CURRICULUM FOR THREE YEAR
(SIX SEMESTER)
DIPLOMA COURSE IN

GLASS AND CERAMIC ENGINEERING

Effective from Session

UNDER DEVELOPMENT

:Semester System :

Prepared By

Curriculum Development Cell

INSTITUTE OF RESEARCH DEVELOPMENT
& TRAINING, U.P., KANPUR

APPROVED BY

BOARD OF TECHNICAL EDUCATION
U.P. LUCKNOW,
CORRECTED AS SYLLABUS COMMITTEE OF:
B.T.E. MEETING HELD ON 27.05.2015:

Corrected and Approved by B.T.E. On Dated 27.05.2015

STUDY AND EVALUATION SCHEME FOR
THREE YEARS(SIX SEMESTER) DIPLOMA COURSE IN GLASS & CERAMIC ENGINEERING.
(Effective From Session)

I SEMESTER

Periods Per Week						S U B J E C T	Scheme of Examination								
							Theory			Practical			Grand Total		
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Marks	Sess. Marks	Total Marks	Examination Dur.	Marks	Sess. Marks	Total Marks	
5	-	-	3	-	8	1.1 Professional Communication	2.5	50	20	70	3	20	10	30	100
3	1	-	-	-	4	1.2 Applied Mathematics-I(A)	2.5	50	20	70	-	-	-	-	70
3	1	-	-	-	4	1.3 Applied Physics-I	2.5	50	20	70	-	--	--	--	70
6	-	-	4	-	10	1.4 Applied Chemistry	2.5	50	20	70	3	40	20	60	130
2	-		5		7	1.5 Introduction To Computer	---	--	--	--	3	60	30	90	90
-	-	14	-	-	14	1.6 Engineering Drawing	3.0	50	20	70	-	-	-	-	70
19	2	14	12	-	47	<---------TOTAL---------->	--	250	100	350	--	120	60	180	530
						Games/NCC/Social and Cultural Activity + Discipline (15 + 10)									25
						Aggregate									555

II SEMESTER

3	1	-	-	-	4	2.1 Applied Mathematics-I(B)	2.5	50	20	70	-	-	-	-	70
3	1	-	4	-	8	2.2 Applied Physics-II	2.5	50	20	70	3	40	20	60	130
5	1		2	-	8	2.3 Applied Mechanics	2.5	50	20	70	3	40	20	60	130
8	2		-	-	10	2.4 Introducation To Glass & Ceramic Engineering	2.5	50	20	70	-	-	-	-	70
-	-	-	-	14	14	2.5 Workshop Practice	--	--	--	--	4	60	30	90	90
-	-	-	-	-	-	2.6 Field Exposure-I(2 Weeks)	--	--	--	--	-	20	10	30	30
19	5	-	6	14	44	<---------TOTAL---------->	--	200	80	280	--	160	80	240	520
						Games/NCC/Social and Cultural Activity + Discipline (15 + 10)									25
						Aggregate									545

NOTE:-(1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be atleast 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) 2 Weeks structured & Supervised branch specific task oriented industrial/field exposure to be organised during Semester break. The students will submit a report. This will be evaluated at institution level for 30 marks - 20 for Viva and 10 for report presented. See Anexure - I & III.
(6) For Community Development work see Annexure - IV .

Corrected and Approved by B.T.E. On Dated 27.05.2015

STUDY AND EVALUATION SCHEME FOR
THREE YEARS(SIX SEMESTER) DIPLOMA COURSE IN GLASS & CERAMIC ENGINEERING.
(Effective From Session)

III SEMESTER

Curriculum						S U B J E C T	Scheme of Examination								
Periods Per Week							Theory			Practical			Grand Total
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Marks	Sess. Marks	Total Marks	Examination Dur.	Marks	Sess. Marks	Total Marks	
4	-	-	--	-	4	3.1 Applied Chemistry-II	2.5	50	20	70	--	--	--	--	70
4	-	-	4	-	8	3.2 Elementry Electrical, Mech. & Civil Engineering	2.5	50	20	70	3	40	20	60	130
4	-	-	-	-	4	3.3 Industrial Operations	2.5	50	20	70	-	-	-	-	70
6	-	-	16	-	19	3.4 Pottery & Refractory	2.5	50	20	70	6	60	30	90	160
-	-	-	10	-	10	3.5 Modelling & Mould Lab	-	-	-	-	3	40	20	60	60
18	-	-	30	-	48	<---------TOTAL---------->	--	200	80	280	--	140	70	210	490
						Games/NCC/Social and Cultural Activity + Discipline (15 + 10)									25
													Aggregate		515

