DIPLOMA IN CERAMIC TECHNOLOGY
SANDWICH

Course Code: 2080

M - SCHEME
2015 – 2016

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

DIPLOMA COURSES IN ENGINEERING/TECHNOLOGY
(SEMESTER SYSTEM)

(Implemented from 2015- 2016)

M – SCHEME

R E G U L A T I O N S*

* *Applicable to the Diploma Courses other than Diploma in Hotel Management & Catering Technology and the Diploma Courses offered through MGR Film Institute, Chennai.*

1. Description of the Course:

a. Full Time (3 years)

The Course for the full Time Diploma in Engineering shall extend over a period of three academic years, consisting of 6 semesters* and the First Year is common to all Engineering Branches.

b. Sandwich (3½ years)

The Course for the Diploma in Engineering (sandwich) shall extend over a period of three and half academic years, consisting of 7 semesters* and the First Year is common to all Engineering Branches. The subjects of three years full time diploma course being regrouped for academic convenience.

During 4th and/or during 7th semester the students undergo industrial training for six months/ one year. Industrial training examination will be conducted after completion of every 6 months of industrial training

c. Part Time (4 years)

The course for the diploma in Engineering shall extend over a period of 4 academic years containing of 8 semesters*, the subjects of 3 year full time diploma courses being regrouped for academic convenience.

* Each Semester will have 15 weeks duration of study with 35 hrs. /Week for Regular Diploma Programme and 18hrs/ week (21 hrs. / Week I year) for Part-Time Diploma Programmes.

The Curriculum for all the 6 Semesters of Diploma courses (Engineering & Special Diploma Courses viz. Textile Technology, Leather Technology, Printing Technology, Chemical Technology etc.) have been revised and revised curriculum is applicable for the candidates admitted from 2015 – 2016 academic year onwards.

2. Condition for Admission:

Condition for admission to the diploma courses shall be required to have passed in

The S.S.L.C Examination of the Board of Secondary Education, TamilNadu.

(Or)

The Anglo Indian High School Examination with eligibility for Higher Secondary Course in TamilNadu.

(Or)

The Matriculation Examination of Tamil Nadu.

(Or)

Any other Examination recognized as equivalent to the above by the Board of Secondary Education, TamilNadu.

Note: In addition, at the time of admission the candidate will have to satisfy certain minimum requirements, which may be prescribed from time to time.

3. Admission to Second year (Lateral Entry):

A pass in HSC (Academic) or (Vocational) courses mentioned in the Higher Secondary Schools in TamilNadu affiliated to the TamilNadu Higher Secondary Board with eligibility for university Courses of study or equivalent examination, & Should have studied the following subjects.

Sl. No	Courses	H.Sc Academic	H.Sc Vocational	
		Subjects Studied	Subjects Studied	
			Related subjects	Vocational subjects
1.	All the Regular and Sandwich Diploma Courses	Maths, Physics & Chemistry	Maths / Physics / Chemistry	Related Vocational Subjects Theory & Practical
2.	Diploma course in Modern Office Practice	English & Accountancy English & Elements of Economics English & Elements of Commerce	English & Accountancy, English & Elements of Economics, English & Management Principles & Techniques, English & Typewriting	Accountancy & Auditing, Banking, Business Management, Co-operative Management, International Trade, Marketing & Salesmanship, Insurance & Material Management, Office Secretaryship.

- For the diploma Courses related with Engineering/Technology, the related / equivalent subjects prescribed along with Practical may also be taken for arriving the eligibility.

- Branch will be allotted according to merit through counseling by the respective Principal as per communal reservation.

- For admission to the Textile Technology, Leather Technology, Printing Technology, Chemical Technology and Modern Office Practice Diploma courses the candidates studied the related subjects will be given first preference.

- *Candidates who have studied Commerce Subjects are not eligible for Engineering Diploma Courses.*

4. Age Limit: No Age limit.

5. Medium of Instruction: English

6. Eligibility for the Award of Diploma:

No candidate shall be eligible for the Diploma unless he/she has undergone the prescribed course of study for a period of not less than 3 academic years in any institution affiliated to the State Board of Technical Education and Training, TamilNadu, when joined in First Year and two years if joined under Lateral Entry scheme in the second year and passed the prescribed examination.

The minimum and maximum period for completion of Diploma Courses are as given below:

Diploma Course	Minimum Period	Maximum Period
Full Time	3 Years	6 Years
Full Time(Lateral Entry)	2 Years	5 Years
Sandwich	3½ Years	6½ Years
Part Time	4 Years	7 Years

7. Subjects of Study and Curriculum outline:

The subjects of study shall be in accordance with the syllabus prescribed from time to time, both in theory and practical. The curriculum outline is given in Annexure **- I**

8. Examinations:

Board Examinations in all subjects of all the semesters under the scheme of examinations will be conducted at the end of each semester.

The Internal assessment marks for all the subjects will be awarded on the basis of continuous internal assessment earned during the semester concerned. For each subject 25 marks are allotted for internal assessment and 75 marks are allotted for Board Examination.

9. Continuous Internal Assessment:

A . For Theory Subjects:

The Internal Assessment marks for a total of 25 marks, which are to be distributed as follows:

i. Subject Attendance **5 Marks**

(Award of marks for subject attendance to each subject theory/practical will as per the range given below)

80% - 83%	)	1 Mark
84% - 87%		2 Marks
88% - 91%		3 Marks
92% - 95%		4 Marks
96% - 100%		5 Marks

ii) Test # **10 Marks**

2 Tests each of 2 hours duration for a total of 50 marks are to be conducted. Out of which the best one will be taken and the marks to be reduced to: 05 marks

The Test – III is to be the Model test covering all the five units and the marks so obtained will be reduced to : 05 marks

Total **10 marks**

TEST	UNITS	WHEN TO CONDUCT	MARKS	DURATION
Test I	Unit – I & II	End of 6th week	50	2 Hrs
Test II	Unit – III & IV	End of 12th week	50	2 Hrs
Test III	**Model Examination** - **Compulsory** Covering all the 5 Units. (Board Examination-question paper-pattern).	End of 15th week	75	3 Hrs

 # - From the Academic year 2015-2016 onwards.

Question Paper Pattern for the Periodical Test :(Test - I & Test- II)

With no choice:

PART A type questions:	4 Questions X 2 mark	… … 8 marks
PART B type questions:	4 Questions X 3 marks	… … 12 marks
PART C type questions:	3 Questions X 10 marks	… … 30 marks

	Total	50 marks
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iii) Assignment **10 Marks**

For each subject Three Assignments are to be given each for 20 marks and the average marks scored should be reduced for 10 marks

All Test Papers and assignment notebooks after getting the signature with date from the students must be kept in the safe custody in the Department for verification and audit. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

B. For Practical Subjects:

The internal assessment mark for a total of 25 marks which are to be distributed as follows:-

a)	Attendance (Award of marks as same as Theory subjects)	:	**5 Marks**
b)	Procedure/ observation and tabulation/ Other Practical related Work	:	**10 Marks**
c)	Record writing	:	**10 Marks**

	TOTAL	:	**25 Marks**

- *All the Experiments/exercises indicated in the syllabus should be completed and the same to be given for final board examinations.*
- The Record for every completed exercise should be submitted in the subsequent Practical classes and marks should be awarded for 20 for each exercise as per the above allocation.
- At the end of the Semester, the average marks of all the exercises should be calculated for 20 marks and the marks awarded for attendance is to be added to arrive at the internal assessment mark for Practical. (20+5=25 marks)
- The students have to submit the duly signed bonafide record note book/file during the Practical Board Examinations.

- *All the marks awarded for assignment, Test and attendance should be entered in the Personal Log Book of the staff, who is handling the subject. This is applicable to both Theory and Practical subjects.*

10. Life and Employability Skill Practical:

The Life and Employability Skill Practical with more emphasis is being introduced in IV Semester for Circuit Branches and in V Semester for other branches of Engineering.
Much Stress is given to increase the employability of the students:

Internal assessment Mark ….. **25 Marks**

11. Project Work:

The students of all the Diploma Programmes **(except Diploma in Modern Office Practice)** have to do a Project Work as part of the Curriculum and in partial fulfillment for the award of Diploma by the State Board of Technical Education and Training, Tamilnadu. In order to encourage students to do worthwhile and innovative projects, every year prizes are awarded for the best three projects i.e. institution wise, region wise and state wise. **The Project work must be reviewed twice in the same semester.**

a) Internal assessment mark for Project Work & Viva Voce:

Project Review I	…	**10 marks**
Project Review II	…	**10 marks**
Attendance	…	**05 marks** (award of marks same as theory subjects pattern)
Total	…	**25 marks**

Proper record to be maintained for the two Project Reviews, and It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

b) Allocation of Mark for Project Work & Viva Voce in Board Examination:

Viva Voce	…	**30 marks**
Marks for Report Preparation, Demo	…	**35 marks**
Total		**65 marks**

c) Written Test Mark (from 2 topics for 30 minutes duration): $

i) Environment Management	2 questions X 2 ½ marks	**= 5 marks**
iI) Disaster Management	2 questions X 2 ½ marks	**= 5 marks**
		10marks

$ **-** Selection of Questions should be from Question Bank, by the External Examiner.

No choice need be given to the candidates.

Project Work & Viva Voce in Board Examination	--	**65 Marks**
Written Test Mark (from 2 topics for 30 minutes duration)	--	**10 Marks**
TOTAL	--	**75 Marks**

A neatly prepared PROJECT REPORT as per the format has to be submitted by individual during the Project Work & Viva Voce Board examination.

12. Scheme of Examinations:

The Scheme of examinations for subjects is given in **Annexure - II.**

13. Criteria for Pass:

1. No candidate shall be eligible for the award of Diploma unless he/she has undergone the prescribed course of study successfully in an institution approved by AICTE and affiliated to the State Board of Technical Education & Training, Tamil Nadu and pass all the subjects prescribed in the curriculum.

2. A candidate shall be declared to have passed the examination in a subject if he/she secures not less than *40% in theory subjects* and *50% in practical subject* out of the total prescribed maximum marks including both the internal assessment and the Board Examination marks put together, subject to the condition that he/she secures at least a minimum of *30 marks out of 75 marks in the Board's Theory examinations and a minimum of 35 marks out of 75 marks in the Board Practical Examinations.*

14. Classification of successful candidates:

Classification of candidates who will pass out the final examinations from April 2018 onwards (Joined in first year in 2015-2016) will be done as specified below.

First Class with Superlative Distinction:
A candidate will be declared to have passed in **First Class with Superlative Distinction** if he/she secures not less than 75% of the marks in all the subjects and passes all the semesters in the first appearance itself and passes all subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class with Distinction:
A candidate will be declared to have passed in **First Class with Distinction** if he/she secures not less than 75% of the aggregate of marks in all the

semesters put together and passes all the semesters except the I and II semesters in the first appearance itself and passes all the subjects within the stipulated period of study 3/ 3½/ 4 years (Full Time/Sandwich/Part Time) without any break in study.

First Class:

A candidate will be declared to have passed in **First Class** if he/she secures not less than 60% of the aggregate marks in all semesters put together and passes all the subjects within the stipulated period of study 3/ 3½ / 4 years (Full Time/Sandwich/Part Time) without any break in study.

Second Class:

All other successful candidates will be declared to have passed in **Second Class.**

The above mentioned classifications are also applicable for the Sandwich / Part-Time students who pass out Final Examination from October 2018 /April 2019 onwards (both joined in First Year in 2015-2016)

15. Duration of a period in the Class Time Table:

The duration of each period of instruction is 1 hour and the total period of instruction hours excluding interval and Lunch break in a day should be uniformly maintained as 7 hours corresponding to 7 periods of instruction (Theory & Practical).

16. Seminar:

For seminar the total seminar 15 hours(15 weeks x 1hour) should be distributed equally to total theory subject per semester(i.e 15 hours divided by 3/4 subject). A topic from subject or current scenario is given to students. During the seminar hour students have to present the paper and submit seminar material to the respective staff member, who is handling the subject. It should be preserved for 2 Semesters and produced to the flying squad and the inspection team at the time of inspection/verification.

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SALIENT FEATURES OF 'M' SCHEME

Ceramic Technology is the branch of Engineering that deals with source of raw materials, physical beneficiation, properties and application with the process of manufacturing of Ceramic products like Sanitary ware, Tiles, Insulators, Abrasives, and Refractories etc. In addition, services of ceramic engineers are essential in the fields of Glass, Cement, Fibre and Composite Technology.

The Diploma holders play a vital role in the industries since they are, recruited for supervisory level, Quality control engineers etc . So revising of syllabus with special importance for Technology implementation for manufacturing, handling the equipments and to maintain the quality control as per IS Specifications.

This M -Scheme syllabus is designed and framed in tune with the international standard, as per the new guidelines and policy prescribed by the Directorate of Technical Education on behalf of the Government of Tamilnadu.

Salient features of 'M' Scheme are: Removal of obsolete portions, Addition of new topics with of modern methods in the field of Ceramics such as Electronic Ceramics, Special ceramic bodies, Knowledge of IS Specification, Enamel coating technology, Enhancement of Computer skills and modern methods of analysis of ceramic raw materials.

The Basic and Sound knowledge of ceramic and allied subjects are incorporated in the syllabus that gives fundamental knowledge expected from a Diploma engineers to suit the needs of ceramic industries.

CONVENER

Syllabus revision committee – M Scheme

K.THIRUMURUGAN B.E.,MBA BGL.
Principal,
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Vridhachalam – 606 001

ANNEXURE I
M– SCHEME
CURRICULUM OUTLINE

THIRD SEMESTER

Sub Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Tutorial / drawing	Practical Hours	Total Hours
38031	General Engineering	5	-	-	5
38032	Geology	5	-	-	5
38033	Ceramic Raw Materials	5	-	-	5
38034	Geology Laboratory		-	5	5
38035	Ceramic Raw Materials Analysis Laboratory	-	-	5	5
38036	Ceramic Testing Laboratory – I	-	-	5	5
30001	Computer Applications Practical #	-	-	4	4
	Seminar	1	-	-	1
	TOTAL	16	-	19	35

FOURTH SEMESTER

Sub Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Tutorial / drawing	Practical Hours	Total Hours
38041	Unit Operations	5	-	-	5
38042	Ceramic Fabrication Process	5	-	-	5
38043	White ware and Heavy Clay ware	5	-	-	5
37044	Engineering Drawing*	-	4	-	4
38045	Ceramic Testing Laboratory – II	-	-	5	5
38046	Moulding Laboratory	-	-	5	5
38047	Ceramic Processing Laboratory	-	-	5	5
	Seminar	1	-	-	1
	TOTAL	16	4	15	35

FIFTH SEMESTER

Sub Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Tutorial / drawing	Practical Hours	Total Hours
38051	Glaze Technology	5	-	-	5
38052	Properties of Ceramics	5	-	-	5
38053	Refractories	5	-	-	5
38071 38072	Elective I: 1.Glass Technology 2.Cement Technology	5	-	-	5
38055	Slip Testing Laboratory	-	-	5	5
38056	Refractories Laboratory	-		5	5
30002	Life and Employability skill Practical#	-	-	4	4
	Seminar	1	-	-	1
	TOTAL	21	-	14	35

SIXTHSEMESTER

Sub Code	SUBJECT	HOURS PER WEEK			
		Theory hours	Tutorial / drawing	Practical Hours	Total Hours
37561	Plant Engineering and Management $	5	-	-	5
38062	Furnace Technology	5	-	-	5
38081 38082	Elective II: 1.Refractories Application 2.Special Ceramics	5	-	-	5
38064	Ceramic Body Preparation Laboratory	-	-	5	5
38065	Glaze Laboratory	-	-	4	4
38066	Enamel Laboratory	-	-	4	4
38067	Project Work	-	-	6	6
	Seminar	1	-	-	1
	TOTAL	16		19	35

SEVENTH SEMESTER

Sub Code	SUBJECT	DURATION
38092	Industrial Training and Report and Viva Voce	JUNE to NOVEMBER

***Common Subject with Diploma in Chemical Engineering**
 # Common to all branches
$ Common Subject with Diploma in Polymer Technology

AANEXURE – II

M -SCHEME
SCHEME OF THE EXAMINATION

THIRD SEMESTER

Sub Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assess-ment Marks	Board Exam. Marks	Total Marks		
38031	General Engineering	25	75	100	40	3
38032	Geology	25	75	100	40	3
38033	Ceramic Raw Materials	25	75	100	40	3
38034	Geology Laboratory	25	75	100	40	3
38035	Ceramic Raw Materials Analysis Laboratory	25	75	100	50	3
38036	Ceramic Testing Laboratory – I	25	75	100	50	3
30001	Computer Applications Practical #	25	75	100	50	3
	TOTAL	175	525	700		

FOURTH SEMESTER

Sub Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assess-ment Marks	Board Exam. Marks	Total Marks		
38041	Unit Operations	25	75	100	40	3
38042	Ceramic Fabrication Process	25	75	100	40	3
38043	White ware and Heavy Clay ware	25	75	100	40	3
37044	Engineering Drawing*	25	75	100	40	3
38045	Ceramic Testing Laboratory – II	25	75	100	50	3
38046	Moulding Laboratory	25	75	100	50	3
38047	Ceramic Processing Laboratory	25	75	100	50	3
	TOTAL	175	525	700		

FIFTH SEMESTER

Sub Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assess-ment Marks	Board Exam. Marks	Total Marks		
38051	Glaze Technology	25	75	100	40	3
38052	Properties of Ceramics	25	75	100	40	3
38053	Refractories	25	75	100	40	3
38071 38072	Elective I: 1.Glass Technology 2.Cement Technology	25	75	100	40	3
38055	Slip Testing Laboratory	25	75	100	50	3
38056	Refractories Laboratory	25	75	100	50	3
30002	Life and Employability skill Practical#	25	75	100	50	3
		175	525	700		

SIXTH SEMESTER

Sub Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assess-ment Marks	Board Exam. Marks	Total Marks		
37561	Plant Engineering and Management $	25	75	100	40	3
38062	Furnace Technology	25	75	100	40	3
38081 38082	Elective II: 1.Refractories Application 2.Special Ceramics	25	75	100	40	3
38064	Ceramic Body Preparation Laboratory	25	75	100	50	3
38065	Glaze Laboratory	25	75	100	50	3
38066	Enamel Laboratory	25	75	100	50	3
	TOTAL	175	525	700		

SEVENTH SEMESTER

Sub Code	SUBJECT	Examination Marks			Minimum for pass	Duration of Exam Hours
		Internal Assess-ment Marks	Board Exam Marks	Total Marks		
38092	Industrial Training and Report and Viva Voce	25	75	100	50	3

Question paper pattern

Common for all theory subjects

PART A ***- (1 to 8) 5 Questions are to be answered out of 8 questions for 2 marks each.*****(Question No. 8 will be the compulsory question and *can be asked from any one of the units)(From each unit maximum of two 2 marks questions alone can be asked)***

PART B ***- (9 to 16)5 Questions are to be answered out of 8 questions for 3 marks each.*** **(Question No. 16 will be the compulsory question and *can be asked from any one of the units) (From each unit maximum of two 3 marks questions alone can be asked)***

PART C ***- (17 to 21) Five Questions will be in the Either OR Pattern. Students have to answer these five questions. Each question carries 10 marks. (Based on the discretion of the question setter, he/she can ask two five mark questions (with sub division A & sub division B) instead of one ten marks question if required)***

Clarks table will not be permitted for the Board Examinations.

