
6. IC engine, types of I.C.engines and calculation of power and efficiency.
7. Refrigeration and Air Conditioning,
8. Different types of conventional machine tools with idea on CNC milling and Turning.

C. TOPIC WISE DISTRIBUTION OF PERIODS

SL.NO.	NAME OF THE TOPIC	PERIODS
1	Shear Force and Bending Moment	10
2	Machine and Mechanism	08
3	Belt, Rope and Chain drives, Brakes and Bearings	08
4	Basic Principles of Thermodynamics	06
5	Boilers and Turbines	10
6	Internal Combustion Engines	06
7	Refrigeration and Air-Conditioning	06
8	Machine Tools	06
	TOTAL	60

D. COURSE CONTENTS (in terms of specific objectives):

1.0 Shear Force and Bending Moment

- 1.1 Define shear force and bending moment
- 1.2 Construct shear force and bending moment diagram of cantilevers, simple supported beam with point load and uniformly distributed load.
- 1.3 Determine stress of loaded beams

2.0 Machine and Mechanism

- 2.1 Define machine, mechanism, kinematics, link, kinematics pair, kinematics chain
- 2.2 Illustrate four – bar linkage, crank – connecting rod, quick return mechanism
- 2.3 Understand function of a cam and cam follower

3.0 Belt, Rope and Chain drives, Brakes and Bearings

- 3.1 Determine the length of open belt drive
- 3.2 Determine the ratio of tensions and power transmitted by belt drive
- 3.3 Discuss advantage of rope and chain drive
- 3.4 State working principle of simple brake and dynamo meters
- 3.5 Define and classify bearings (bush and anti-friction)

4.0 Basic Principles of Thermodynamics

- 4.1 Define heat and work and derive inter – relationship
- 4.2 Determine work done by compression and expansion of gases
- 4.3 Explain properties of steam (sensible, latent heat & dryness fraction)
- 4.4 Discuss use of steam tables.

5.0 Boilers and Turbines

- 5.1 Explain the functions of the boiler
- 5.2 Define fire tube, water tube, boiler.
- 5.3 Define and classify steam turbines (impulse and reaction type and steam condensers)

6.0 Internal Combustion Engines

- 6.1 Define and classify internal combustion (I.C.) engine
- 6.2 Explain Otto and Diesel cycles
- 6.3 Explain and compare 2 stroke and 4 stroke and I.C. engine
- 6.4 Define Indicate power, brake power and mech. efficient.

7.0 Refrigeration and Air-Conditioning

- 7.1 Define Refrigeration and Air – conditioning and state various application
- 7.2 Explain simple vapour compression refrigeration system
- 7.3 State types of refrigerants and explain their properties
- 7.4 Describe the basic concept of air – conditioning with reference to a room air conditioner

8.0 Machine Tools

- 8.1 Define machine tools
- 8.2 Describe different machine tools and their functions (lathe, drill, shaper, milling machine and grinding machine)
Brief idea on CNC milling and CNC Turning

Syllabus Coverage upto Internal Assessments:

Topics: - 1, 2&3

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Strength of material	R.S.Khurmi	S.Chand Publisher
2.	Engineering Thermodynamics	P.L.Ballaney	Khanna Publisher
3.	Refrigeration and Air Conditioning	R.S.Khurmi	S.Chand Publisher
4.	Theory of Machine	R.S.Khurmi	S.Chand Publisher
5.	Basic Mechanical Engineering	Dr.N.R.Banapurma Mr.V.S.Yaliwal	Vikas Publisher

CHEMISTRY OF CERAMIC MATERIALS (Th-02)

Name of the Course Diploma in Ceramic Technology			
Course Code		Semester	3 rd
Total Period	60	Examination	3 hours
Theory Period	4 period of week	Internal Assessment	20
Maximum Marks	100	End Semester Examination	80

A. Rationale :

To understand the science of ceramic it is essential to know thermodynamics, thermo chemistry, phase rule, thermal analysis for a ceramic students.