IV SEMESTER

6	2	-	8	-	16	4.1 Glass & Enamel	2.5	50	20	70	6	60	30	90	160
-	-	14	-	-	14	4.2 Glass & Ceramic Engg.Draw-I	3.0	50	20	70	-	-	-	-	70
6	-	-	-	-	6	4.3 Industrial Calcualtion & Environmental Pollution	2.5	50	20	70	-	-	-	-	70
6	-	-	-	-	6	4.4 Fuels,Furnaces & Pyrometry	2.5	50	20	70	-	-	-	-	70
3	1	-	2	-	6	4.5 Element of Geology	2.5	50	20	70	3	40	20	60	130
-	-	-	-	-	-	4.6 Industrial Tour (2 Weeks)	--	--	--	--	-	40	20	60	60
21	3	14	10	--	48	<---------TOTAL---------->	--	250	100	350	--	140	70	210	560
						Games/NCC/Social and Culturl Activity + Discipline (15 + 10)									25
													Aggregate		585

NOTE:- (1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) Visit to ceramic industries and related mines and mineral deposits
(6) For Community Development work see Annexure - IV .
(7) 2 Weeks structured & Supervised branch specific task oriented industrial/field exposure to be organised during summer vacation. See Anexure - I & III.

Corrected and Approved by B.T.E. On Dated 27.05.2015

STUDY AND EVALUATION SCHEME FOR
THREE YEARS(SIX SEMESTER) DIPLOMA COURSE IN GLASS & CERAMIC ENGINEERING.
(Effective From Session)

V SEMESTER

Curriculum						S U B J E C T	Scheme of Examination								
Periods Per Week							Theory			Practical				Grand Total	
Lec.	Tutorial	Draw	Lab	Work Shop	Total		Examination Dur.	Examination Marks	Sess. Marks	Total Marks	Examination Dur.	Examination Marks	Sess. Marks	Total Marks	
6	2		--		8	5.1 Industrial Management and Enterprenurship Development	2.5	50	20	70	--	--	--	--	70
5	-	-	-	-	5	5.2 Pottery & Porcelain-I	2.5	50	20	70	-	-	-	-	70
5	-	-	-	-	5	5.3 Refractory Technology	2.5	50	20	70	-	-	-	-	70
5	-	-	-	-	5	5.4 Glass Technology-I	2.5	50	20	70	-	-	-	-	70
6	-	-	-	-	6	5.5 Modern Ceramics & Its Application	2.5	50	20	70	-	-	-	-	70
-	-	-	10	-	10	5.6 Pottery & Refractory Lab	-	-	-	-	6	60	30	90	90
-	-	-	9	-	9	5.7 Glass & Ceramic Workshop Practice(Glass,Enamel & Cement)	-	-	-	-	6	60	30	90	90
-	-	-	-	-	-	5.8 Industrial Training(4 Weeks	--	--	--	--	Viva	30	10	40	40
27	2	-	19	--	48	<---------TOTAL---------->	--	250	100	350	--	150	70	220	570
Games/NCC/Social and Culturl Activity + Discipline (15 + 10)															25
Aggregate															595

VI SEMESTER

4	-	-	-	-	4	6.1 Environmental Education * & Disaster management	2.5	50	--	--	-	--	--	--	--
6	-	-	-	-	6	6.2 Cement And Lime	2.5	50	20	70	-	-	-	-	70
6	-	-	-	-	6	6.3 Ceramic Machinery & furnace Design	2.5	50	20	70	-	-	-	-	70
-	-	8	-	-	8	6.4 Glass & Ceramic Engineering Drawing-II	2.5	50	20	70	-	-	-	-	70
6	-	-	-	-	6	6.5 Elective (Any One)	2.5	50	20	70	-	-	-	-	70
-	-	-	-	-	-	I. Glass Technology-II	-	-	-	-	-	-	-	-	--
-	-	-	-	-	-	II. Pottery & Porcelain-II	-	-	-	-	-	-	-	-	--
-	-	-	8	-	8	6.6 Silicate Analysis Lab	-	-	-	-	3	40	20	60	60
-	-	-	8	-	8	6.7 Physical Testing Lab	-	-	-	-	3	60	30	90	90
-	-	-	2	-	2	6.8 Project	-	-	-	-	Viva	80	40	120	120
-	-	-	-	-	-	6.9 Industrial Tour	--	--	--	--	-	-	30	30	30
22	-	8	18	-	48	<---------TOTAL---------->	--	200	80	280	--	180	120	300	580
Games/NCC/Social and Cultural Activity + Discipline (15 + 10)															25
Aggregate															605

30% of I & II Semester	330
70% of III & IV Semester	770
100% of V & VI Semester	1200
Grand Total	2300

NOTE:- (1) Each period will be 50 minutes duration.
(2) Each session will be of 16 weeks.
(3) Effective teaching will be at least 14 weeks.
(4) Remaining periods will be utilised for revision etc.
(5) 4 weeks structured & supervised branch specific task oriented industrial training to be organised during after exam of IV semester Students will submit a report. This will be evaluated for 30 marks by external examiner and 10 marks at institute level. (See Annexure II & III)
(6))For Community Development work see Annexure - IV .
(7) Industrial Tour : Students will go on industial tour (various industries related to ceramics). Student will submit a report this will be evaluated at institute level for 30 marks.
(8) (*) It is compulsory to appear & to pass in examination, But marks will not be included for division and percentage of obtained marks.