III SEMESTER

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GENERAL ENGINEERING

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38031
Semester : III Semester
Subject Title : **GENERAL ENGINEERING**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GENERAL ENGINEERING	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	MANUFACTURING PROCESS AND FOUNDRY	15
2.	INTERNAL COMBUSTION ENGINES (IC ENGINE) AND BOILERS	15
3.	FRICTION AND DRIVES	15
4.	ELECTRICITY	15
5.	D.C AND A.C. MACHINES	15
	Total	75 Hours

RATIONALE:

The subject General Engineering introduces the basic knowledge of mechanical engineering and work of industrial plant. The basic knowledge helps the student to coordinate with mechanical engineers to run the ceramic industries at optimum production level.

OBJECTIVES:

- To identify the parts of lathe and study the important manufacturing operations using lathe.
- To acquire the knowledge of different drilling machines and drilling tools.
- To acquire the knowledge of grinding operations.
- To acquire the various methods of welding and cutting.
- To identify the different parts of pattern and acquire knowledge of moulding

and melting operations.

- To gain the knowledge of internal combustion engine and its working principle.
- To identify the types of friction and acquire the knowledge of application.
- To acquire the knowledge of basic electricity.
- To explain the working of DC generator and DC machines

38031 – GENERAL ENGINEERING
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**MANUFACTURING PROCESS AND FOUNDRY** **LATHE –** Types of Lathe, Lathe operations, Taper turning methods, Thread cutting, single point, Cutting tool nomenclature and cutting tool Angles. **DRILLING MACHINE –** Types of drilling machine, upright drilling machine, Radial drilling machine, Gang drilling machine, Multi spindle drilling machine, Types of drills – Twist drill nomenclature and drill size. **GRINDING –** Grinding machine, Grinding operation – Surface grinding, Cylindrical grinding, Internal grinding, Centre less grinding, Formed grinding. **WELDING –** Types of welding – Arc welding , Gas welding , Forge welding, Resistance welding, Thermit welding , Tungsten inert gas welding, submerged arc welding. Arc welding equipments, Cutting process – Gas cutting , Arc cutting **FOUNDRY –** Types of Pattern, Preparation of moulding sand, Dry sand moulding, – Properties and Preparation of moulding sand .Moulding process – Green sand moulding – Dry sand moulding. Moulding equipments – Moulding board – Clay box – Rammer – Riddle – Travels – Vent wire – Melting - Cupola furnace operation - Defects in casting – Reasons – Remedies. **MELDING** – Cupola furnace operation – Defects in casting – Reasons – Remedies.	15
II	**INTERNAL COMBUSTION ENGINES (I.C.ENGINES) AND BOILERS** Internal combustion engine: Classification of IC engine, IC engine parts - cylinder head – Piston – Piston rings –Connecting rod – Crank shaft – Flywheel – Function of carburretor, Functions of injector – Injection pump, Working principles of I.C.Engine – Suction stroke – Compression stroke – Power stroke –Exhaust stroke. Two stroke petrol engine – Four stroke petrol engine – Four stroke diesel engine – Comparison of two stroke and four stroke cycle engine.	15

III	**FRICTION AND DRIVES** Friction – Types of friction – Friction between Lubricated surface - Friction between Un lubricated surface – Limiting friction – Angle of friction – Co-efficient of friction. Belt drive – Simple belting – compound belting – slip of the belt – length of belt – tension of the belt – Ratio of tensions – power transmitted by belt – simple problems – V-belt – chain drive – advantage and disadvantage of chain drive over belt drive. Gear – Types of gear - spur gear, bevel gear – helical gear – Rack and pinion – spiral gear – worm and worm gear – simple gear train – compound gear train – simple problems in gear train.	15
IV	**ELECTRICITY** Definition and units of voltage – Current resistance – Power and energy, basic law of Electricity – Ohm's law. Electromagnetic induction – Faraday's law of electricity – Fleming's right hand rule – Fleming's left hand rule –D.C - circuits – Equivalent resistance of series circuit – parallel circuit, problem on D.C. circuit. A.C circuit – AC series circuit – power factor – problems on RL, RC and RLC series circuit.	15
V	**D.C AND A.C. MACHINES** DC – Generator – Simple loop generator – Parts and function of practical generator, Types and application of D.C. Generator. D.C. Motor – Principle of working, Back electromotive force, Types of D.C. motor – Application of DC motor. Necessity of starter – Construction and working of Three point starter.	15

REFERENCE BOOKS:

1. Elements of Workshop technology by S.k.Choudry and A.k.Hajra Choudry
2. Theory of machines by R.S.Kurmi
3. Heat power Engineering by N.Rengasamy and E.Sundaramoorthy
4. A text book of Electrical Engineering by B.L.Theraja

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GEOLOGY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38032
Semester : III Semester
Subject Title : **GEOLOGY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours /Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GEOLOGY	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	PRINCIPLES OF GEOLOGY	15
2.	MINERALOGY	15
3.	PETROLOGY	15
4.	PROCESS OF FORMATION OF MINERALS AND ORES	15
5.	ESSENTIAL CERAMIC MATERIALS	15
	Total	75 Hours

RATIONALE:

Geology is study of earth science. The subject imparts the knowledge of identifying different minerals and rock types. The physical and chemical properties of minerals will help the student to utilize properly in ceramic field.

OBJECTIVES:

At the end of this semester the student will be able acquire the basic knowledge of

- physiographical features of earth and interior of the earth.
- Crystals, system of crystallization, mineral properties and origin.
- Types of rock, structure, texture and classification.
- Process of formation of minerals and ores.
- Physical and chemical composition of ceramic minerals.

38032-GEOLOGY
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**PRINCIPLES OF GEOLOGY** Study of Geology – Branches of Geology – Origin of Earth – Age of Earth – Interior of Earth – Earth quake – Volcanoes – Continental drift-Plate Tectonics. Geological work of Running water – Geological work of wind –Geological work of glacier – Geological work of ground water – Uses of Geology.	15
II	**MINERALOGY** Definition of Crystal – Faces – Solid angles – Symmetry elements –System of Crystallization – Normal class of Six systems – Twinning Definition of Mineral – Physical properties of Mineral. General description – Physical properties – Classification- Chemical Composition – Origin and occurrence of rock forming minerals – Quartz group – Feldspar group – Pyroxene group – Amphibole group– Mica group – Olivine group	15
III	**PETROLOGY** Definition of rock – Divisions of Petrology – Igneous rocks- Definition of Intrusive and extrusive rocks – Structures – Textures –Classification – Important rock types – Granite , Syenite ,Gabbros, Diorite, Basalt. Sedimentary rock – Formation of Sedimentary rock- Texture –Structure – Classification. Important rock types – Sand stone, Lime stone, Conglomerate, Shale, Silt, Coal. Metamorphic rock – Agents – Kinds – Textures – Structures –Important rock types – Schist , Gneiss , Slate , Marble.	15
IV	**PROCESS OF FORMATION OF MINERALS AND ORES** Ores – Definition – Gangue – Tenor – Magmatic Concentration-Sublimation – Contact metasomatism – Hydrothermal process – Sedimentation – Evaporation – Residual and mechanical concentration – Metamorphism – Important ores – Haematite, Magnetite, Chalcopyrite, Galena, pyrite, Sphalerite, Limonite,Psilomelane, pyrolusite.	15

V	**ESSENTIAL CERAMIC MINERALS** General Description – Physical properties – Chemical composition –Varieties and Indian Occurrence – Uses of following minerals:Clay ,Asbestos ,Talc, Graphite, Fluorspar,Bauxite , Garnet , Andalusite, Sillimanite ,kyanite ,Calcite, Barite, Steatite,Gypsum,Magnesite, Beryl, Zircon , illmenite ,Rutile ,Dolomite ,Chromite. Mineral wealth of Tamilnadu	15

REFERENCE BOOKS:

1. Principles of Geology by Arther Homes.
2. A Text book of Geology by B.K.Mukergee
3. A Text book of Mineralogy by E.S.Dana
4. Petrology by G.W.Tyrrel
5. Economic Mineral deposit by Allan M.Bateman
6. Rock forming Minerals by Deer, Howie, Zussman
7. Mineral Economics by R.K.Sinha and N.L.Sharma
8. Sedimentary Petrology by Pettijohn.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC RAW MATERIALS

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38033
Semester : III Semester
Subject Title : **CERAMIC RAW MATERIALS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC RAW MATERIALS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	CLAYS	15
2.	FLUXES	15
3.	SILICA AND SILICATES	15
4.	SYNTHETIC AND OXIDE MATERIALS	15
5.	OTHERS MATERIALS	15
	Total	75 Hours

RATIONALE:

The growth of Engineering and Technology has benefited the mankind. The utility of various materials in the field of ceramic will reduce the cost of production.The more utility of raw materials with less cost will reduce the cost of production.

OBJECTIVES:

- At the end of this program the student will be able to understand the various types of clay, their structure and properties.
- To acquire knowledge about fluxes, their physical and chemical properties.
- To gain the knowledge about silica their structure physical and chemical properties.
- To acquire knowledge about silicate minerals.

- To gain the knowledge about synthetic and other oxide materials.
- To acquire knowledge about other additives.
- To understand to physical and chemical properties and their utility in the field
- of ceramic and their merits and demerits.

38033-CERAMIC RAW MATERIALS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CLAYS** Definition- Occurrence- Purification of clay- English method and Germany method , Types of clay- Primary Clay - China clay or Kaolin Secondary clay- , Ball clay, Fire clay, Brick clay, Stoneware clay, Loess. Structure, Properties – raw colours , fired colour , Plasticity, Shrinkage, Strength Role in ceramic body and Glazes **Clay groups:** Kaolinite, Montmorillonite, Ilite, **Other Minerals and Materials :** Pyrophyllite, Wollastonite, Talc, Mica.	**15**
II	**FLUXES** Definition, Physical and chemical properties and role in body and Glazes - Soda Feldspar, Potash Feldspar, Nepheline syenite, Calcium carbonate , Fluorspar, Magnesium carbonate , Barium carbonate, Borax, Boric acid, Red lead, White lead.	**15**
III	**SILICA AND SILICATES** Occurance,Structure, Physical and chemical properties, Polymorphic transformation of Silica. Silicate minerals- Sillimanite, Kyanite, Andalusite- properties and uses.	**15**
IV	**SYNTHETIC OXIDE AND NON OXIDE MATERIALS** Production, properties and uses - Bayer Alumina, Electro fused alumina, Sea water magnesia, Silicon Carbide, Tungsten Carbide, Silicon Nitride, Borides, Molybdenum di silicides, SIALON, Zirconia, Mullite, Titania, Thoria.	**15**
V	**OTHER MATERIALS** Properties and uses- Bone ash, Coloring oxides - Chromium oxide , Cobalt oxide, Manganese di oxide, Venadium penta oxide, Iron oxide , Flocculants, Deflocculants, Binders, plasticizers, Lubricants, Sintering aids, Gypsum, Plaster of Paris.	**15**

REFERENCE BOOKS:

1. Fine Ceramics – Technology and applications by Norton F.H., Mc Graw – Hill, NY, 1978
2. Ceramic Raw materials by Worral – W.E., Pergamon press, NY 1998
3. Rock Forming materials by W.A. Howie, R.A. and Zussman.J., Longmans, London,1967
4. Properties of ceramic raw materials, by W.Rayon., Pergamon press 2nd edn., 1978
5. Clay mineralogy, by M.J. Wilson., Chapman and Hall , 1995
6. Ceramic raw materials of India by S.K.Guha

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GEOLOGY LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38034
Semester : III Semester
Subject Title : **GEOLOGY LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GEOLOGY PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by hands on experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

- All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS

Description of Crystal model:

1. Normal class of Isometric system

2. Normal class of Tetragonal system

3. Normal class of Hexagonal system

4. Normal class of Orthorhombic system

5. Normal class of Monoclinic system

6. Normal class of Triclinic system

7. Megascopic identification of following rock forming minerals
   Quartz,Feldspar,Mica,Olivine,Garnet,Bauxite,Clay,Calcite,
   Gypsum,Barite,Talc,Beryl

8. Megascopic identification of following individual minerals
   Asbestos, Chromite, Dolomite, Graphite, Magnetite, Haematite,
   Kyanite, Sillimanite, Pyrophyllite, Serpentine, Soapstone,
   Andalusite.

9. Megascopic identification of following rock types
   Granite, Syenite, Nepheline syenite, Charnockite,Pegmatite,
   Dolerite, Basalt, Conglomerate, Sandstone, Limestone, Shell
   limestone, Clay, Shale, Quartzite, Schist, Gneiss, Marble, Slate

10. Simple geological map
    Different type of outcrop map, Fold and Fault map, Unconformity map, Draw a cross section of all types of map, Geological history of all types of map

LIST OF EQUIPMENTS

1. A wooden box containing crystal modal of all the systems.
2. A rack containing minerals specimens.
3. A rack containing rock specimens
4. A rack containing ores specimens.
5. Structural Geology models and maps.

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38034 – GEOLOGY LABORATORY
MODEL QUESTION PAPER

1. Describe the crystal models
2. Identify and describe the properties of given minerals
3. Identify and describe the properties of give rock types
4. Describe the properties of Ore minerals
5. Complete the given structural geology map. Find the Dip and Strike of bed. describe the geology of the area. Draw a cross-section of map.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC RAW MATERIALS ANALYSIS LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNAD

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38035
Semester : III Semester
Subject Title : **CERAMIC RAW MATERIALS ANALYSIS LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC RAW MATERIALS ANALYSIS PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

- All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS:

1. Analysis of Quartz
2. Analysis of Bauxite
3. Analysis of Clay – Loss on Ignition
4. Analysis of Clay - Silica
5. Analysis of Clay - Alumina
6. Analysis of Clay – Iron oxide, Titanium dioxide, Calcium oxide and Magnesium oxide
7. Analysis of Calcite
8. Analysis of Iron oxide
9. Analysis of Dolomite
10. Standardization of EDTA and estimation of total, permanent and temporary hardness of water and TDS of water.

LIST OF EQUIPMENTS:

1. Muffle furnace (Temperature up to 1200C) - 1no.
2. Platinum crucible - Sufficient number.
3. Platinum lid.
4. Electric hot plate. -1no
5. Bunsen burner -2nos
6. LPG stove with indane gas - 1no
7. Chemical balance with weight - Sufficient number
8. PH meter
9. Electronic balance - 1no
10. Fire extinguisher
11. First aid box (Full set)
12. Working table with all accessories - 4nos.
13. Others - Glass wares.

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38035 – CERAMIC RAW MATERIALS ANALYSIS LABORATORY

MODEL QUESTION PAPER

1. Analyze the given Quartz sample and estimate the % of SiO2 present in it.

2. Estimate the % of Al2O3 present in the given Bauxite sample

3. Estimate the % of Loss on ignition in the given clay sample

4. Estimate the % of SiO2 present in the given clay sample

5. Estimate the % of Al2O3 present in the given sample solution of clay

6. Estimate the % of Fe203 and Tio2,Cao and Mgo present in the sample solution of Clay

7. Estimate the % purity of Caco3 present in the given Calcite sample
8. Estimate the % purity of Fe2o3 present in the given Iron oxide sample

9. Estimate the % of Cao and Mgo present in the given Dolomite sample

10. Standardized the given EDTA Solution and estimate the total, permanent and temporary hardness of given water sample.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC TESTING LABORATORY – I

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38036
Semester : III Semester
Subject Title : **CERAMIC TESTING LABORATORY – I**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC TESTING PRACTICAL – I	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

- All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.
- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

LIST OF EXPERIMENTS:

1. Moisture content by weighing method

2. Loss on Ignition by weighing method

3. Water of Plasticity

4. To determine particle size by sieve analysis.

5. Specific Gravity (Soluble)

6. Specific Gravity (Insoluble)

7. Drying Shrinkage

8. Firing Shrinkage

9. Density by immersion method.

10. Porosity and water absorption by immersion method

LIST OF EQUIPMENTS

- Weighing equipments
- Dryer
- Watch glass or Crucible
- Infrared moisture balance
- Pfefferhorn Instrument
- Atternberg Instrument
- Vernier Calliper
- Test bar mould
- Furnace
- Breaking strength machine (MOR – Modulus of Rupture)
- Measuring scale
- Cold crushing strength machine

38036 – CERAMIC TESTING LABORATORY – I

MODEL QUESTION PAPER

1. To determine the Moisture content of the given clay sample by weighing method
2. To determine the Loss on ignition of the given sample by weighing method
3. To determine the Water of plasticity of the given clay material.
4. To determine particle size of the given sample by sieve analysis. Method.
5. To determine the Specific gravity of the given sample by soluble method.
6. To determine the Specific gravity of the given sample by Insoluble method.
7. To determine the Drying shrinkage of the given sample by using Vernier Caliper.
8. To determine the firing shrinkage of the given sample by using Vernier Caliper.
9. To determine the Density of the given sample by immersion method.
10. To determine the Porosity and water absorption of the given sample by immersion method.