B. Objectives :

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

1. Know about the relation between ceramics and Thermodynamics.
2. Know about the fundamentals of phase diagram and its application in ceramics.
3. Understand colloids and its requirements in ceramics industry.
4. Understand thermal analysis of ceramic raw materials.

C. Topic wise distribution of periods

Sl. No.	Name of the Topic	Periods
1.	Thermodynamics & thermo chemistry	20
2.	Phase rule & Phase diagram	20
3.	Colloids	10
4.	Thermal Analysis & Spectroscopy	10

1. THERMODYNAMICS AND THERMO CHEMISTRY

- 1.1 Define different terms of thermodynamics systems
- 1.2 State ideal gas laws.
- 1.3 Explain Extensive and intensive properties.
- 1.4 Define and explain Homogenous and heterogeneous systems
- 1.5 State and explain first law of thermo dynamics.
- 1.6 Explain similarities between heat and work
- 1.7 Define internal energy.
- 1.8 Define heat capacity and specific heat.
- 1.9 Define adiabatic Isothermal process.
- 1.10 Define heat of formation.
- 1.11 Define heat of reaction.
- 1.12 Limitation in the first law of thermodynamics (Clausius statement Kelvin-plank statement)
- 1.13 Explain the postulate of 2nd law of thermodynamics.
- 1.14 Explain Carnot cycle.
- 1.15 Explain absolute scale of temperature.
- 1.16 State and explain free energy.
- 1.17 Define entropy and chemical potential.
- 1.18 State the importance of thermodynamics in ceramics in ceramic industry.
- 1.19 State and explain 3rd law of thermo dynamics.

2. PHASE RULE AND PHASE DIAGRAM

- 2.1 Define phases, components, degree of freedom
- 2.2 Phase diagram of pure substance Eutectic system, lever rule.
- 2.3 Phase rule, one component, two component and three component system
- 2.4 Explain importance of phase diagram and its application.
- 2.5 SiO_2 , Al_2O_3 - SiO_2 , CaO - MgO and MgO - Al_2O_3 system.

3. COLLOIDS

- 3.1 Define and classify colloids.
- 3.2 State & Explain different methods of preparation of colloids.
- 3.3 Application of colloids in ceramic making and in other areas
- 3.4 Base exchange capacity, flocculation, deflocculation & clay water system

4. THERMAL ANALYSIS AND SPECTROSCOPY.

- 4.1 Introduction to thermo – gravimetric analysis.
- 4.2 Basic idea on thermal method of analysis.
- 4.3 State and Explain spectrophotometry concept in spectroscopy.
- 4.4 Define spectroscopy and describe various types of spectrophotometers
- 4.5 State Beer's law and describe its application.
- 4.6 Visible spectrophotometry and colorimetric.
- 4.7 Discuss different applications of spectrophotometry.
- 4.8 Description of atomic absorption spectrophotometers.
- 4.9 Introduction DTA, TGA, XRD, & XRF.

Syllabus coverage upto internal assessment

Chapter 1&2

LEARNING RESOURCES :-			
Sl. No.	Title of the books	Name of the Author	Name of Publisher
1.	Engineering thermodynamics	P.K. Nag.	Tata Mc grawhill Publisher
2.	Engineering Chemistry	P.C. Jain and Monica Jain.	Dhanpat Rai Publisher
3.	Physical chemistry	Puri, Sharma, Pathania	Vishal Publishing company
4.	Instrumental method of chemical analysis	B.K. Sharma.	Krishna Educational Publisher
5.	Introduction to Ceramic	W.D. Kingery.	Wiley Publisher

CERAMIC MANUFACTURING PROCESS (Th-03)

Name of the Course Diploma in Ceramic Technology			
Course Code		Semester	3 rd
Total Period	60	Examination	3 hours
Theory Period	4 period of week	Internal Assessment	20
Maximum Marks	100	End Semester Examination	80

A. Rationale :

Conversion of ceramic non-plastic raw-material into appropriate particle size is required to make ceramic body for shaping. Green articles are prepared by various forming methods. The articles are dried before firing. So it is highly essential to know about size reduction, forming methods, drying and firing process for ceramic product making.