DIRECTORATE OF TECHNICAL EDUCATION

FOR ALL BARNCHES OF ENGINEERING

II YEAR

M– SCHEME

III SEMESTSER

2015 –2016 onwards

30001- COMPUTER APPLICATIONS PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU.

M- SCHEME

(Implemented from the academic year 2016-2017 onwards)

Course Name : For All Branches

Subject Code : 30001

Semester : III

Subject title : COMPUTER APPLICATIONS PRACTICAL

TEACHING & SCHEME OF EXAMINATION:

No. of weeks per Semester: 15 Weeks

Course	Instruction		Examination			
			Max.			Duration
	Hours/ week	Hours/ Semester	Internal Assessment	Board Examination	Total	
COMPUTER APPLICATIONS PRACTICAL	4Hrs	60 Hrs	25	75	100	3Hrs

RATIONALE:

The application of Computer knowledge is essential the students of all disciplines of Engineering in addition to their respective branch of study. The Computer Application Practical course facilitates the necessary knowledge and skills regarding creating, working and maintaining the documents and presentation of documents with audio visual effects ina computer and produces necessary skills in E- Learning and Chatting tools..

OBJECTIVES:

On completion of the following exercises, the students will be able to

- Use the GUI operating systems
- Familiarize and customize the desktop
- Use the different facilities available in the word processor
- Prepare Power Point presentation with different formats
- Expose E-learning tools and chatting tools
- Analyze the datasheet
- Create and manipulate the database
- Create different types of charts
- Prepare PowerPoint presentation
- Understand Internet concepts and usage of e-mail

GUIDELINES:

- All the experiments given in the list of experiments should be completed and all the experiments should include for the end semester practical examination.
- The computer systems should be 1:1ratioforpracticalclasses

SYLLABUS
LAB EXERCISES
SECTION – A

GRAPHICAL OPEARTING SYSTEM

Introduction to GUI OS; Features and various versions of GUI OS & its use; Working with GUI OS; My Computer & Recycle bin ; Desktop, Icons and Explorer; Screen description & working styles of GUI OS; Dialog Boxes & Toolbars; Working with Files & Folders; simple operations like copy, delete, moving of files and folders from one drive to another, Shortcuts &Autostart; Accessories and Windows Settings using Control Panel- setting common devices using control panel, modem, printers, audio, network, fonts, creating users, internet settings, Start button & Program lists; Installing and Uninstalling new Hard ware & Software program on your computer - Copying in CD/DVD settings – Recording Audio files.

Exercises

1. a. Installing screen saver and change the monitor resolution by 1280X960
   b. Setting wall papers
   c. Creating, moving, deleting and renaming a folder
   d. Copy, paste and cut a folder/file
   e. Displaying the properties for a file or folder
2. a. Restoring files and folders from Recycle bin
   b. Creating short cuts for folder/file
   c. Finding a file or folder by name
   d. Selecting and moving two or more files/folders using mouse
   e. Sorting folders/files.

WORD PROCESSING

Introduction to Word Processing – Examples- Creation of new documents, opening document, insert a document into another document. Page setup, margins, gutters, font properties, Alignment, page breaks, header footer deleting, moving, replace, editing text in document. Saving a document, spell checker.
Printing a document. Creating a table, entering and editing, Text in tables. Changing format of table, height width of row or column. Editing, deleting Rows, columns in table. Borders, shading, Templates, wizards, drawing objects, mail merge.

Exercises

3. Create the following table and perform the operations given below

DAYS	1	2	3	4	5	6	7	8
MON	←TEST→		**A**: JPP			CA	RDBMS	TUT
			B:RDBMS					
TUE	CA	OOP	CN	RDBMS	**A**: RDBMS			
					B: JPP			
WED	CN	RDBMS	OOP	RDBMS	COMMUNICATION		CN	CA
THU	OOP	**A**: JPP			CA	RDBMS	CN	OOP
		B: RDBMS						
FRI	COMMUNICATION		**A**: RDBMS		OOP	CN	RDBMS	CA
			B: JPP					
SAT	OOPS	RDBMS	CN	CA	---------			

4. Create a standard covering letter and use mail merge to generate the customized letters for applying to a job in various organizations. Also, create a database and generate labels for the applying organizations.

5. Create a news letter of three pages with two columns text. The first page contains some formatting bullets and numbers. Set the document background colour and add 'confidential' as the watermark. Give the document a title which should be displayed in the header. The header/ footer of the first page should be different from other two pages. Also, add author name and date/ time in the header. The footer should have the page number.

SPREADSHEET

Introduction to Analysis Package – Examples - Concepts of Workbook & Worksheets; Using Wizards; Various Data Types; Using different features with Data, Cell and Texts; Inserting, Removing & Resizing of Columns & Rows; Working with Data & Ranges; Different Views of Worksheets; Column Freezing, Labels, Hiding, Splitting etc.; Using different features with Data and Text; Use of Formulas, Calculations & Functions; Cell Formatting including Borders & Shading; Working with Different Chart Types; Printing of Workbook & Worksheets with various options.

Exercises

6. Create a result sheet containing Candidate's Register No., Name, Marks for six subjects. Calculate the total and result. The result must be calculated as below and failed candidates should be turned to red.

   Result is Distinction if Total >= 70 %

   First Class if Total > = 60 % and < 70 %

   Second Class if Total >= 50 % and < 60 %

Pass if Total >= 35 % and < 50 %

Fail otherwise

Create a separate table based on class by using auto filter feature.

7. Create a table of records with columns as Name and Donation Amount. Donation amount should be formatted with two decimal places. There should be at least twenty records in the table. Create a conditional format to highlight the highest donation with blue color and lowest donation with red colour. The table should have a heading.

8. Create line and bar chart to highlight the sales of the company for three different periods for the following data.

SALES BAR CHART

Period	Product1	Product2	Product3	Total
JAN	35	40	50	125
FEB	46	56	40	142
MAR	70	50	40	160

SECTION – B

DATABASE

Introduction – Menus – Tool bar – Create – Edit – Save – Data types – Insert – Delete – Update – View – Sorting and filtering – Queries – Report – Page setup – Print.

Exercises

9. Create Database to maintain at least 10 addresses of your class mates with the following constraints

- Roll no. should be the primary key.
- Name should be not null

10. create a students table with the following fields: Sr.No, Reg. No, Name, Marks in 5 subjects. Calculate total and percentage of 10 students. Perform the following queries.

- To find the details of distinction student
- To find the details of first class students
- To find the details of second class students

11. Design a report for the above exercise to print the consolidated result sheet and mark card for the student.

PRESENTATION

Introduction - Opening new presentation, Parts of PowerPoint window – Opening - Saving and closing presentations - Features of PowerPoint, Background design, Word art, Clip art, Drawings,3D settings - Animations, Sound, Views, types of views - Inserting and deleting slides, arranging slides, slides show, rehearsal, setup show,

custom show - Creating custom presentations, action setting, auto content wizard, working with auto content wizard

Exercises

12. Make a marketing presentation of any consumer product with at least 10 slides. Use different customized animation effects on pictures and clip art on any four of the ten slides.
13. Create a Presentation about our institution or any subject with different slide transition with sound effect.

INTERNET

Introduction – Getting acquainted with Internet Connection - Browsers – Website URL - Open a website – Net Browsing - Email: Creating E-mail id – Sending , receiving and deleting E-mail - Email with Attachments – CC and BCC - Chatting – Creating Group mail - Google docs – Search Engines – Searching topics .

Most Popular Social Networking Sites : History – Features – Services – Usage of Face book , Twitter and Linkdln.

Transferring data through wifi / bluetooth among different devices.

Introduction to cybercrime – Software Piracy – Viruses – Antivirus Software

Exercises

14. Create an e-mail id and perform the following
    - Write an e-mail inviting your friends to your Birthday Party.
    - Make your own signature and add it to the e-mail message.
    - Add a word attachment of the venue route
    - Send the e-mail to at least 5 of your friends.

15. Create a presentation on Google docs. Ask your friend to review it and comment onit. Use "Discussion" option for your discussions on the presentation.

Hardware and Software Requirements

Hardware Requirements:

- Computers – 36Nos
    - Intel Core i3 Processor
    - 500 GB Hard Disk, 2 MB RAM
    - 14” Monitor
- Projector – 1 Nos
- Laser Printer – 1 No
- Internet Connection – Minimum of 512 KB

Software Requirement

- Any GUI Operating System
- Open Source Software / MS- Office

1. SemesterEndExamination–75 Marks

Content	Max.Marks
Writing Procedure – One Question from Section A	15
Demonstration	15
Results with Printout	5
Writing Procedure – One Question from Section B	15
Demonstration	15
Results with Printout	5
Viva voce	5
Total	**75MARK**

FOURTH SEMESTER

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

UNIT OPERATIONS

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38041
Semester : IV Semester
Subject Title : **UNIT OPERATIONS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
UNIT OPERATIONS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	MINING EQUIPMENTS	15
2.	SIZE REDUCTION	15
3.	SIZE SEPARATION AND MAGNETIC SEPARATOR	15
4.	MIXING AND CONVEYING	15
5.	DEWATERING AND PUGGING	15
	Total	75 Hours

RATIONALE:

This subject is introduced in the curriculum to know the functions of machineries in the field of ceramics. The principle of operations involved in the machineries and equipments are dealt with .

OBJECTIVES:

At the end of this program the student will be able to acquire the basic knowledge of various mining equipments and handling the mining equipments.

- To acquire the knowledge of raw material processing equipments and their functioning.
- To gain the knowledge of method of various separation and handling of magnetic impurities.

- To gain the knowledge of mixing and handling of mixing equipments.
- To gain the knowledge of de-watering and pugging equipment and its advantages and disadvantages.

38041 UNIT OPERATIONS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**MINING EQUIPMENTS** Removal of over burden, Digging and excavation, Blasting, Digging by hand, Single bucket excavator or Navies, Power shovels, Multi bucket or ladder excavator, Loading & loaders, Necessity of treatment of raw materials, Stages of treatment.	**15**
II	**SIZE REDUCTION** Mechanism of size reduction, Crushers – primary crusher, Jaw crusher, Gyratory crusher, Secondary crusher - roll crusher , Hammer mill, Pan mill, Grinders – Attrition mill, Rod mill, Pot mill, Conical ball mill, ball mill – critical speed , factors affecting the grinding.	**15**
III	**SIZE SEPARATION AND MAGNETIC SEPARATOR** Principle of screening, Stationary screen, Vibrating screen, Efficiency and capacity of screens, Cyclone separator, Magnetic separator- Removal of iron & its compounds, permanent magnet, Ferro filter.	**15**
IV	**MIXING AND CONVEYING** Mixing – Types of mixing, batch and continuous mixers, free flowing solid mixer, Kneader, Slurry mixers – Conveying – Solid conveyors – Belt, Bucket, Vibrating, Pneumatic, Liquid conveyors - Pumps – Types of pumps – centrifugal pumps , diaphram pumps, reciprocating pumps.	**15**
V	**PUGGING** Principle of cake filters – Filter Aids – Filter media – Filter press - Vacuum filter, Centrifugal filter, Spray drier, Pug mill- De-airing pug mill – Principle, construction and working . pugging – Advantage and defects.	**15**

REFERENCE BOOKS:

1. Unit operations of Chemical Engineering by Mac Cabe and Smith
2. Chemical Engineers Handbook by “Perry”
3. An introduction to Chemical Engineering by Badger and Banchers
4. Modern Pottery Manufacture by H.N.Bose
5. Modern brick making by Alfred B.Searle
6. Industrial Ceramics by Felix Singer and Sonja S. Singer

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC FABRICATION PROCESS

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38042
Semester : IV Semester
Subject Title : **CERAMIC FABRICATION PROCESS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC FABRICATION PROCESS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	DRY FORMING	15
2.	PLASTIC FORMING	15
3.	SLIP CASTING	15
4.	DRYING	15
5.	FIRING	15
	Total	75 Hours

RATIONALE:

The subject of ceramic fabrication process enrich the student in method of forming and shaping of ceramic material and further micro structural changes and mechanism involved in further processing it into finished compounds. This knowledge gives the qualitative and quantitative production of ceramic component in their various fields.

OBJECTIVES:

At the end of this programme the student will be able

- To acquire basic knowledge about dry forming methods of shaping.
- To understand the basic method of uni-axial, iso-static pressing and their stress distribution.
- To gain knowledge about plastic forming and injection moulding

- To acquire knowledge about slip casting, their defects and remedies
- To gain knowledge of dry mechanism, types of dryer – principle and their

function

- To understand about reaction due to heat microstructure control and firing schedule adopted
- To acquire sufficient knowledge about easy method of shaping, their merits and demerits

38042- CERAMIC FABRICATION PROCESS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**DRY FORMING** Pressing, Raw material Characteristics, Additives, Process flow chart. Types of presses, pressing Tools. uni axial pressing – Principle, construction and working. Stress distribution, defects and remedies. Other methods - Isostatic Pressing – Cold Pressing, Wet pressing, Dry pressing, Hot - Isostatic Pressing	**15**
II	**PLASTIC FORMING** Plastic forming methods – Throwing, Hand moulding, Jiggering and Jollying, Extrusion –Defects and remedies, Plastic pressing – Cold, hot – principle, working – Advantages and disadvantages.	**15**
III	**SLIP CASTING** Plaster Mould preparation, Selection of raw materials, Preparation and Characteristics of slip, Additives – Types of casting – hollow, solid, pressure, vacuum, Process control, defect and remedies. Other casting techniques –Battery casting, Tape Casting, and Water fall casting.	**15**
IV	**DRYING** Mechanism of drying, Modes of heat transfer, Factors controlling drying, First falling rate, Second falling rate, Critical moisture content, Types of Dryers –Natural dryer, Artificial dryer- Intermittent and Continuous dryer. Drying defects,Finishing operations.	**15**
V	**FIRING** Action of heat on ceramic bodies, Firing schedule, Firing curve, Firing equipments, problems-sanitary ware and tiles, Liquid phase sintering Microstructure control**.**	**15**

REFERENCE BOOKS:

1. Principles of Ceramic Processing, by James S.Reed, John Wiley&Sons, NY, 1998
2. Ceramic White ware, by Sudir Sen, Oxford & IBH Publishing Co., New Delhi, 1992
3. Fine Ceramics: Technology and applications, by Nortan F.H. Robert E.Krieger Publishing Co., NY, 1978
4. Ceramic Processing, by Terpstra, Chapmann and Hall , 1995
5. Forming, Shaping and Working of High Performance Ceramics, by I.J.Mc Colm, N.J.Clark, Chapmann and Hall, 1988

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

WHITEWARE AND HEAVY CLAY WARE

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38043
Semester	:	IV Semester
Subject Title	:	**WHITEWARE AND HEAVY CLAY WARE**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
WHITE WARE AND HEAVY CLAY WARE	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	CLASSIFICATION OF WHITE WARE AND HEAVY CLAY WARE	15
2.	WHITE WARE	15
3.	HEAVY CLAY WARE	15
4.	TESTING	15
5.	IS SPECIFICATIONS	15
	Total	75 Hours

RATIONALE:

The subject introduces the knowledge of required properties of ceramic bodies and their composition. This gives the student to study the Whiteware and Heavy clay ware on their application and method of manufacturing as per specification and market requirement.

OBJECTIVES:

At the end of this programme the student will be able to acquire basic knowledge of

- Various types of ceramic body with required properties
- To gain knowledge of improve the properties with suitable composition
- To acquire knowledge of Whiteware and Heavy clay ware product and application
- To improve the knowledge of handling the equipments
- To improve and ability the control of quality
- To know the ISI Specification and maintain

38043- WHITEWARE AND HEAVY CLAY WARE
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CLASSIFICATION OF WHITE WARE AND HEAVY CLAY WARE** Definition, Classification – whiteware bodies **–** Tri axial system – Earthenware, Stoneware, Terracotta, Majolica, Porcelain, Art ware. Raw materials used in triaxial bodies and their pyrochemical reaction – Physical and chemical characteristics. Comparative study of the Properties of Earthenware, Stoneware, Terracotta, Majolica, Porcelain, Art ware.	**15**
II	**WHITEWARE** **Body preparation process flow chart , Characteristics and applications:** **Earthenware:** Semi Vitreous Wall and Floor tiles. **Porcelain:** Vitreous sanitary ware, Vitrified Tiles, High and low tension insulators, Chemical porcelain, porcelain Art ware, Dental porcelain. **Fireclay:** Sanitary ware and sinks. **Stoneware**: Classification - Coarse and Fine stoneware **Other bodies**: Bone china, Cordierite, steatite and Wollastonite.	**15**
III	**HEAVY CLAY-WARE** Raw material–Method of winning, Handling. Classification of building material –Common bricks – Engineering bricks – Perforated and hollow bricks – ridge tiles –Terracing tiles – Floor tiles – Ceiling tiles – red clay products , Manufacturing method– Hand moulding – Machine moulding, Extrusion – Pressing – Drying and Firing . Stoneware pipes – Manufacturing process - Extrusion, drying, finishing, glazing and firing.	**15**
IV	**TESTING** Plasticity, Shrinkage, Strength, Porosity, Water absorption, Bulk density, Abrasion resistance, Chipping resistance, Acid and alkali resistance, Crazing resistance, Puncture voltage, Flashover strength (wet and dry), Di-electric constant.	**15**
V	**IS SPECIFICATIONS** Terracotta, Majolica, Earthenware- Semi-vitreous wall and floor tile, Porcelain- Chemical porcelain, dental porcelain, Tableware, dinnerware, Art ware. Fireclay sanitary ware and sink. Stoneware- Coarse stoneware(Sewage pipes) – Fine stoneware.	**15**

REFERENCE BOOKS:

1. Modern Pottery Manufacture by H.N.Bose
2. The Chemistry and Physics of Clay and other Ceramic Raw Material by Searle and Grimshaw
3. Modern Brick Making by Alfred B.Searle
4. Pottery Science by Allen Dinsdale, Ellis Horwood Ltd, NY, 1986
5. Ceramic Whiteware by Sudirsen, Oxford & IBH Publishing Co., New Delhi, 1992
6. White-ware production, Testing and Quality Control by Ryan, W and Radford , C.,Pergamon Press, NY, 1987

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

ENGINEERING DRAWING

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M- SCHEME
(Implemented from the Academic year 2016-2017 onwards)

Course Name : Diploma in Chemical Engineering (FT/ SW)
Subject Code : 37044
Semester : IV
Subject Title : **ENGINEERING DRAWING**

TEACHING AND SCHEME OF EXAMINATION

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Week / Hours	Semester / Hours	Marks			Duration
ENGINEERING DRAWING	4	60	Internal Assessment	Board Examination	Total	
			25	75	100	3 Hrs

TOPICS AND ALLOCATION OF HOURS

Sl.No.	**TOPIC**	**TIME (HOURS)**
UNIT-I	SECTIONSAL VIEWS AND MACHINE ELEMENTS	22
UNIT-II	ASSEMBLY DRAWING	22
UNIT-III	FREE HAND DRAWING	8
	REVISION AND TEST	8
	TOTAL	**60**

RATIONALE

Diploma Holders are required to read and interpret drawings. Therefore it is essential that they have competency in preparing drawings and sketches of various machine parts. Therefore this subject is essentially required. Drawing is said to be the language of engineers and technicians. Reading and inter prating engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use

No. of Hours per week : 4
No. of Weeks per semester : 15
Total No. of Hours per semester : 60

OBJECTIVES

1.0 Need and Importance of Sectional Views in Machine Drawing.

1.1 To show the inner parts clearly as possible.

1.2 To identify the types of threads, bolts, nuts, keys, rivets and joints in machine elements.

1.3 To know different terms used in connection with screw threads and drawing external metric threads.

1.4 To know how to draw fasteners like bolt, nut and its assembly.

1.5 To know how to draw different types of keys in shaft and hub assembly.

1.6 To illustrate with neat sketch how two parts can be joined by rivets in different forms.

2.0 To know various parts, how they are assembled and how do they work.

2.1 Have an idea about the Functional requirements of individual parts and their location.

2.2 Understand the purpose, principle of operation and filed of application of the given machine part.

2.3 thes To prepare Assembly Drawing from final finished part drawings (or) pictorial drawing.

3.0 To make free hand sketches of some important Chemical Engineering Equipments.

3.1 To have better understanding about their function and applications.

3.2 It is used for preparing detailed drawing of the required parts.

ENGINEERING DRAWING

DETAILED SYLLABUS

UNIT - 1 SECTIONAL VIEWS AND MACHINE ELEMENTS		22 Hours
SECTIONAL VIEWS (THEORY ONLY)	:	Need for sectioning - cutting plane - Section lines - Section of adjacent components - Types of Sections - Full Section - Half Section - Removed Section - Revolved Section - Partial Section - Off set Section - Sectioning of thin and large areas - Convention of Sectioning - Material Convention.
THREADS	:	Nomenclature of Thread - Types of Threads - V.Thread - Square Thread - Right hand and Left hand thread - Internal Threads - External Threads - Single start thread - Multiple thread Draw Single Start External Metric V and Square threads.
BOLT AND NUT	:	Hexagonal and Square Nut - Bolt and Nut assembly.
KEYS	:	Sunk Key - Rectangles Key - Square Key - Gib Headed Key - Woodruff Key And Feather Key. Saddle Key - Flat And Hollow Saddle Key Round Key
RIVETED JOINTS	:	Single riveted Lap Joint - Double riveted Lap Joint (chain and Zig - Zag) - Single riveted Butt Joint (Single Strap and Double Strap).

UNIT - 2 ASSEMBLY DRAWING (ONLY TWO VIEWS)		22 Hours
Drawing Elevation and Plan (or) Elevation and End View of a component from the given part drawing or pictorial drawing.	:	Bushed Bearing for Horizontal Shaft Sleeve and Cotter Joint Flanged Coupling (Plain type) Cast Iron Flanged Pipe Joint Horizontal stuffing Box.

UNIT - 3 FREE HAND DRAWING			8 Hours
HEAT EXCHANGES	:	Shell and Tube (1 - 1 Pass)	
EVAPORATOR	:	Standard Vertical Type	
DISTILLATION COLUMN	:	Multi Stage Tray tower	
ABSORPTION COLUMN	:	Counter Current Packed Tower	
VALVE	:	Globe Valve - Gate Valve - Check Valve	

TEXT BOOKS

1. Engineering Drawing by **P.K.Kapur and P.K.Sapra** - Tata McGraw - Hill Publishing Company Limited, New Delhi - 1990.

2. A Text Book of Machine Drawing by **P.S.Gill** - Kataria & Son Publishing House, New Delhi - 2010.

3. A Text Book of Machine Drawing by **N.D.Bhatt & V.M.Panchal** - Charotor Publishing, Anand - 2011.

REFERENCE BOOKS

1. Perry's Chemical Engineer's Hand Book by Robert H.Perry - McGraw - Hill Book Co-New York - 1994.

2. Unit Operations of Chemical Engineering by Warren L.McCabe, Julian C.Smith, and Peter Harriott - McGraw - Hill Higher Education - International Edition - 2001.

Model Question Paper - I

Marks: 75 **Time: 3 Hrs.**

(Sketch 'K' to Accompany)

(N.B. (i) Answer any two Questions from Part - A.
(ii) Part - B and Part - C are Compulsory.
(iii) Only First Angle Projection is to be followed.
(iv) Any missing dimensions can be assumed suitably)

PART - A

2 X 10 = 20

I. Draw elevation and plan of a hexagonal headed bolt with hexagonal nut and washer for 24 mm dia bolt.

II. Draw the following orthographic views of a Single riveted Single Strap Butt Joint suitable to join two plates, each 10 mm thick.

(a) Sectional front view

(b) Plan

III. Explain the following with neat sketches :-

(a) Feather Key

(b) Woodruff Key

PART - B

1 X 40 = 40

IV. The detailed drawings of a Horizontal Stuffing Box are given in sketch 'K' Assemble the parts and draw.

(a) Bottom Half Sectional elevation (30)

(b) Left end view (10)

PART - C

1 X 15 = 15

V. Draw a Free hand sketch of a Standard Vertical type Evaporator.

Model Question Paper - II

Marks: 75 **Time: 3 Hrs.**

(Sketch 'G' to Accompany)

(N.B. (i) Answer any two Questions from Part - A.
(ii) Part - B and Part - C are Compulsory.
(v) Only First Angle Projection is to be followed.
(vi) Any missing dimensions can be assumed suitably)

PART - A

2 X 10 = 20

I. Draw a Right hand Square thread of 40 mm diameter, 60 mm long and 4 mm pitch.

II. Draw three views of a Hexagonal nut for a 20 mm dia bolt.

III. Explain with neat sketch Removed Section and Off-set Section.

PART - B

1 X 40 = 40

IV. The detailed drawings of a Sleeve & Cotton Joint are given in sketch 'G' Assemble the parts and draw the following views :-

(c) Sectional Elevation (30)

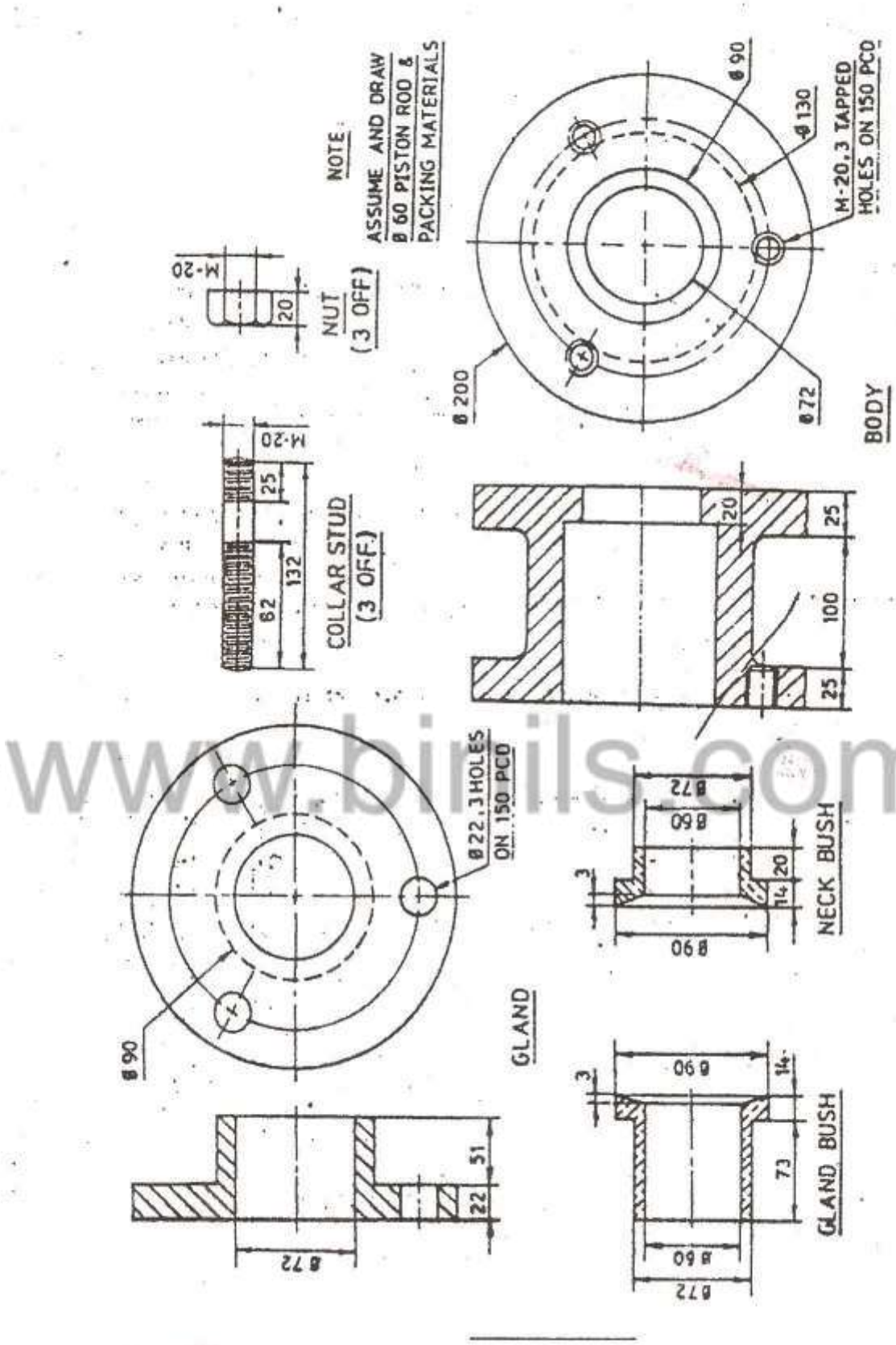
(d) Left end view (10)

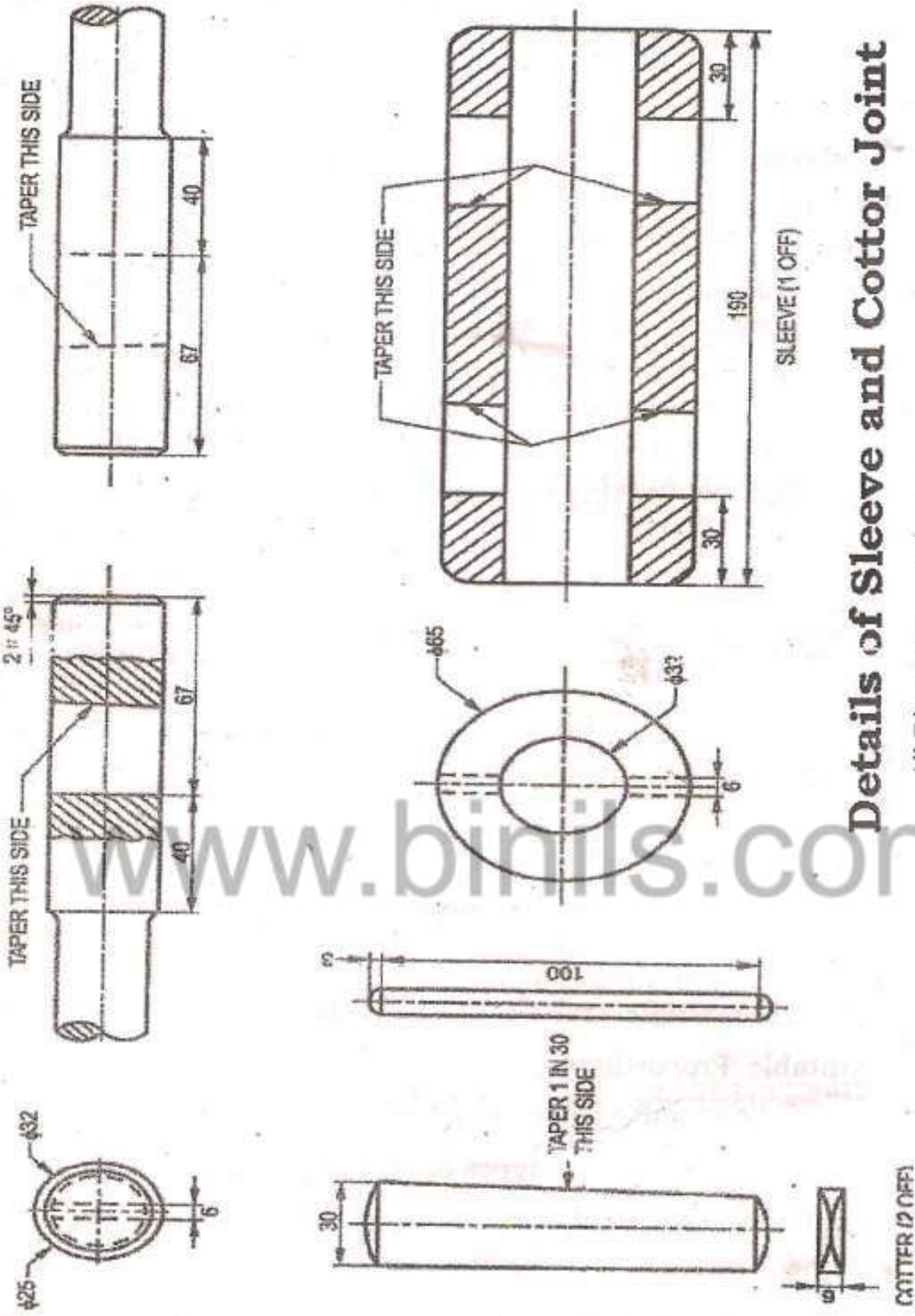
PART – C

1 X 15 = 15

V. Draw a Free hand sketch of a Globe Valve.

SKETCH 'K' TO ACCOMPANY MODEL QUESTION PAPER 1





Details of Sleeve and Cottor Joint

All Dimensions are in mm

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC TESTING LABORATORY – II

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

ANNEXURE
STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38045
Semester	:	IV Semester
Subject Title	:	**CERAMIC TESTING LABORATORY – II**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC TESTING PRACTICAL – II	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

CERAMIC TESTING LABORATORY – II

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Moisture content by Infrared moisture balance

   To determine the Moisture content of the given clay sample by using Infrared moisture balance method.

2. Particle size by Anderson Pipette

   To determine the particle size by Anderson Pipette method

3. Particle size by Hydrometer method

   To determine the particle size by Hydrometer method

4. Pfefferhorn Plasticity index

   To measure the water of plasticity by using Pfefferhorn plasticity instrument.

5. Dried strength using MOR machine - cylindrical bar

6. Fried strength using MOR machine - cylindrical bar

   To determine the Fired strength by using MOR instrument

7. Fired strength using MOR machine – Rectangular bar

   To determine the Fired strength by using MOR instrument

8. Tensile Strength

   To determine the strength of the given bar sample by using Tensile strength machine.

9. Compressive Strength

   To determine the Compressive strength of the given sample by using Compressive strength machine.

10. Crazing Test

    To determine the Crazing of the given sample by using Autoclave machines.

LIST OF EQUIPMENTS:

- Sieve set
- Anderson Pipette
- Weighing equipments
- Hydrometer instrument
- Beaker
- Hydrostatic bench
- Autoclave machine
- Universal testing machine (UTS)

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voce	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

38045–CERAMIC TESTING LABORATORY – II

MODEL QUESTION PAPER

1. To determine the Moisture content of the given clay sample by using Infrared moisture balance method.

2. To determine the particle size by Anderson Pipette method

3. To determine the particle size by Hydrometer method

4. To measure the water of plasticity by using Pfefferhorn plasticity instrument.
5. To determine the Atternberg number by using Atternberg instrument

6. To determine the dried strength by using MOR instrument

7. To determine the Fired strength by using MOR instrument

8. To determine the strength of the given bar sample by using Tensile strength machine.

9. To determine the Compressive strength of given sample by using Compressive strength machine.

10. To determine the Crazing of the given sample by using Autoclave machine

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

MOULDING LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38046
Semester : IV Semester
Subject Title : **MOULDING LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
MOULDING PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

MOULDING LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Moisture content – Plaster of Paris
   To determine the moisture content of the given plaster of Paris.

2. Particle Size Analysis – Sieve Method (POP)
   To determine the particle size analysis of the given plaster of Paris by sieve method.