B. Objectives :

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

1. Know about the machines and equipments used for manufacturing of ceramic products.
2. Understand the factors related to grinding and crushing & particle size reduction.
3. Know various factors related to ceramic forming method.
4. Understand drying and firing process of ceramic.
5. Understand various kiln and driers used in ceramic manufacturing.

C. TOPIC WISE DISTRIBUTION OF PERIOD

Sl. No.	Name of the Topic	Periods
1.	Introduction to ceramic manufacture	10
2.	Size Reduction	10
3.	Forming Methods & forming machines	20
4.	Drying and Driers	10
5.	Firing Behaviors	10

D. COURSE CONTENTS

1. INTRODUCTION TO CERAMIC MANUFACTURING

- 1.1 Various steps for manufacturing ceramic.
- 1.2 Various machines used in manufacturing process.
- 1.3 Kiln used for ceramic firing.
- 1.4 Important factors relating to ceramic making.
- 1.5 Important tests for ceramic production quality assessment.

2. SIZE REDUCTION

- 2.1 Various types of machines used in size reduction.
- 2.2 Discuss various methods of crushing & grinding.
- 2.3 Various factors influencing grinding efficiency & special emphasis on ball mill
- 2.4 Particle size analysis and various sieves and equipment used for it.
- 2.5 Fundamental ideas on furnace model of packing, Theory of settling, application of stoke's law.

3. FORMING METHODS AND FORMING MACHINE.

- 3.1 Body preparation and machines used for it.
- 3.2 Basic ideas on the principle of operation of machines for body preparation such as Blunger, Agitator, Filter press, Spray drier, Pug mill etc.

- 3.3 Fundamental ideas on refractory batch making and machines used for it, Such as mixing machines.
- 3.4 Forming methods and machines used for it for white ware making.
- 3.5 Principle of operation of potter's wheel, jigger& jolly, roller head, pan mill, press etc.
- 3.6 Basic ideas on various types of pressing machines for refractory shaping. Special emphasize on FSP, Hydraulic press, Isostatic press.
- 3.7 Slip casting process and various factors relating to slip casting.
- 3.8 Special forming methods for special ceramics such as hot pressing, injection moulding reaction hot pressing, sol gel method etc.
- 3.9 Basic ideas on glazing operation and machines and equipment required for it.
4. **DRYING AND DRIERS**
 - 4.1 Various stages of Drying of ceramic wares
 - 4.2 Discuss on changes on drying and various external parameters on drying.
 - 4.3 Various drying defects and their elimination.
 - 4.4 Description of various types of industrial dryers and special emphasize on tunnel drier
5. **FIRING BEHAVIOR:**
 - 5.1 Discuss various changes on firing.
 - 5.2 Various type of firing operation.
 - 5.3 Various stages of firing of ceramic ware.
 - 5.4 Explain various firing defects and their elimination.
 - 5.5 Basic ideas on calcinations, sintering, vitrifications, fusion and melting.
 - 5.6 Advance firing process in ceramic making.
 - 5.7 Kiln, kiln accessories, conveyer and feeders need for manufacturing process.

Syllabus coverage up to internal assessment

Chapters: 1, 2 &3

LEARNING RESOURCES			
Sl. No.	Title of the book	Name of the Author	Name of the publisher
1.	White Wares	Sudhir Sen	Oxford &IBH Publishing Company Pvt. Ltd.
2.	Industrial Ceramic	Singer and Singer	Chemical Publishing Company
3.	Modern pottery manufacturing	H.N Bose	Ceramic Publishing House , Bhagalpur , India
4.	Drying	R.W. Ford	Pergamon press
5.	Effect of Heat Ceramic	W.F. Ford.	R.W. Ford Company
6.	Technology of ceramic and refractory	P.P. Budnikov	MIT Press Ltd. Cambridge
7.	White ware production , testing and Q.C	W.Ryan	Institute of ceramic by Pergamon press
8.	Elements of ceramic	F.H.Nonton	Addison Wesley

RAW MATERIALS FOR CERAMIC MAKING (Th-04)

Name of the Course Diploma in Ceramic Technology			
Course Code		Semester	3 rd
Total Period	60	Examination	3 hours
Theory Period	4 period of week	Internal Assessment	20
Maximum Marks	100	End Semester Examination	80

A. Rationale:

Ceramic raw materials are mainly mineral based. Clay and industrial wastes are also used as raw materials for ceramic making. It is highly essential to know the properties and uses of clay, rocks, minerals for manufacturing ceramic product

B. Objectives :

After completion of the course, students will

1. Understand the types of raw materials required for ceramic making.
2. Know the formation of minerals and properties of ceramic raw materials.
3. Know the classification of rocks in details.
4. Understand the clay for ceramic use.
5. Know about the binders, additives & chemicals required for ceramic making.
6. Understand the use of ceramic raw materials.
7. Know about the beneficiation of ceramic raw materials.

C. Topic wise distribution of Periods

Sl. No.	Name of the Topic	Periods
1.	Introduction to Rocks & minerals	10
2.	Clay for ceramic use	10
3.	Major & minor ceramic raw materials	25
4.	Availability of ceramic raw materials	05
5.	Benefaction and utilization of waste material	05
6.	Binders, additives & chemicals for ceramic use	05

COURSE CONTENTS

1. INTRODUCTION TO ROCK & MINERALS.

- 1.1 Various type of rock and their use as ceramic raw material.
- 1.2 Various types of minerals & their mode of formation by weathering.
- 1.3 Properties of minerals.
- 1.4 Economic minerals and their importance

2. CLAY FOR CERAMIC USE

- 2.1 Definition, classification of clay.
- 2.2 Various type of clay for ceramic use.
- 2.3 Formation of clay.
- 2.4 Properties of clay.
- 2.5 Clay minerals
- 2.6 Effect of heat on clay.

3. MAJOR AND MINOR CERAMIC RAW MATERIALS

- 3.1 Major ceramic raw materials.
- 3.2 List of minor ceramic raw materials.
- 3.3 Silica bearing mineral & their properties & uses
(Quartz & Quartzite, Ganister, glass sand) .
- 3.4 Alumina bearing materials, their properties & uses.
1-Bauxite & other hydrated alumina naturally available.

2-Variou type of prepared alumina.

3.5 Anhydride alumina silicate mineral &their properties &uses .

3.6 Lime and magnesia bearing minerals for ceramic uses.

(Limestone, Dolomite, Magnetite, Calcite, Gypsum, Talc ,Forsterite & Olivine).