3. Setting Time - POP
   To determine the setting time of the given plaster of Paris.

4. Setting Temperature
   To determine the setting temperature of the given plaster of Paris

5. Water Absorption
   To determine the Water absorption of the given plaster of Paris.

6. Compressive Strength
   To determine the Compressive Strength of the given plaster of Paris

7. Tensile Strength
   To determine the tensile strength of the given plaster of Paris

8. Expansion and contraction of POP
   To determine the expansion and contraction of the given plaster of Paris

9. Pattern Preparation
   To prepare the pattern for the given article by using clay or Plaster of Paris material

10. Mould Making
    To prepare mould for the given pattern using Plaster of Paris.

LIST OF EQUIPMENTS

- Weighing equipments
- Watch glass or Crucible
- Sieve set
- Stop clock
- Vicat needle apparatus
- Thermometer
- Dryer
- MOR machine or UTM
- Tensile machine or UTM
- Vernier caliper

- Test bar mould
- Jigger head or throwing wheel
- Measuring scale
- Cardboard sheet
-

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to
select by a lot.

ALLOCATION OF MARKS

Procedure	**10** Marks
Observation (including taking readings)	**25** Marks
Calculation	**30** Marks
Result	**05** Marks
Viva-Voce	**05** Marks
Internal Assessment	**25** Marks
Total	**100** Marks

38046–MOULDING LABORATORY

MODEL QUESTION PAPER

1. To determine the moisture content of the given plaster of Paris.

2. To determine the particle size analysis of the given plaster of Paris by sieve method.

3. To determine the setting time of the given plaster of Paris

4. To determine the raise of temperature for the given plaster of Paris

5. To determine the Water absorption of the given plaster of Paris.

6. To determine the Strength for the given plaster of Paris

7. To determine the Tensile strength of the given plaster of Paris

8. To determine the expansion and contraction of the given plaster of Paris

9. To prepare the pattern for the given article by using clay material.

10. To prepare the mould for the given pattern.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC PROCESSING LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38047
Semester : IV Semester
Subject Title : **CERAMIC PROCESSING LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC PROCESSING PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

CERAMIC PROCESSING LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Casting of Tea Cup
   To prepare tea cup by casting technique

2. Throwing
   To prepare jar by throwing technique

3. Jiggering and Jollying
   To prepare jar by jiggering and jolleying technique

4. Saucer Making
   To prepare saucer by jiggering and jolleying technique

5. Extrusion
   To prepare tube by extrusion process with the help of pug mill

6. Hand Moulding
   To prepare standard brick by hand moulding technique

7. Sagger Making
   To prepare sagger by hand moulding technique

8. Crucible Making
   To prepare crucible by hand moulding technique

9. Setters Making
   To prepare setter by hand moulding technique

10. Pressing
    To prepare tiles by pressing technique

LIST OF EQUIPMENTS:

- Cup Mould
- Stirrer
- Throw wheel
- Jiggering and Jolleying machine
- Extruder
- Wood or metal mould
- Sagger mould
- Plaster mould
- Toggle press

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38047–CERAMIC PROCESSING LABORATORY

MODEL QUESTION PAPER

1. To prepare the tea cup for the given raw materials by casting technique

2. To prepare the jar for the given raw materials by throwing technique

3. To prepare the jar for the given raw materials by jiggering and jolleying Technique

4. To prepare the saucer for the given raw materials by jiggering and jolleying Technique

5. To prepare tube for the given raw materials by extrusion process with the help of pug mill

6. To prepare the standard brick for the given raw materials by hand moulding Technique

7. To prepare the sagger for the given raw materials by hand moulding technique

8. To prepare the crucible for the given raw materials by hand moulding Technique

9. To prepare the setter for the given raw materials by hand moulding technique

10. To prepare the tiles for the given raw materials by pressing technique

V SEMESTER

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GLAZE TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38051
Semester : V Semester
Subject Title : **GLAZE TECHNOLOGY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GLAZE TECHNOLOGY	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl. No	Topics	Time (Hours)
1.	CLASSIFICATION OF GLAZE AND ITS MATERIALS	15
2.	FRIT MAKING AND GLAZE APPLICATIONS	15
3.	GLAZE BATCH CALCULATION	15
4.	ENAMELING	15
5.	DECORATION AND GLAZE DEFECTS	15
	Total	75 Hours

RATIONALE:

The modern trend of ceramic field student able to understand in handling the various chemicals involved in glaze preparation. The various function of materials gives the utility in the manufacture of glaze provide a basic knowledge in compounding and getting a best quality with aesthetic effect in preparation of glaze.

OBJECTIVES:

At the end of this programme the student will be able

- To gather knowledge about the various types of glaze and the material involvement in the preparation of glaze.
- To acquire knowledge about milling, milling practice and various technique of application.
- To acquire knowledge about different terms related to chemical and calculation followed in compounding glaze.
- To gather knowledge about coating on metal sheet, its preparation and application
- To acquire knowledge about various defects which arise in glaze and enamel and their remedies
- To acquire basic knowledge about glaze and enamel properties

38051- GLAZE TECHNOLOGY
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CLASSIFICATION OF GLAZE AND ITS MATERIALS** Definition, Types of glazes - Raw glazes- Fritted glazes, Lead glazes, Porcelain glazes- High temperature glazes, Low temperature glazes ,Salt glazes- Decorative glazes, Loam or earth glazes- Adventuring glazes – Bristol glazes – Crystalline glazes –Matt glazes – Coloured glazes – raw materials and Composition. Glaze materials – Lead, Opacifier, colouring oxides, Bases, alkali etc- Physical and chemical characteristics and their functions in glazes.	**15**
II	**FRIT MAKING AND GLAZE APPLICATIONS** Fritting rules- Properties and function of oxides – Advantages and disadvantages –Preparation – Batch materials composition – Mixing – Milling – Dry grinding –equipments – consistency – deflocculants – flocculants – Adhesives and suspension agents – Gum. Applications: Under glaze and over glaze colours – Under glaze preparation – Soluble under glaze – Techniques insoluble under glaze colours – Requirements – Fluxes – Over glaze colour - Lustre	**15**
III	**GLAZE BATCH CALCULATION** Ceramic glazes - Seger formula ,Empirical formula and its calculation from the chemical analysis – Calculation of percentage composition from empirical formula – Calculation of weight –(Molecular weight) equivalent weight and formula batch weights – compounding of raw glazes the calculation of formula to recipe and recipe to formula – Rational analysis and proximate analysis.	**15**
IV	**DECORATION AND GLAZE DEFECTS** **a) Decoration** , Ceramic transfers - Preparation, application and firing – Screen printing, decalcomania, printing, grinding and marbleizing, stippling and Miscellaneous **b) Glaze defects and remedies:** Crazing, Bubbles, Crawling , Pinholes, Blistering, chipping , copper edging, egg shells, fish scale, gloss hair lining, Jumping, tool marks , re-boiling , rusting, specking tearing ,waving surfaces **c) Properties**: Thermal, Optical, Physical, mechanical, chemical and electrical properties.	**15**

V	**ENAMELING** Definition, Classification of Enamels, Enamel materials, – Enamel composition –Sheet iron enamel, Dry and wet process enamel – Cast iron enamel – Ground coat enamel, White coat enamel, Coloured enamel, Jewellery and aluminium enamel. Metal treatment - Sand blasting , Pickling- Sulphuric acid, hydrochloric acid, Neutralising – Nickel dipping , Frit furnaces – rotary, batch type. Furnaces for enamelling – Muffle furnace – firing and control.	**15**

REFERENCE BOOKS:

1. Porcelain Enamels by Andrews
2. Industrial Ceramics by Singer .F and Singer. S.S
3. Modern Pottery Manufacture by H.N.Bose
4. Ceramics by G.M.parmalle
5. Ceramics Columns and decoration by Kenneth Shaw

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

PROPERTIES OF CERAMICS

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38052
Semester	:	V Semester
Subject Title	:	**PROPERTIES OF CERAMICS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject:	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROPERTIES OF CERAMICS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	MECHANICAL PROPERTIES	15
2.	THERMAL PROPERTIES	15
3.	OPTICAL PROPERTIES	15
4.	ELECTRICAL PROPERTIES	15
5.	MAGNETIC PROPERTIES	15
	Total	75 Hours

RATIONALE:

The study gives the properties of all kinds of materials. Based on this the ceramic product are used in various purpose in industrial as well as domestic application. The student will conduct various test and study the materials and produce the new component to meet out the needs.

OBJECTIVES:

At the end of this programme the student will be able

- To acquire basic knowledge about mechanical properties like young modulus, critical strain, Brittle fracture, creep.
- To understand about the thermal properties like specific heat capacity, Thermal expansion, thermal conductivity, thermal diffusivity.
- To gain knowledge about optical properties like principle of light transmission and loss of intensity, scattering of light by a spherical bubbles.

- To acquire basic knowledge about resistivity, Porosity, Di-electric strength and Permittivity.
- To understand the magnetic properties like Permeability, bulk density, exchange interaction, super exchange etc.,

38052- PROPERTIES OF CERAMICS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**MECHANICAL PROPERTIES** Stress – Strain – Young's modulus , Critical strain , Strength, effect of porosity and grain size on strength – brittle fracture – mechanism, hardness and abrasion – relationship with elastic modulus – Creep.	**15**
II	**THERMAL PROPERTIES** Specific heat capacity – Thermal expansion – Thermal conductivity –Thermal diffusivity – Thermal shock resistance – low thermal expansion bodies – effect of temperature difference on firing the body – stress in glaze and body due to thermal expansion difference.	**15**
III	**OPTICAL PROPERTIES** Basic relationships – Reflection, Transmission, Absorption, loss of intensity- Refractive index- dispersion, Scattering of light by a spherical bubble –boundary reflectance and surface gloss – Specula and diffused reflection –opacity and translucency – absorption and colour – applications.	**15**
IV	**ELECTRICAL PROPERTIES** Classification – metal, semi conductors and insulators – resistivity, effect of composition of bodies – variation of resistivity with temperature – effect of porosity , moisture permittivity ,dielectric strength ,conducting glazes ,dielectric loss	**15**
V	**MAGNETIC PROPERTIES** Susceptibility – Permeability – flux density – types of magnetism and their origin – electronic structure and magnetic moment – spinel structure and ferro magnetism– hysteresis loop and magnetic domain – domain structure.	**15**

REFERENCE BOOKS:

1. Allen Dinsdale, Pottery science, Processes and products , Ellis Horwood Ltd., NY 1986.

2. M.W. Barsoum, Fundamentals of Ceramics, McGraw- Hill, 1997

3. J.Moulson and H.M.Herbert, Electro ceramics, Chapman and Hall, London,1990

4. R.C.Buchanan, Ceramic materials for Electronics, Marcel Dekker inc., NY,1991

5. W.D.Kingery, H.K.Bowen and D.R.Uhlmann, Introduction to Ceramics, John Wiley & Sons, 1991.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

REFRACTORIES

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38053
Semester : V Semester
Subject Title : **REFRACTORIES**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
REFRACTORIES	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	CLASSIFICATION AND PROPERTIES	15
2.	ACIDIC REFRACTORIES	15
3.	BASIC REFRACTORIES	15
4.	NEUTRAL AND SYNTHETIC REFRACTORIES	15
5.	INSULATION BRICKS AND APPLICATION OF REFRACTORIES	15
	Total	75 Hours

RATIONALE:

The subjects introduce the methods of manufacturing Refractories and testing procedure. The differences in different type of Refractories and their end use is studied. The subject gives the knowledge of manufactures and uses of special Refractories, insulation materials, and their behaviour at high temperature.

OBJECTIVES:

At the end of this programme the student will be able

- To acquire basic knowledge of Refractories and their testing procedure to access the quality of product.
- To gain knowledge about Acid, Basic and Neutral Refractories in their

manufacture, properties and application.

- To acquire knowledge about Synthetic Refractories.
- To gain knowledge about insulating materials.

38053- REFRACTORIES
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CLASSIFICATION AND PROPERTIES** Introduction – General classification – Acidic – Basic –Neutral Common properties and Testing : Specific gravity – Bulk density – Porosity – Permeability – Refractoriness, Refractoriness under load – Volume stability – Slag attack – Resistance to thermal shock – cold crushing strength – Abrasion resistance – Hot modulus of rupture – Creep – Thermal conductivity.	15
II	**ACIDIC REFRACTORIES** Material processing – Manufacture process – Properties and application of Fireclay, Silica, Semi-silica, Kyanite, Andalusite, Sillimanite, Bauxite.	15
III	**BASIC REFRACTORIES** Material processing – Manufacture – Properties and application of Magnesite – Dead burnt magnesite- Dolomite— Stabilized dolomite – chrome magnesite – Mag chrome –Forsterite.	15
IV	**NEUTRAL AND SPECIAL REFRACTORIES** Material processing – Manufacture – Properties and application of Neutral Refractories –Graphite – Chromite – Zirconia Synthetic Refractories – Silicon carbide- Silicon Nitride – Fused Alumina – Fused Magnesia – Mullite – Magnesite alumino spinel. Process and manufacturer of Electro cast Refractories.	15
V	**INSULATION AND MONOLITHIC REFRACTORIES** Material processing – Manufacture – Properties and application of Insulating bricks, Ceramic fibre, Monolithic refractory- Castables, Ramming mass, Fettling mass, Gunning mass.	15

REFERENCE BOOKS:

1. Refractories by M.L.Misra
2. Refractories by F.H.Norton
3. Steel plant Refractories by Chesters

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GLASS TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38071
Semester : V Semester
Subject Title : **GLASS TECHNOLOGY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GLASS TECHNOLOGY	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	INTRODUCTION TO GLASS MATERIALS	15
2.	MELTING PROCESS	15
3.	FORMING PROCESS	15
4.	SPECIAL GLASS	15
5.	PROPERTIES OF GLASS	15
	Total	75 Hours

RATIONALE:

The knowledge of raw materials and method of manufacturing of glass, special glass and their properties are studied. To know the methods of glass formation, melting
process and batch preparation. Handling the furnace function and forming process.

OBJECTIVES:

At the end of this program the student will be able

- To acquire basic knowledge about rules of glass formation, raw material and their properties.
- Melting process and batch preparation and types of furnace their function.
- All forming process of glass manufacturing products.
- Types of special glasses and properties of glasses.
-

38071- GLASS TECHNOLOGY
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**INTRODUCTION TO GLASS MATERIALS** Glass Definition, Zachariasen's rules of glass formation – Raw materials- glass forming materials, Fluxes, Oxidising and reducing agents, refining agent, colouring agent.	15
II	**MELTING PROCESS** Process leading to glass formation – Volatilization – Effect of pre-sintering-refining- source of gas bubbles- Physico – chemical reactions taking in glass batch– Homogenization and devitrification –Tempering – Annealing -Condition of glass furnace – pot furnace – Tank furnace	15
III	**FORMING PROCESS** Hand operation – Laboratory ware and Bulb making, Tube making – Danner process – Up draw process, down draw process, pressing – Hand press, Flat glass- Pitts berg process, Foucault process, Float process.	15
IV	**SPECIAL GLASS** Heat resisting glass- fibre glass, glass wool, Optical glass- Glass for electrical and electronic industries – Borosilicate glasses – Silica glass. Toughened glass- tempering, lamination.	15
V	**PROPERTIES OF GLASS** Mechanical properties, Thermal properties, Optical properties. Viscosity of glass, Annealing, Strain in glass –Softening point of glass – Strain point – Annealing curve.	15

REFERENCE BOOK

1. Hand book of glass manufacture by tooley F.V. Vol I & II. Ogden Publishing Company, New York.
2. Glass ceramics by Nomillian P.W.Academic press

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CEMENT TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38072
Semester : V Semester
Subject Title : **CEMENT TECHNOLOGY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CEMENT TECHNOLOGY	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	RAW MATERIALS	15
2.	NATURAL CEMENT AND PORTLAND CEMENT	15
3.	PROPERTIES AND TESTING OF CEMENT	15
4.	TESTING AND QUALITY CONTROL OF CEMENT	15
5.	SPECIAL CEMENTS	15
	Total	75 Hours

RATIONALE:

The subject of Cement technology enrich the knowledge of cement manufacturing process and handling of raw material and improvement of production capacity and testing as per IS Specification The knowledge of cement gives the qualitative and quantitative methods of production of cement .

OBJECTIVES:

At the end of this program the student will be able

- know the required raw material for cement manufacturing process as per specification
- To gain the knowledge of manufacturing method and control of production.
- To gain the knowledge of types of cement and manufacturing methods and their properties.
- Testing the Cement as per IS Specification
- To know about various types of cement and their Properties

38072- CEMENT TECHNOLOGY
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**RAW MATERIALS** Raw materials – Calcareous materials, Argillaceous materials, additional or connective components - Gypsum, Coal ash**,** Lime and limestone – classification, impurities, effect of impurities, calcinations and preparation of lime, properties and uses. Other raw materials: Fly ash – availability, chemical composition, properties and uses .	**15**
II	**NATURAL CEMENT AND PORTLAND CEMENT** Natural cement rock –occurrence, availability, composition, analysis and its uses – comparative study – Portland cement. Manufacturing process - wet method and dry method, calculation of composition, preparation of kiln feed, cement clinker production, pyro -processing, thermal efficiency of pyro- processing. Treatment of clinkers – grinding and milling, factors influencing grindability of clinkers, addition of Gypsum	**15**
III	**PROPERTIES AND TESTING OF CEMENT** Properties of cement – hydration, hydrolysis, setting, hardening and crystallization, effect of different phases on setting characteristics of cement, fineness, determination of surface area, particle size distribution, workability and consistency of cement paste, mortar and concretes	**15**
IV	**TESTING AND QUALITY CONTROL OF CEMENT** Testing of cement – Consistency- Setting time, Soundness, Tensile strength, Compressive strength of cement, Mortar and Concrete, heat of hydration Quality Control – Litre Weight, Microscopic, x-ray investigation of clinker.	**15**
V	**SPECIAL CEMENTS** Special Portland cement, pozzoulona cement, quick setting cements – low heat cements – rapid hardening cements – blast furnace cement – slag cement – high alumina cement – white and coloured cement – oil well cement – iron ore cement – hydrophobic cement – water proof cement – super sulphate cement	**15**

REFERENCE BOOKS:

1. Lee, Text book of cement and concrete, 1975.
2. M.Moukwa, cement based materials, ceramic transactions, vol.37, American ceramic society, Ohio, 1993
3. Peter C.Hewlett(ED), Lea's chemistry of cement and concrete, 4th edn., Elsevier,1998
4. Deborah DL.Chung, Multifunctional cement based materials, Marcel Dekker Inc.,2003
5. J.Bensted and P.Barnes (ED). structure and performance of cements, 2nd Edn., Spon press, 2002

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

SLIP TESTING LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38055
Semester	:	V Semester
Subject Title	:	**SLIP TESTING LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SLIP TESTING PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

SLIP TESTING LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Preparation of Casting Slip
   To prepare the good casting slip for the given batch composition

2. Effect of Na_2CO_3 in Casting body
   find the effect of casting body by adding sodium carbonate

3. Effect of Na_2SiO_3 in Casting body
   To find the effect of casting body by adding sodium silicate

4. Effect of Na_2CO_3 Solution in Casting body
   To study /find the effect of Sodium Silicate on casting slip/body.

5. Effect of Na_2SiO_3 Solution in Casting body
   To study/find the effect of Na_2CO_3& Na_2SiO_3 ratio on fluidity.

6. Fluidity ratio 1:1 (Na_2CO_3: Na_2SiO_3)
   To find out the fluidity ratio with the effect of given ratio of sodium carbonate & sodium silicate.

7. Fluidity ratio 1:2 (Na_2CO_3: Na_2SiO_3)
   To find out the fluidity ratio with the effect of given ratio of sodium carbonate & sodium silicate.

8. Fluidity ratio 2:1 (Na_2CO_3: Na_2SiO_3)
   To find out the fluidity ratio with the effect of given ratio of sodium carbonate & sodium silicate.

9. Dry content for 1 cc & 1000 cc
   To find out the amount of dry material or powdered substance present in a given slip - dry content for 1 cc and 1000 cc

10. Brongnarts Formula
    To find out the dry content of the given slip or dry liquid using the brongnarts formula and also verify the weight of the slip

LIST OF EQUIPMENTS

- Stirrer
- Plaster mould (Cup shape mould)
- Flow meter or Viscometer
- Dryer
- Weighing equipments
- Specific gravity bottle
- Watch glass

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38055 – SLIP TESTING LABORATORY

MODEL QUESTION PAPER

1. To prepare the good casting slip for the given raw material

2. To find the effect of casting body by adding sodium carbonate

3. To find the effect of casting body by adding sodium silicate

4. To find the effect of casting body by adding sodium carbonate solution

5. To find the effect of casting body by adding sodium silicate solution

6. To find out the fluidity ratio with the effect of given ratio of sodium carbonate and sodium silicate.

7. To find out the fluidity ratio with the effect of given ratio of sodium carbonate and sodium silicate.

8. To find out the fluidity ratio with the effect of given ratio of sodium carbonate and sodium silicate.

9. To find out the amount of dry material or powdered substance present in a given slip - dry content for 1 cc and 1000 cc

10. To find out the dry content of the given slip or dry liquid using the brongnarts formula and also verify the weight of the slip

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

REFRACTORIES LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38056
Semester	:	V Semester
Subject Title	:	**REFRACTORIES LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
REFRACTORIES PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

REFRACTORIES LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Packing density
   To find out the packing density by using grogs of different sizes.

2. Effect of Grog on Fire clay – Study the shrinkage, strength
   To find the effect of different grog by addition on fireclay.

3. Water of Absorption
   To determine the water of absorption of the given sample

4. Porosity
   To determine the porosity of the given sample

5. Bulk density
   To determine the bulk density of the given sample

6. True Porosity
   To determine the true porosity of the given sample

7. Specific gravity – Pycnometer bottle method
   To determine the Specific gravity for the given sample by pycnometer method

8. Cold Crushing Strength
   To determine the cold crushing strength for the given sample

9. Spalling Resistance
   To determine the spalling resistance of the given sample

10. PCE – Cone Preparation and Plaque mounting
    To prepare the sample cone for determination of the PCE value and plaque mounting with the help of neutral refractory plate

LIST OF EQUIPMENTS

- Test bar mould
- Vernier caliper
- Weighing equipments
- Hydrostatic bench
- Dryer
- Cold crushing strength
- Furnace
- Plaque
- Cone mould
- Beaker

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38056 – REFRACTORIES LABORATORY

MODEL QUESTION PAPER

1. To find out the packing density of given grogs sizes?
2. To find out the effect of different percentage of grog addition on fireclay (strength and shrinkage)
3. To determine the water absorption for the given sample
4. To determine the porosity for the given sample
5. To determine the Bulk density for the given sample
6. To determine the True porosity for the given sample
7. To determine the Specific gravity for the given sample by pycnometer method
8. To determine the cold crushing strength for the given sample
9. To determine the spalling resistance for the given sample
10. To prepare the sample cone and plaque mounting

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CERAMIC TECHNOLOGY

III YEAR

V SEMESTER

M - SCHEME

2015 – 2016 onwards

LIFE AND EMPLOYABILITY SKILL PRACTICAL

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN ENGINEERING – SYLLABUS – M Scheme
(Being implemented from the Academic Year 2016-2017 onwards)

Course Name : **All Branches of Diploma in Engineering and Technology and Special Programmes**
Subject Code : **30002**
Semester : **V**
Subject Title : **LIFE AND EMPLOYABILITY SKILLS PRACTICAL**

Teaching and Scheme of Examination: **No. of Weeks per Semester: 15 Weeks**

Subject	Instruction		Examination			
			Marks			
	Hours/ Week	Hours/ Semester	Internal assessment	Board Examination	Total	Duration
Life and Employability Skills	4 Hours	60 Hours	25	75	100	3 Hours

Topics and Allocation of Hours:

Sl. No.	Section	No. of Hours
1	**Part – A** Communication	30
2	**Part – B** Entrepreneurship, Project Preparation, Productivity, Occupational Safety, Health, Hazard, Quality Tools& Labour Welfare	20
3	**Part – C** Environment, Global Warming, Pollution	10
TOTAL		60

RATIONALE

Against the backdrop of the needs of the Industries, as wells as based on fulfilling the expectations of the Industries, the Diploma Level students have to be trained directly and indirectly in toning up their competency levels. Proficiency in Communication only, equips them with confidence and capacity to cope with the employment. Hence, there is a necessity to focus on these in the curriculum. At the end of the Course, the student is better equipped to express himself in oral and written communication effectively.

SPECIFIC INSTRUCTIONAL OBJECTIVES

1. **Emphasize and Enhance Speaking Skills**

2. **Increase Ability to Express Views & Opinions**

3. **Develop and Enhance Employability Skills**

4. **Induce Entrepreneurship and Plan for the Future**

5. **Expose & Induce Life Skills for Effective Managerial Ability**

LIFE AND EMPLOYABILITY SKILLS PRACTICAL SYLLABUS

Unit	Topics	Activity	Hours
I	**Communication, Listening, Training, Facing Interviews, Behavioural Skills**	-- instant sentence making – say expressions/phrases-- self- introduction/another higher official in company – describe/explain product – frame questions based on patterns – make sentences based on patterns	**30**
II	**Entrepreneurship, Project Preparation, Marketing Analysis, Support & Procurement**	-- prepare an outline of a project to obtain loan from bank in becoming an entrepreneur – prepare a resume	**10**
III	**Productivity – comparison with developed countries, Quality Tools, Circles, Consciousness, Management, House Keeping**	-- search in the website -- prepare a presentation – discuss & interact	**05**
IV	**Occupational Safety, Health Hazard, Accident & Safety, First-Aid,Labour Welfare Legislation, Welfare Acts**	-- search in the website -- prepare a presentation – discuss & interact	**05**

V	**Environment, Global Warming, Pollution**	-- taking down notes / hints – answering questions -- fill in blanks the exact words heard	**10**

LEARNING STRUCTURE 100

Marks

-- Focus more on Speaking & Listening Skills
-- Attention less on Reading & Writing Skills
-- Apply the skills in fulfilling the Objectives on Focused Topics

a) Listening **25 Marks**

1. Deductive Reasoning Skills (taking down notes/hints) **10**
2. Cognitive Skills (answering questions) **10**
3. Retention Skills (filling in blanks with exact words heard) **05**

b) Speaking Extempore/ Prepared **30 Marks**

1. Personality/Psychological Skills (instant sentence making) **05**
2. Pleasing & Amiable Skills (say in phrases/expressions) **05**
3. Assertive Skills (introducing oneself/others) **05**
4. Expressive Skills (describe/explain things) **05**
5. Fluency/Compatibility Skills (dialogue) **05**
6. Leadership/Team Spirit Skills (group discussion) **05**

c) Writing & Reading **20 Marks**

1. Creative & Reasoning Skills (frame questions on patterns) **05**
2. Creative & Composing Skills (make sentences on patterns) **05**
3. Attitude & Aim Skills (prepare resume) **05**
4. Entrepreneurship Skills (prepare outline of a project) **05**

d) Continuous Assessment (Internal Marks) **25 Marks**
(search,read, write down, speak, listen, interact & discuss)

1. Cognitive Skills (Google search on focused topics)
2. Presentation Skills& Interactive Skills (after listening, discuss)

Note down and present in the Record Note on any 5 topics **10 Marks**
Other activities recorded in the Record note **10 Marks**
Attendance **05 Marks**

INTERNAL MARKS **25 MARKS**

EXTERNAL MARKS AT END EXAMINATION **75 MARKS**

MODEL QUESTION

Time: 3 Hours **Maximum Marks: 75**

A. LISTENING **25 Marks**

1. Listen to the content and take down notes/hints 10
2. Listen to the content and answer the following questions. 10
3. Listen to the content and fill in the blanks the exact words heard. 05

B. SPEAKING **30 Marks**

1. Say in a sentence instantly on hearing the word(5 words, one after another). 05
2. Say any five expressions commonly used in communication. 05
3. Imagine, a consultant has come to your department.
   Introduce him to your subordinates. 05
4. Explain/describe the product you are about to launch in the market. 05
5. Speak with your immediate boss about the progress you have made. 05
6. Discuss within the group on the topic of focus in the syllabus. 05

C. WRITING & READING **20 Marks**

1. Frame new questions from the pattern given by changing sets of words with your own. 05

a.	When	do	you	return?
b.	How	is	his performance?	
c.	Where	has	the manager	gone?
d.	What	is	the progress	today?
e.	Why	are	the machines	not functioning?

2. Make sentences from the pattern given by changing sets of words with your own. 05

a.	The workers	are	on strike		
b.	The labourers	are paid	well	in this factory	
c.	There	is	a rest room	for the workers	
d.	These	are	the new products	launched	by our company
e.	Almost everyone	come	to the company	on motorbikes	

3. Prepare a resume for the post of Department Manager. 05

4. Prepare an outline of a project to obtain a loan. (Provide headings and subheadings) 05

I. Guidelines for setting the question paper:

A. LISTENING :

ONLY TOPICS related to
POLLUTION /
ENVIRONMENT /
GLOBAL WARMING are to be taken.
These topics are common for all the three types of evaluation.

B. SPEAKING :

1. WORDS of common usage
2. Fragments – expression of politeness, courtesy, cordiality
3. Introduce yourself as an engineer with designation or
   Introduce the official visiting your company/department

4. Describe/Explain the product/machine/department
5. Dialogue must be with someone in the place of work.
6. Group of six/eight
   Discuss the focused topic prescribed in syllabus

C. WRITING & READING:

1. Provide five different structures.
   Students are to substitute at least one with some other word/words
2. Provide five different structures.
   Students are to substitute at least one with some other word/words
3. Provide some post related to industries.
4. Outline of the project (skeleton/structure)
   Only the various headings and subheadings
   Content is not needed

II. Guidelines for recording the material on the Focused Topics in the Record note.

Write in the record note, **on any five topics**, from the list of topics given below. **10 Marks**
(5 topics x 10 marks = 50 marks. Thus, the **Average of 5 topics is 10 Marks)**

1. Productivity in Industries – Comparison with developed countries
2. Quality Tools, Quality Circles and Quality Consciousness

3. Effective Management
4. House Keeping in Industries
5. Occupational Safety and Hazard
6. Occupational Accident and First Aid
7. Labour Welfare Legislations
8. Labour Welfare Acts and Rights
9. Entrepreneurship
10. Marketing Analysis, Support and Procurement

LABORATORY REQUIREMENT:

1. An echo-free room
2. Necessary furniture and comfortable chairs
3. A minimum of two Computers with internet access
4.A minimum of two different English dailies
5. A minimum of Three Mikes with and without cords
6. Colour Television (minimum size – 29")
7. DVD/VCD Player with Home Theatre speakers
8. Smart board
9. Projector

Suggested Reading:

1. Production and Operations Management by S.N. Chary, TMH
2. Essentials of Management by Koontz &Weihrich, TMH
3. Modern Production / Operations Management by E.S. Buffa and R.K. Sarin, John Wiley &
Sons
4. Production Systems: Planning, Analysis and Control by J.L.Riggs, 3rd ed., Wiley.
5. Productions and Operations Management by A.Muhlemann, J.Oakland and K.Lockyer,
Macmillan
6. Operations Research - An Introduction by H.A.Taha, Prentice Hall of India
7. Operations Research by J.K.Sharma, Macmillan
8. Business Correspondence & Report Writing by R.C. Sharma and K.Mohan, TMH
9. How to prepare for Group Discussion & Interview (With Audio Cassette) by Prasad, TMH
10. Spoken English – A self-learning guide to conversation practice (with Cassette)
11. Introduction to Environmental Engineering by Mackenzie, L. Davis and A. David, Cornwell, McgrawHill, 3rd Ed.
12. Environmental Engineering by Peary, Rowe and Tchobanoglous, McgrawHill
13. Total Quality Management – An Introductory Text by Paul James, Prentice Hall
14. Quality Control and Applications by Housen&Ghose
15. Industrial Engineering Management by O.P. Khanna

VI SEMESTER

DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN CERAMIC TECHNOLOGY

III YEAR

VI SEMESTER

M - SCHEME

2015 – 2016 onwards

PLANT ENGINEERING AND MANAGEMENT

CURRICULUM DEVELOPMENT CENTRE

M-SCHEME
(Implemented from the Academic year 2015-2016 onwards)

Course Name : **Diploma in Ceramic Technology**
Subject Code : 37561
Semester : VI Semester
Subject Title : **PLANT ENGINEERING AND MANAGEMENT**

TEACHING AND SCHEME OF EXAMINATION:

No. of Weeks per semester: 15 weeks

Subject	Instruction		Examination			
	Hours /Week	Hours/Semester	Marks			Duration
PLANT ENGINEERING AND MANAGEMENT	5	75	Internal Assessment	Board Examination	Total	3 Hrs
			25	75	100	

TOPICS AND ALLOCATION OF HOURS:

UNIT	TOPIC	Time (Hours)
I	**PRINCIPLES OF MANAGEMENT**	15
II	**ORGANISATION AND QUALITY CONTROL**	15
III	**MARKETING FUCNTIONS-INDUSTRIAL RELATIONS AND SAFETY**	15
IV	**ENVIRONMENT MANAGEMENT**	15
V	**DISASTER MANAGEMENT**	15
	Total	75

RATIONALE:

In this subject the basic concepts on the various principles of management about scientific management, entrepreneurship, different types of organanisation are covered to enable the students to understand working of various management principles. Students also get an opportunity to learn about PPC, Leadership and the modern quality control techniques.

In this subject due emphasis is given for marketing functions, Industrial relation and safety and also Environmental management and disaster management techniques which are highly essential for the present situation.

OBJECTIVES:

On completion of the units of the syllabus, the student will be able to understand the following :

- To understand the different types of ownership in industry
- To understand the scientific management
- To organise the different activities of the plant
- To develop the traits required for entrepreneur

- To select the plant location and product
- To acquire better knowledge about decision making and communication
- To understand the important factors of production planning control
- To carryout suitable effective methods for inventory control
- To maintain good quality control
- To understand the various quality certification schemes
- To understand the different marketing techniques
- To promote the products with effective methods
- To select the suitable advertising techniques
- To understand the different factory acts for employee welfare
- To appraise the safety performance
- To understand the importance of pollution control
- To analyse the impact of pollution
- To select the suitable solid waste treatment techniques
- To understand various treatments and disposal methods for waste water
- To choose the suitable air pollution control methods
- To understand the disaster management
- To identify different causes for disaster management
- To understand various preventive measures and warning systems
- To estimate the arrangements required in industry to avoid disaster
- To understand the insurance claim and rehabilitation methods.

37561 - PLANT ENGINEERING AND MANAGEMENT

DETAILED SYLLABUS

Unit	Name of the Topic	Hours
I	**UNIT I: PRINCIPLES OF MANAGEMENT (12 hours)** Role of industry –Types of ownership-Proprietorship, partnership-Private limited –Public limited –Industrial co-operatives –Scientific management –Functions of management –Types of organization –line-staff-functional organization – concept and Definition –Importance of Entrepreneurship – Promotion of self employment –Government policies - Advantages and limitations of entrepreneurship –Site selection – Principles of plant layout –Factors influencing plant location. Plant maintenance – importance – Break down maintenance, preventive maintenance and scheduled maintenance.	**15 Hrs**
II	**UNIT II: ORGANISATION AND QUALITY CONTROL (12 hours)** Leadership in organization –Decision making –Communication – Motivation –Group dynamics –Production planning and control – Need for planning –Routing –Scheduling –Despatching –PERT – CPM –Inventory control –ABC analysis of safety stock –EOQ method –Purchasing procedures –Records –Bin cards - Quality control –Basic concepts –Definition –Terminology –Presentation of data –Indian standards on quality control technique –Quality certification schemes –ISO 9000 etc.	**15 Hrs**
III	**UNIT III MARKETING FUNCTIONS, INDUSTRIAL RELATIONS AND SAFETY (13 hours)** Marketing –Definition –Information –Functions –Pricing policy – Pricing techniques - Sales –Definition –Personal selling – Promotion mix –Advertising –Sales packaging –Promotion techniques Trade unions –Disputes –Settlement –Collective bargaining – Welfare concepts –Rights and responsibilities of employer and employee –Factories act 1948 –Industrial dispute act 1947 – Trade unions act 1926 –ESI act 1948 –Child labour act Process safety –Hazard analysis –Risk analysis –Common causes of accidents –Safety training –Electrical hazard –Fire hazard –Explosion hazard –First aid.	**15 Hrs**

IV	**UNIT IV: ENVIRONMENTRAL MANAGEMENT (15 hours)** Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution. Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies. Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health. Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management. Noise pollution management – Effects of noise on people – Noise control method**s.**	**15 Hrs**
V	**UNIT V: DISASTER MANAGEMENT (16 hours)** Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life. Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems. Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbours / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.	**15 Hrs**

Text book:

1. O.P.Khanna Industrial engineering and management, Dhanpat rai & sons.
2. C.S.Rao - Environmental Engineering and Pollution control, Wiely

Reference Books:

1. Industrial Management by Dalilal & Mansur Ali
2. Hand Book of “Industrial Safety and Health, Trade and Technical Press Ltd., Modern, U.K. 1980.