3.7 Alkali bearing minerals, their properties & uses(Potash feldspar, Soda feldspar).

3.8 Fluorine bearing minerals (Cryolit , Fluorite)

3.9 Boron minerals for ceramic use Borax and boron compounds.

3.10 Graphite and carbon, zircon & zirconia.

3.11 Raw material used for ceramic making.

3.12 Raw materials for glass and enamel industry.

3.13 Raw material for White ware and special ceramic.

4. **AVAILABILITY OF CERAMIC RAW MATERIALS :**

4.1 Availability of ceramic raw materials in India.

4.2 Availability various ceramic raw materials in Odisha.

4.3 Ceramic raw material imported from other countries.

5. **BENEFICIATION AND UTILISATION OF WASTE MATERIAL AS CERAMIC RAW MATERIAL :**

5.1 Beneficiation china clay .

5.2 Beneficiations non plastic ceramic raw material.

5.3 Use of Fly ash and blast furnace slag.

5.4 Use of red mud , phosphogypsum & rice husk in ceramic making.

6. **BINDERS, ADDITIVES & CHEMICALS USED IN CERAMIC MAKING:**

6.1 Various types of binders used in ceramic making.

6.2 Various types of additives used in refractory making .

6.3 Chemical compounds used in ceramic making.

Syllabus coverage up to internal assessment

Chapter- 1, 2& 3

Learning Resources			
Sl. No.	Title of the books	Nam of the author	Name of the publisher
1.	Ceramic raw materials		published by Indian institute of ceramic , Kolkata
2.	Pottery manufacture	H.N .Bose	Ceramic publishing house Bhagalpu, India
3.	Industrial ceramic	singer & singer.	Chemical publishing company
4.	Clay and ceramic raw materials	W.E Worrall.	The Institute of ceramic pergamon press
5.	Raw material for glass and ceramic	Chistopher.w. sinton.	Wiley publisher
6.	Ceramic & glass materials	F. shacke ford	Springer Publisher

ENVIRONMENTAL STUDIES (Th-05)

(Common to All Branches)

Name of the Course: Diploma in Ceramic Technology			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Internal Assessment:	20
Maximum marks:	100	End Semester Examination	80

A. Rationale:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every student in order to take care of the environmental aspect in each and every activity in the best possible manner.

B. OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

C. TOPIC WISE DISTRIBUTION OF PERIODS		
SL.NO.	NAME OF THE TOPIC	PERIODS
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	10
3	Systems	08
4	Biodiversity and it's Conservation	08
5	Environmental Pollution.	12
6	Social issues and the Environment	10
7	Human population and the environment	08
	TOTAL	60

Unit 1: The Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources

Renewable and non renewable resources:

- a) Natural resources and associated problems.
- Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
 - Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
 - Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
 - Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
 - Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
 - Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.
- b) Role of individual in conservation of natural resources.
- c) Equitable use of resources for sustainable life styles.

Unit 3: Systems

- Concept of an eco system.
- Structure and function of an eco system.
- Producers, consumers, decomposers.
- Energy flow in the eco systems.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco system:
 - Forest ecosystem:
 - Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation

- Introduction-Definition: genetics, species and ecosystem diversity.
- Biogeographically classification of India.

- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values.
- Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

Unit 5: Environmental Pollution.

Definition Causes, effects and control measures of:

- a) Air pollution.
- b) Water pollution.
- c) Soil pollution
- d) Marine pollution
- e) Noise pollution.
- f) Thermal pollution
- g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 6: Social issues and the Environment

- Form unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems and concern.
- Environmental ethics: issue and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.
- Air (prevention and control of pollution) Act.
- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment

- Population growth and variation among nations.
- Population explosion- family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health.

Syllabus coverage upto Internal Assessment

Units 1, 2, 3

Learning Resources:			
Sl.No	Title of the Book	Name of Authors	Name of Publisher
1.	Textbook of Environmental studies	Erach Bharucha	#UGC
2.	Fundamental concepts in Environmental Studies	D.D. Mishra	S.Chand&Co-Ltd
3.	Text book of Environmental Studies	K.Raghavan Nambiar	SCITECH Publication Pvt. Ltd
4.	Environmental Engineering	V.M.Domkundwar	Dhanpat Rai & Co

WORKSHOP PRACTICE – II (Pr. 01)

Name of the Course: Diploma in Ceramic Technology			
Course code:		Semester	3 rd
Total Period:	60	Examination :	3 hrs
Theory periods:	4P / week	Sessional	25
Maximum marks:	50	End Semester Examination ::	25

1. MACHINE SHOP

- 1.1 Shop talk on different types of machine tools, their functions, different tools used and general safety precautions to be observed.
- 1.2 Study a centre lathe
- 1.3 Operate a centre lathe on a cylindrical ob and perform following operations like plain turning, taper turning, facing, parting
- 1.4 Operate a drill machine to perform drilling and counter boring operation on a job
- 1.5 Observe milling, shaping and grinding operations during demonstration at the shop floor

2. FOUNDRY SHOP

- 2.1 Prepare a simple wooden pattern
- 2.2 Make a green sand mould using above pattern

3. WELDING SHOP

- 3.1 Observe demonstration of different type of welding methods and TIG & MIG welding

Sl.No	Title of the Book	Name of Authors	Name of Publisher
1	Workshop Technology - II	Hazra & Choudhury	Media Promoters Publisher
2	Advance welding Technology	Dr.Ali Hasan Dr.Islam Nawaz	SCITECH Publisher.