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

FURNACE TECHNOLOGY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38062
Semester : VI Semester
Subject Title : **FURNACE TECHNOLOGY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
FURNACE TECHNOLOGY	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	CLASSIFICATION OF FUELS	15
2.	PROPERTIES OF FUELS	15
3.	HEAT TRANSFER AND COMBUSTION CALCULATION	15
4.	FURNACES	15
5.	PYROMETRY	15
	Total	75 Hours

RATIONALE:

Modern development of industries requires more understanding of fuels and their advantages for industrial purposes. This subject explains various aspects with regard to types of fuels, furnaces and pyrometers. It will give the basic knowledge of furnace techniques and skill in furnace technology.

OBJECTIVES:

At the end of this program the student will be able

- To acquire basic knowledge about Solid, liquid and gaseous fuels.
- To gain knowledge of Handling, storage and Transportation Properties of fuels, Analysis of fuels and to determine the Calorific value.
- Types of Furnace, Kilns and Construction works Determine the temperature and handling the temperature instruments also.

38062 - FURNACE TECHNOLOGY
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**CLASSIFICATION OF FUELS** Definition of fuels – Classification – Solid, liquid, gaseous fuel. Solid fuels: Coal - formation, Coal classification – Peat, lignite, Bituminous coal, Anthracite coal and coke. Storage of Coal. Handling – Transportation – Advantages/disadvantages Liquid fuels: Types of oils, Petroleum, Refining of Petroleum. Storage: Handling –Transportation -Advantages/disadvantages. Gaseous fuels: classification of gaseous fuels, natural gas, producer gas, water gas, blast furnace gas, LPG- advantages/disadvantages.	16
II	**PROPERTIES OF FUELS** Combustion, Production of flame, Ignition temperature- Gases and vapours – Limits of combustion- In flammability and vapours – Velocity of flame propagation – Calorific value – Gross calorific value – Net calorific value - High flash point – low viscosity limited sulphur, presence. Analysis of coal (proximate and ultimate).	16
III	**HEAT TRANSFER AND COMBUSTION CALCULATION** Mechanism of heat transfer- Conduction, Convection, Radiation- Heat recovery. Air requirements for combustion, Bomb calorimeter – simple problems– Types of Solid fuel burner– Liquid fuel burner Gaseous burners, burner accessories, Burners – Types and their functions.	16
IV	**KILN** Intermittent: Open top kiln or Clamp kiln – Up draught kiln, Horizontal draught kiln –Down draught kiln – Bottle kiln – Muffle kiln. Semi continuous kiln Continuous kilns –Muffle type continuous kiln - Hoffmann kiln – Tunnel kiln – different zones, operation – Rapid cooling temperature – Heat recovery from hot gases – Advantages over other kilns.	16
V	**HEAT AND TEMPERATURE MEASUREMENTS** Effects of heat – Assessing temperature using colour tint – Eye vision, Wedge wood cylinder , Pyrometric cones, Hold crafts bar, Bullers rings Pyrometers: Principles - Thermocouple, pyrometer, Radiation pyrometer, Optical pyrometer, Ferry optical pyrometer and wedge optical pyrometer. Advantages and disadvantages of pyrometry and pyroscopes.	16

REFERENCE BOOKS:

1. Fuels, solid ,Liquid and gaseous by Drame and J.K.King
2. Modern Pottery Manufacture by H.N.Bose
3. Industrial Ceramics by Singer .F and Singer. S.
4. Combustion Engineering and Fuel Technology by Shaha. A.K
5. Furnace Operation by Robert D.Reed

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

REFRACTORIES APPLICATION

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38081
Semester : VI Semester
Subject Title : **REFRACTORIES APPLICATION**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
REFRACTORIES APPLICATION	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	REFRACTORIES FOR IRON AND STEEL INDUSTRY	15
2.	REFRACTORIES FOR NON FERROUS INDUSTRY	15
3.	REFRACTORIES FOR GLASS	15
4.	REFRACTORIES FOR CEMENT AND CERAMICS	15
5.	REFRACTORIES FOR INSULATION	15
	Total	75 Hours

RATIONALE:

The subject introduces the knowledge of Refractories of Iron and Steel industry. The study of properties and processing procedure give the student a strong foundation to the refractories field. This also help to gain the processing and use of advanced technology used in the Industries.

OBJECTIVES:

At the end of this programme the student will able

- To know about the Refractories used in Iron and Steel industry
- To gain the knowledge of Refractories in non-ferrous industry
- To know the function in Refractories in Glass and cement industries.
- To gain the knowledge of Refractories for Energy Conservation and ceramic industries.

38081- REFRACTORIES APPLICATION
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**REFRACTORIES FOR IRON AND STEEL INDUSTRY** Coke oven, Blast furnace, twin hearth, LD converter – electric arc furnace, induction furnaces – reheating furnaces – slide plate system – nozzle, shroud/SDN – ladle and tundish lining practices – monolithic – gunning techniques – refractory, slag and metal interactions	15
II	**REFRACTORIES FOR NON FERROUS INDUSTRY** Refractory requirement and use in copper, aluminium, lead. Refractory requirement in fertilizer and hydrocarbon industry. Application of monolithic	15
III	**REFRACTORIES FOR GLASS** Design of glass tank for container, sheet, lamp, float glasses, refractory practices in sidewall, throat, fore hearth and roof of glass tanks –regenerator systems – alumina and AZS fused cast Refractories –glass corrosion resistance, oxidation, seed potential tests – glass defects and analysis –feeder expandable.	15
IV	**REFRACTORIES FOR CEMENT AND CERAMICS** Wet/Dry process for cement making – pre heater and pre-calcination zone lining – alkali and wear resistance, Kiln furniture – types – properties, requirements – Silicon carbide, Mullite, Cordierite, Alumina, Zirconia – Mullite, Zirconia types – kiln design – LTM concept – fast firing technology.	15
V	**REFRACTORIES FOR INSULATION** Purpose of insulation – types of insulation materials & preparation of insulating refractories – ceramic fibre products – design & installation – ceramic coating.	15

REFERENCE BOOK:

1. Chester J.H.Steel plant Refractories 2nd edition, 1973, United steel companies Limited, Sheffield UK
2. Robert E Fisher (ED), Advances in refractory technology, Ceramic Transaction volume 4, American ceramic society, 1990, Westerville, Ohio, USA
3. Akira Nishikawa, Technology of Monolithic Refractories, Plibrico, Japan Co Ltd, Tokyo 1984
4. Nandi D.N, Handbook of Refractories, Tata McGraw – Hill Publishing Co., New Delhi, 1991
5. Shaw K, Refractories and their uses, App. Science publishers, UK, 1972
6. Keishi gotoh, powder technology handbook, Marcel Dekker Inc, 1997

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

SPECIAL CERAMICS

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38082
Semester : VI Semester
Subject Title : **SPECIAL CERAMICS**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
SPECIAL CERAMICS	5	75	25	75	100	3 Hrs

Topics and Allocation of Hours:

Sl.No	Topics	Time (Hours)
1.	FIBERS	15
2.	COMPOSITES	15
3.	ABRASIVE MATERIALS	15
4.	MANUFACTURING PROCESS OF COATED ABRASIVES AND BONDED ABRASIVES	15
5.	SPECIAL BODIES	15
	Total	75 Hours

RATIONALE:

The subject introduces the knowledge about fiber materials and composite materials The study of properties and processing procedure will give the student the basic methods production of special value added ceramic materials on fiber reinforcing, Abrasives and Abrasives bonding . This also help to gain the processing and use of advanced material used in special application.

OBJECTIVES:

At the end of this programme the student will be able to acquire basic knowledge of

- Manufacturing method, properties and application of glass fiber, Silica fiber, boron fiber and composite.
- Types of Abrasives material manufacture process.
- Know the function of Abrasive grain in industries.
- Get the knowledge the bonds and types.
- To gain the knowledge the special types of bodies and know the characteristics and applications.

38082- SPECIAL CERAMICS
DETAILED SYLLABUS

Contents: Theory

Unit	Name of the Topic	Hours
I	**FIBRES** Definition, Characteristics, fibre flexibility, Manufacturing methods, Properties and applications of glass fibres, Silica fibres, boron fibres and Carbon fibres, Whiskers – definition , Manufacturing process, properties and uses.	15
II	**COMPOSITES** Definition, Classification – CMC, MMC, PMC - Manufacturing process, Properties and applications.	15
III	**ABRASIVE MATERIALS** Garnet, Alumina, Silicon carbide, Alumina- Zirconia, Tungsten carbide, diamond- Cubic, boron Nitride, Properties – hardness, fracture, toughness.	15
IV	**MANUFACTURING PROCESS OF COATED AND BONDED ABRASIVES** **Coated abrasives:** Various coating steps – making machine – closed coating- open coating- finishing or converting operation – fluxing, slitting, sheet cutting, disc cutting, belt making , Skiving – quality control and testing – principle of working of coated abrasives. **Bonded abrasive:** Cutting wheels- Cutting action- factors depending, bonds – kinds of bonds- Vitrified, Silicate resinoid, shellac, rubber, oxychloride- functions of abrasive grains, bonds and structure	15
V	**SPECIAL BODIES:** Silicon Nitride, Aluminium Nitride, Zirconia, Titania, Magnesia, Mullite, Ferrite- Body preparation – Fabrication method –Physical and Chemical Characteristics – Special Feature and Field of application. Introduction – Cermets, Glass ceramic	15

REFERENCE BOOK:

1. Brook R.J. (Ed), Concise Encyclopedia of Advanced Ceramic Materials, Pergamon Press, NY,1991
2. Noboru Ichinose, Introduction to Fine Ceramics, John Wiley & Sons, 1987
3. Somiya S., Silicon Nitride – I, Elsevier Applied Science, 1990
4. Hampshire S, Non Oxide Technical and Engineering Ceramics, Elsevier Applied Science, 1986
5. A.K.Vasudevan and J.J. Petrovic, High Temperature Structural Silicides, Elsevier Science Publishers, 1992
6. Warren R, Ceramic Matrix Composites, Blackie

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

CERAMIC BODY
PREPARATION LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38064
Semester : VI Semester
Subject Title : **CERAMIC BODYPREPARATION LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
CERAMIC BODY PREPARATION PRACTICAL	5	75	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

CERAMIC BODY PREPARATION LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Preparation of Terracotta body ware
   To prepare terracotta art ware from given the raw materials

2. Preparation of Majolica body ware
   To prepare majolica cups from given the raw materials

3. Preparation of Earthenware body ware
   To prepare earthenware tile from given the raw materials

4. Preparation of Stoneware body ware
   To prepare stoneware jar from given the raw materials

5. Preparation of Porcelain body ware
   To prepare porcelain tea cups from given the raw material

6. Preparation of Insulator body ware
   To prepare insulator from given the raw materials

7. Preparation of Bone china body ware
   To prepare bone china art ware from given the raw materials

8. Preparation of Cordierite body ware
   To prepare cordierite kiln furniture from given the raw materials

9. Preparation of Steatite body ware
   To prepare steatite grinding media from given the raw materials

10. Preparation of Alumina body ware
    To prepare alumina grinding media from given the raw materials

LIST OF EQUIPMENTS

- Stirrer
- Dryer
- Furnace
- Finishing equipments
- Plaster mould
- Pistol and Mortar
- Sieve set
- Weighing equipments

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38064–CERAMIC BODY PREPARATION LABORATORY

MODEL QUESTION PAPER

1. To prepare terracotta art ware from given the raw materials

2. To prepare majolica cups from given the raw materials

3. To prepare earthenware tile from given the raw materials

4. To prepare stoneware jar from given the raw materials

5. To prepare porcelain tea cups from given the raw material

6. To prepare insulator from given the raw materials

7. To prepare bone china art ware from given the raw materials

8. To prepare cordierite kiln furniture from given the raw materials

9. To prepare steatite grinding media from given the raw materials

10. To prepare alumina grinding media from given the raw materials

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

GLAZE LABORATOR

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

ANNEXURE
STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38065
Semester : III Semester
Subject Title : **GLAZE LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
GLAZE PRACTICAL	4	60	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

GLAZE LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Preparation and application of lead glaze
   To prepare and apply lead glaze on the given test pieces

2. Preparation and application of Leadless glaze – Transparent glaze
   To prepare and apply leadless glaze (TG) on the given test pieces

3. Preparation and application of Leadless glaze – Opaque glaze
   To prepare and apply leadless glaze (OG) on the given test pieces

4. Preparation and application of Fritted glaze – TG frit or Opaque frit
   To prepare and apply fritted glaze on the given test pieces

5. Preparation and application of Blue glaze
   To prepare and apply blue glaze on the given test pieces

6. Preparation and application of Green glaze
   To prepare and apply green glaze on the given test pieces

7. Preparation and application of Yellow glaze
   To prepare and apply yellow glaze on the given test pieces

8. Preparation and application of Golden brown glaze
   To prepare and apply golden brown glaze on the given test pieces

9. Preparation and application of Insulator brown glaze
   To prepare and apply insulator brown glaze on the given test pieces

10. Preparation and application of Black glaze
    To prepare and apply black glaze on the given test pieces

LIST OF EQUIPMENTS

- Stirrer
- Dryer
- Furnace
- Finishing equipments
- Plaster mould
- Pistol and Mortar
- Sieve set
- Weighing equipments
- Spray gun

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38065–GLAZE LABORATORY

MODEL QUESTION PAPER

1. To prepare and apply lead glaze on the given test pieces

2. To prepare and apply leadless glaze (TG) on the given test pieces

3. To prepare and apply leadless glaze (OG) on the given test pieces

4. To prepare and apply fritted glaze on the given test pieces

5. To prepare and apply blue glaze on the given test pieces

6. To prepare and apply green glaze on the given test pieces

7. To prepare and apply yellow glaze on the given test pieces

8. To prepare and apply golden brown glaze on the given test pieces

9. To prepare and apply insulator brown glaze on the given test pieces

10. To prepare and apply black glaze on the given test pieces

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

ENAMEL LABORATORY

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

ANNEXURE
STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38066
Semester	:	III Semester
Subject Title	:	**ENAMEL LABORATORY**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
ENAMEL PRACTICAL	4	60	25	75	100	3 Hrs

RATIONALE:

In Diploma Engineering education skill development plays a vital role. The skill development can be achieved by on hand experience in handling various instruments, apparatus and equipment. This is accomplished by doing engineering related experiments in practical classes in various laboratories.

GUIDELINES:

All the ten experiments given in the list of experiments should be completed and given for the end semester practical examination.

- In order to develop best skills in handling instruments/Equipment and taking readings in the practical classes, every two students should be provided with a separate experimental setup for doing experiments in the laboratory.
- The external examiners are requested to ensure that a single experimental question should not be given to more than four students while admitting a batch of 30 students during Board Examinations.

ENAMEL LABORATORY

LIST OF EXPERIMENTS WITH OBJECTIVES:

1. Stencil preparation for Enameling
   To make a proper stencil for the given sentence into the chart

2. Preparation of metal sheet
   To prepare the metal sheet for ready to enamelling

3. Pickling – H_2SO_4 & HCl
   To adopt pickling process using H_2SO_4 and HCL for the given metal sheet

4. Special Treatment – Nickel dipping
   To adopt the nickel dipping for the given picked metal sheet.

5. Ground Coat enamel
   To prepare and apply the ground coat enamel on the given test pieces

6. White coat enamel
   To prepare and apply the white coat enamel on the given test pieces

7. Colour coat enamel
   To prepare and apply the colour coat enamel on the given test pieces

8. Frit making – Ground coat
   To prepare the ground coat frit for the given raw material

9. Frit making – White coat
   To prepare the white coat frit for the given raw material

10. Frit making – Colour coat
    To prepare the co lour coat frit for the given raw material

LIST OF EQUIPMENTS

- Measuring scale
- Written instruments
- Hammer
- Chisel
- Punching machine
- Enamel or glass vessel
- Beaker
- Weighing equipments
- Dryer
- Electric furnace
- Frit furnace

BOARD EXAMINATION EVALUATION
Practical Examination

Note: All the exercises should be given in the question paper and students are allowed to select by a lot.

ALLOCATION OF MARKS

➢ Procedure	**10** Marks
➢ Observation (including taking readings)	**25** Marks
➢ Calculation	**30** Marks
➢ Result	**05** Marks
➢ Viva-Voce	**05** Marks
➢ Internal Assessment	**25** Marks
➢ Total	**100** Marks

38066–ENAMEL LABORATORY

MODEL QUESTION PAPER

1. To make a proper stencil for the given sentence into the chart

2. To prepare the metal sheet for ready to enamelling

3. To adopt pickling process using H2SO4 & HCL for the given metal sheet

4. To adopt pickling process using HCl for the given metal sheet

5. To adopt the nickel dipping for the given picked metal sheet.

6. To prepare and apply the ground coat enamel on the given test pieces

7. To prepare and apply the white coat enamel on the given test pieces

8. To prepare and apply the colour coat enamel on the given test pieces

9. To prepare the ground coat frit for the given raw material

10. To prepare the white coat frit for the given raw material

11. To prepare the co lour coat frit for the given raw material

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

PROJECT WORK

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name : **Diploma in Ceramic Technology (Sandwich)**
Subject Code : 38067
Semester : VI Semester
Subject Title : **PROJECT WORK**

TEACHING AND SCHEME OF EXAMINATION:

No of weeks per semester: 15 Weeks

Subject	Instructions		Examination			
	Hours/ Week	Hours/ Semester	Marks			Duration
			Internal Assessment	Board Examination	Total	
PROJECT WORK	6	90	25	75	100	3 Hrs

OBJECTIVES:

- To develop the creative talents in the students.
- The project work should involve less cost, easy manufacturing technique and suitable to the real life situations.
- The project work should be useful to the mankind.
- To give the students a taste of real life problem solving and thus simulate industrial environment within the polytechnic.
- To develop those abilities that cannot be developed by normal class room situations such as group work, sharing responsibility, initiate, creativity etc

Internal Assessment	**Marks**
Project Review I (8th Week)	10
Project Review II (14th Week)	10
Attendance	5
Total	25

Note: -

- The selection of Project work should be carried out in V semester itself.
- The Project committee's approval should be obtained prior to the executing of project.

- ❖ Periodical assessment should be carried out from V semester.
- ❖ The students' batch size should not exceed 6 Nos.
- ❖ The students should maintain a logbook of the work carried out by them.
- ❖ The internal assessment marks will be given based on the work carried out by the students as per the logbook.

Minimum Marks for Pass is 50 out of which minimum 35 marks should be obtained out of 75 marks in the board Examination alone.

- ➢ Implement the theoretical and practical knowledge gained through the curriculum into an application suitable for a real practical working environment preferably in and industrial environment.
- ➢ Get exposure on industrial environment and its work ethics.
- ➢ Understand what entrepreneurship is and how to become an entrepreneur.
- ➢ Learn and understand the gap between the technological knowledge acquired through curriculum and the actual industrial need and to compensate it by acquiring additional knowledge as required.
- ➢ Carry out cooperative learning through synchronous guided discussions within the class in key dates, asynchronous document sharing and discussions, as well as to prepare collaborative edition of the final project report.

- ➢ Understand the facts and importance of environmental management.
- ➢ Understand and gain knowledge about disaster management.

EVALUATION FOR BOARD EXAMINATION:

Details of Mark allocation	Max Marks
Marks for Report Preparation, Demo, Viva-voce	65
Marks for answers of 4 questions which is to be set by the external examiner from the given question bank consisting of questions in the following two topics Disaster Management and Environmental Management. Out of four questions two questions to appear from each of the above topics i.e. 2 questions x 2 topics = 4 questions 4 questions x 2 ½ marks = 10 Marks	10
Total	**75**

DETAILED SYLLABUS

ENVIRONMENTAL & DISASTER MANAGEMENT

1. ENVIRONMENTAL MANAGEMENT

Introduction – Environmental Ethics – Assessment of Socio Economic Impact – Environmental Audit – Mitigation of adverse impact on Environment – Importance of Pollution Control – Types of Industries and Industrial Pollution.

Solid waste management – Characteristics of Industrial wastes – Methods of Collection, transfer and disposal of solid wastes – Converting waste to energy – Hazardous waste management Treatment technologies.

Waste water management – Characteristics of Industrial effluents – Treatment and disposal methods – Pollution of water sources and effects on human health.

Air pollution management – Sources and effects – Dispersion of air pollutants – Air pollution control methods – Air quality management.

Noise pollution management – Effects of noise on people – Noise control methods.

2. DISASTER MANAGEMENT

Introduction – Disasters due to natural calamities such as Earthquake, Rain, Flood, Hurricane, Cyclones etc – Man made Disasters – Crisis due to fires, accidents, strikes etc – Loss of property and life..

Disaster Mitigation measures – Causes for major disasters – Risk Identification – Hazard Zones – Selection of sites for Industries and residential buildings – Minimum distances from Sea – Orientation of Buildings – Stability of Structures – Fire escapes in buildings - Cyclone shelters – Warning systems.

Disaster Management – Preparedness, Response, Recovery – Arrangements to be made in the industries / factories and buildings – Mobilization of Emergency Services - Search and Rescue operations – First Aids – Transportation of affected people – Hospital facilities – Fire fighting arrangements – Communication systems – Restoration of Power supply – Getting assistance of neighbors / Other organizations in Recovery and Rebuilding works – Financial commitments – Compensations to be paid – Insurances – Rehabilitation.

LIST OF QUESTIONS

1. ENVIRONMENTRAL MANAGEMENT

1. What is the responsibility of an Engineer-in-charge of an Industry with respect to Public Health?
2. Define Environmental Ethic.
3. How Industries play their role in polluting the environment?

4. What is the necessity of pollution control? What are all the different organizations you know, which deal with pollution control?
5. List out the different types of pollutions caused by a Chemical / Textile / Leather / Automobile / Cement factory.
6. What is meant by Hazardous waste?
7. Define Industrial waste management.
8. Differentiate between garbage, rubbish, refuse and trash based on their composition and source.
9. Explain briefly how the quantity of solid waste generated in an industry could be reduced.
10. What are the objectives of treatments of solid wastes before disposal?
11. What are the different methods of disposal of solid wastes?
12. Explain how the principle of recycling could be applied in the process of waste minimization.
13. Define the term 'Environmental Waste Audit'.
14. List and discuss the factors pertinent to the selection of landfill site.
15. Explain the purpose of daily cover in a sanitary landfill and state the minimum desirable depth of daily cover.
16. Describe any two methods of converting waste into energy.
17. What actions, a local body such as a municipality could take when the agency appointed for collecting and disposing the solid wastes fails to do the work continuously for number of days?
18. Write a note on Characteristics of hazardous waste.
19. What is the difference between municipal and industrial effluent ?
20. List few of the undesirable parameters / pollutants anticipated in the effluents from oil refinery industry / thermal power plants / textile industries / woolen mills / dye industries / electroplating industries / cement plants / leather industries (any two may be asked)
21. Explain briefly the process of Equalization and Neutralization of waste water of varying characteristics discharged from an Industry.
22. Explain briefly the Physical treatments "Sedimentation" and "Floatation" processes in the waste water treatment.
23. Explain briefly when and how chemical / biological treatments are given to the waste water.
24. List the four common advanced waste water treatment processes and the pollutants they remove.
25. Describe refractory organics and the method used to remove them from the effluent.
26. Explain biological nitrification and de-nitrification.
27. Describe the basic approaches to land treatment of Industrial Effluent.

28. Describe the locations for the ultimate disposal of sludge and the treatment steps needed prior to ultimate disposal.
29. List any five Industries, which act as the major sources for Hazardous Air Pollutants.
30. List out the names of any three hazardous air pollutants and their effects on human health.
31. Explain the influence of moisture, temperature and sunlight on the severity of air pollution effects on materials.
32. Differentiate between acute and chronic health effects from Air pollution.
33. Define the term Acid rain and explain how it occurs.
34. Discuss briefly the causes for global warming and its consequences
35. Suggest suitable Air pollution control devices for a few pollutants and sources.
36. Explain how evaporative emissions and exhaust emissions are commonly controlled.
37. What are the harmful elements present in the automobile smokes? How their presence could be controlled?
38. What is the Advantage of Ozone layer in the atmosphere? State few reasons for its destruction.
39. Explain the mechanism by which hearing damage occurs.
40. List any five effects of noise other than hearing damage.
41. Explain why impulsive noise is more dangerous than steady state noise.
42. Explain briefly the Source – Path – Receiver concept of Noise control.
43. Where silencers or mufflers are used ? Explain how they reduce the noise.
44. Describe two techniques to protect the receiver from hearing loss when design / redress for noise control fail.
45. What are the problems faced by the people residing along the side of a railway track and near to an Airport? What provisions could be made in their houses to reduce the problem?

2. DISASTER MANAGEMENT

1. What is meant by Disaster Management? What are the different stages of Disaster management?
2. Differentiate Natural Disasters and Man made Disasters with examples.
3. Describe the necessity of Risk identification and Assessment Surveys while planning a project.
4. What is Disasters recovery and what does it mean to an Industry?
5. What are the factors to be considered while planning the rebuilding works after a major disaster due to flood / cyclone / earthquake? (Any one may be asked)
6. List out the public emergency services available in the state, which could be approached for help during a natural disaster.

7. Specify the role played by an Engineer in the process of Disaster management.
8. What is the cause for Earthquakes? How they are measured? Which parts of India are more vulnerable for frequent earthquakes?
9. What was the cause for the Tsunami 2004 which inflicted heavy loss to life and property along the coast of Tamilnadu ? Specify its epicenter and magnitude.
10. Specify the Earthquake Hazard Zones in which the following towns of Tamilnadu lie: (a) Chennai (b) Nagapattinam (c) Coimbatore (d) Madurai (e) Salem.
11. Which parts of India are experiencing frequent natural calamities such as (a) heavy rain fall (b) huge losses due to floods (c) severe cyclones
12. Define basic wind speed. What will be the peak wind speed in (a) Very high damage risk zone – A, (b) High damage risk zone, (c) Low damage risk zone.
13. Specify the minimum distance from the Sea shore and minimum height above the mean sea level, desirable for the location of buildings.
14. Explain how the topography of the site plays a role in the disasters caused by floods and cyclones.
15. Explain how the shape and orientation of buildings could reduce the damages due to cyclones.
16. What is a cyclone shelter ? When and where it is provided ? What are its requirements ?
17. What Precautionary measures have to be taken by the authorities before opening a dam for discharging the excess water into a canal/river ?
18. What are the causes for fire accidents ? Specify the remedial measures to be taken in buildings to avoid fire accidents.
19. What is a fire escape in multistoried buildings ? What are its requirements ?
20. How the imamates of a multistory building are to be evacuted in the event of a fire/Chemical spill/Toxic Air Situation/ Terrorist attack, (any one may be asked).
21. Describe different fire fighting arrangements to be provided in an Industry.
22. Explain the necessity of disaster warning systems in Industries.
23. Explain how rescue operations have to be carried out in the case of collapse of buildings due to earthquake / blast / Cyclone / flood.
24. What are the necessary steps to be taken to avoid dangerous epidemics after a flood disaster?
25. What relief works that have to be carried out to save the lives of workers when the factory area is suddenly affected by a dangerous gas leak / sudden flooding ?
26. What are the difficulties faced by an Industry when there is a sudden power failure? How such a situation could be managed?
27. What are the difficulties faced by the Management when there is a group clash between the workers? How such a situation could be managed?

28. What will be the problems faced by the management of an Industry when a worker dies because of the failure of a mechanical device due to poor maintenance? How to manage such a situation ?
29. What precautionary measures have to be taken to avoid accidents to labourers in the Industry in a workshop / during handling of dangerous Chemicals / during construction of buildings / during the building maintenance works.
30. Explain the necessity of medical care facilities in an Industry / Project site.
31. Explain the necessity of proper training to the employees of Industries dealing with hazardous products, to act during disasters.
32. What type of disaster is expected in coal mines, cotton mills, Oil refineries, ship yards and gas plants?
33. What is meant by Emergency Plan Rehearsal? What are the advantages of such Rehearsals?
34. What action you will take when your employees could not reach the factory site because of continuous strike by Public Transport workers?
35. What immediate actions you will initiate when the quarters of your factory workers are suddenly flooded due to the breach in a nearly lake / dam, during heavy rain?
36. What steps you will take to avoid a break down when the workers union of your Industry have given a strike notice?
37. List out few possible crisis in an organization caused by its workers? What could be the part of the middle level officials in managing such crisis?
38. What types of warning systems are available to alert the people in the case of predicted disasters, such as floods, cyclone etc.
39. Explain the necessity of Team work in the crisis management in an Industry / Local body.
40. What factors are to be considered while fixing compensation to the workers in the case of severe accidents causing disability / death to them?
41. Explain the legal / financial problems the management has to face if safely measures taken by them are found to be in adequate.
42. Describe the importance of insurance to men and machinery of an Industry dealing with dangerous jobs.
43. What precautions have to be taken while storing explosives in a match/ fire crackers factory?
44. What are the arrangements required for emergency rescue works in the case of Atomic Power Plants?
45. Why residential quarters are not constructed nearer to Atomic Power Plants?

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VII SEMESTER

DIPLOMA IN CERAMIC TECHNOLOGY
(SANDWICH)

M - SCHEME
2015 – 2016

INDUSTRIAL TRAINING AND REPORT AND VIVA VOCE

DIRECTORATE OF TECHNICAL EDUCATION
GOVERNMENT OF TAMILNADU

ANNEXURE
STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU
DIPLOMA IN CERAMIC TECHNOLOGY SYLLABUS

M – SCHEME
(Implemented from the academic year 2015-2016 onwards)

Course name	:	**Diploma in Ceramic Technology (Sandwich)**
Subject Code	:	38092
Semester	:	VII Semester
Subject Title	:	**INDUSTRIAL TRAINING AND REPORT AND VIVAVOCE**

SCHEME OF EXAMINATION:

SUBJECT CODE	SUBJECT	EXAMINATION ASSESSMENT MARKS		
		INTERNAL	BOARD EXAM	TOTAL
38092	INDUSTRIAL TRAINING REPORT AND VIVAVOCE	25	75	100

1. INTRODUCTION:

The main objective of the sandwich Diploma Course is to mould a well rounded technician acclimated with industrial environment while being a student in the institution.

The Sandwich Diploma Course study is pursued by students, in 7 semesters of 31/2 years duration, the subjects of 3 years- Full Time Diploma Course being regrouped for academic convenience.

The Apprenticeship (Amendment) Act 1973 is followed in regulating the Industrial training procedure for Sandwich Course.

- **Industrial training – VII Semester**
- **Duration: May to October**

2. ATTENDANCE CERTIFICATION:

Every month students have to get their attendance certified by industrial supervisor in the prescribed form supplied to them. Students have also to put their signature on the form and submit it to the institution supervisor.

Regularity in attendance and submission of report will be duly considered while awarding the sessional mark.

3. TRAINING REPORTS:

The students have to prepare two types of reports:

- ✓ Weekly report in the form of diary to be submitted to the concerned staff in charge of the institution. This will be reviewed while awarding sessional marks.
- ✓ Comprehensive report at the end of each spell which will be used for Board Examination.

3.1 INDUSTRIAL TRAINING DIARY:

Students are required to maintain the record of day – to- day work done. Such record is called Industrial training Diary. Students have to write this report regularly. All days for the week should be accounted for clearly giving attendance particulars (Presence, Absence, Leave, and Holidays etc.). The concern Industrial supervisor is to check periodically these progress reports.

3.2 COMPREHENSIVE TRAINING REPORT:

In additions to the diary, students are required to submit a comprehensive report on training with details of the organization where the training was undergone after attestation by the supervisors. The comprehensive report should be incorporating study of plant / product / process / construction along with intensive in-depth study on any one of the topics such as processes, methods, tolling, construction and equipment, highlighting aspects of quality, productivity and system. The comprehensive report should be completed in the last week of industrial training. Any data, drawings etc. should be incorporated with the consent of the Organization.

4. SCHEME OF EVALUATION

4.1 SESSIONAL MARKS:

First review (during 3rd month)	: 10marks
Second review (during 5th month)	: 10marks
Attendance (Awarded same as in Theory)	: 05 marks
Total	**: 25 marks**

4.2 BOARD EXAMINATION:

Presentation about Industrial Training	: 20marks
Comprehensive Training Report	: 30marks
Viva- voce	: 25marks
Total	**: 75 marks**

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DIPLOMA IN CERAMIC TECHNOLOGY (SANDWICH)
ALTERNATIVE SUBJECTS

Semester	Subject Code	L- SCHEME (Implementing from the academic year 2011-2012)	Subject Code	M-SCHEME (Implementing from the academic year 2015-2016)
III SEMESTER W.E.F. OCT '16				
III	28031	General Engineering	38031	General Engineering
III	28032	Geology	38032	Geology
III	28033	Ceramic Raw materials	38033	Ceramic Raw materials
III	28034	Geology laboratory	38034	Geology laboratory
III	28035	Ceramic raw materials analysis Laboratoty	38035	Ceramic raw materials analysis Laboratoty
III	28036	Ceramic Testing Laboratory - I	38036	Ceramic Testing Laboratory - I
III	20001	Computer Applications Practical#	30001	Computer Applications Practical#
IV SEMESTER W. E. F APR '17				
IV	28041	Unit operations	38041	Unit operations
IV	28042	Ceramic Fabrication process	38042	Ceramic Fabrication process
IV	28043	Whiteware and Heavy Clayware	38043	Whiteware and Heavy Clayware
IV	27044	Engineering Drawing*	37044	Engineering Drawing*
IV	28045	Ceramic Testing Laboratory - II	38045	Ceramic Testing Laboratory - II
IV	28046	Moulding Laboratory	38046	Moulding Laboratory
IV	28047	Ceramic Processing Laboratory	38047	Ceramic Processing Laboratory
V SEMESTER W.E.F. OCT '17				
V	28051	Glaze Technology	38051	Glaze Technology
V	28052	Properties of Ceramics	38052	Properties of Ceramics
V	28053	Refractories	38053	Refractories
V	28071	Glass and Cement Technology	38071	Glass Technology
V	28072	Cement Technology	38072	Cement Technology
V	28055	Slip Testing Laboratory	38055	Slip Testing Laboratory

V	28056	Refractories Laboratoty	38056	Refractories Laboratoty
V	20002	Communication and Life Skills Practical#	30002	Life and Employability Skill Practical#
VI SEMESTER W.E.F. APR '18				
VI	27561	Plant Engineering and Management	37561	Plant Engineering and Management
VI	28062	Furnace Technology	38062	Furnace Technology
VI	28081	Refractories Application	38081	Refractories Application
VI	28082	Special Ceramics	38082	Special Ceramics
VI	28064	Ceramic Body Preparation Laboratory	38064	Ceramic Body Preparation Laboratory
VI	28065	Glaze Laboratory	38065	Glaze Laboratory
VI	28066	Enamel Laboratory	38066	Enamel Laboratory
VI	28067	Project work	38067	Project work
VII SEMESTER W.E.F. OCT '18				
VII	28092	Industrial Training and Report and viva voce	38092	Industrial Training and Report and viva voce