CERAMIC WORKSHOP - I (Pr. 02)

Name of the Course Diploma in Ceramic Technology			
Course Code		Semester	3 rd
Total Period	90	Examination	3 hours
Practical Period	6 period of week	Sessional	50 marks
Maximum Marks	100	End Semester Examination	50marks

A. Rationale :

For making ceramic products moulds of various sizes made of plaster of paris are required. Articles are made of ceramic plastic body of casting slip. A student must practice to make plaster of paris mould and models also observe the working operation of various machine & equipments used for making plastic mass and slip for ceramic shaping .

B. Objectives :

1. After completion of the course student will able to know the preparation of mould for shaping.
2. Understand the operation of various machines and equipment used for ceramic body making.
3. Operate the machine like ball mill, pot mill, magnetic separator, blunger etc.

Course Contents in terms of Specific Objectives:

1. Study the machine and equipment available in the ceramic department.
2. Identification of various minerals and ceramic raw materials by visual observation.
3. Prepare various type of model by the help of plastic clay.
4. Prepare one piece moulds by the help of plaster of paris.
5. Prepare two piece moulds by the help of plaster of Paris.
6. Study crushing and grinding of raw materials with jaw / roller crusher, edge runner, Ball mill.
7. Study charging the batch in ball mill and pot mill.
8. Study operation of fitter press.
9. Magnetic separation of iron bearing particles. By the help of permanent magnet & Electromagnet.
10. Sieves analysis.
11. Study operation of filter press.
12. Study operation of potter's Wheel and jigger jolly.
13. Observe various ceramic raw material used for white ware and refractory making
14. Study the operation of de- airing pug mill.
15. Study the operation of blunger & agitator.
16. Study the operation of toggle press.

CERAMIC TESTING - I (Pr. 03)

Name of the Course Diploma in Ceramic Technology			
Course Code		Semester	3 rd
Total Period	90	Examination	3 hours
Practical Period	6 period of week	Sessional	50 marks
Maximum Marks	100	End Semester Examination	50 marks

A. Rationale:

To understand the properties of clay for use in making ceramic products testing of clay and ceramic minerals are highly essential .

B. Objectives

1. After completion of the course student will be able to understand the quantity of various types of clay.
2. Know the fineness of various ground materials.
3. Understand various properties of clay in the green stage and after firing

(Atleast 15 nos of tests will be conducted)

Course Contents in terms of Specific Objectives:

1. Observe colour of ceramic clays and other raw material detect impurities by simple test.
2. Determine specific gravity of clay and other powder materials.
3. Determine power of suspension of various types clay.
4. Determine slaking characteristics of various clays.
5. Determine water of plasticity of various clays and clay mixture.
6. Determine plasticity of clay.
7. Determine shrinkage of various types of clay and clay mixture.
 - i) Drying shrinkage linear and volume
8. Burning shrinking linear and volume of clay & clay bodies
9. Determine shrinkage water and pour water.
10. Determine moisture content of clay and powder ceramic raw materials. (By Speedy moisture tester).
11. Study various types of sieves used in ceramic lab.
12. Sieve analysis of various raw materials.
13. Testing of slip.
14. Determine the grinding efficiency of ball mill.
15. Study of various types of sieves used in ceramic laboratory
16. Study the rate of heating and cooling of Electric furnace and drying oven.
17. Determine moisture content of clay and ceramic raw materials. By the help of dryer.
18. Determine moisture content of clay and ceramic raw materials. By the help of infrared Moisture balance.
19. Determination of pH value of clay slip.