Corrected and Approved by B.T.E. On Dated 27.05.2015

CONTENTS

Corrected and Approved by B.T.E. On Dated 27.05.2015

Corrected and Approved by B.T.E. On Dated 27.05.2015

MAIN FEATURES OF THE CURRICULUM

Title of the course	:	Diploma in Glass & Ceramic Engineering
Duration of the course	:	Three Years (Six Semester)
Pattern of the course	:	Semester System
Intake of the course	:	60
Type of the course	:	Full time Institutional
Entry qualification	:	Passed High School With 35% Marks
Mode of admission	:	Through Joint Entrance Examination

Corrected and Approved by B.T.E. On Dated 27.05.2015

PROLOGUE TO REVISION

In the ever expanding universe of knowledge,the need for revision of a curriculum in any system of education, always exists. A revision is vital to accomodate new ideas, to systematise them and to make them suitable to need of the time. Material is the sole basis of present day science and technology, and its consumption is spiralling to the extent that there is a crises for many materials in the present age.Besides this, with the advance of science and technology, new uses of the materials are also identified every day. For example ceramic materials about 30 years before,there have been a very limited use but now it is vast field where they find their new uses and ceramic itself is now a separate discipline of knowledge for scholors to study and research. Science and technology has gone to the extent where it is possible to develop the materials of our choice for intended use and this have happened in the field of ceramics too. A new group of materials known as composite material has come up.Ceramics has contributed too much to it and to its uses in the field of advance technological designs of three year diploma curriculum in ceramic Engg. has been felt imparative .

The aims and objects of the curriculum keeping the same as before, the changes required in the present curriculum,to make it suitable to present needs, has been carefully made. Care has been taken in choosing the topics for development of knowledge and skill wanted for jobs available to diploma holders. The continuity and consistency in the development of subject matter spreading over the period of three year span has been carefully assured.

Besides this, issues of present day obsessions of the society such as environment pollution,ecological imblance and need of development of enterprenurship in the youth due to growing unemployment too has been duly introduced for the awareness of the students.

The present curriculum is the out come of up-shorts of the experts in the work shop organised for the purpose and thoughts obtained by personal contacts. A list of their names appears on the following page sufficient provision for practical experience has been made in the curriculum by providing a good number of labs/shops exposure to industry twice during the period of the course, first after first year exam for 2 weeks and second after second year exam for 4 weeks, will certainly give a extra imptus to sharpening of the students talent.

In addition to this all , the following changes can not remain concealed to any reviewer of the text.They are as envisaged below.

1. For the first time a provision for project work has been made in the final year of the course. It is just to give the students an opportunity to deal a practical problem in the light of the knowledge and skill they attained during the course of their studies. This will also help developing an enterprenurship attitude in them.

2. There is prolific growth of machanisation in every field of work from large industrial to cottage industry. With this

Corrected and Approved by B.T.E. On Dated 27.05.2015

view in mind, a concept of machanisation has been introduced for small unit works.

3. A product should have an aesthetic appeal in addition to its functional utility, with this view some concepts regarding aesthetic sense too has been given a due space. A new class of materials called ceramic composites has been given a due place and weightage in the course.

4. In Glass Technology-II paper ornamental glass introduced in place of Sealent Glass.

5. Preperation of Jigger & Profile has been deleted in the Final year.

During revision the subject matter has been carefully arranged according to developmental continuity to help teaching and comrehensiveness. The new ideas where-ever felt necessary have been added to enrich the course study.It is hoped now that the new form of the curriculum will certainly proove conducive to students employment in present enviorance of the industry.

Corrected and Approved by B.T.E. On Dated 27.05.2015

LIST OF EXPERTS

List of experts whose deliberation helped the development of curriculum in Semester System for three year(Six Semester) diploma course in Glass & Ceramic Engineering at I.R.D.T. U.P., Kanpur on 31.03.15 are honourably named below -

1.	Shri K. C. Sharma H.O.D., Glass & Ceramic	G. P., Firozabad	
2.	Shri Mool Chandra Lecturer, Glass & Cermaic	S. G. S.J. P., Khurja	
7.	Shri Lal Ji Patel	T.B.O.	I. R. D. T.,U. P., Kanpur

Corrected and Approved by B.T.E. On Dated 27.05.2015

NEED ANALYSIS

The utility of glass and ceramics is welknown in the present civilisation. It has vide application in domestic, industrial and decorative utility articles. By now the personnel envolved in these industries were using conventional methods for manufacture of glass and ceramics. Due to technological upgradation, new machines have been introduced in these industries. The operation and maintenance of these machines requires trained personnel in the respective fields. A diploma holder in ceramic and galss engineering is supposed to possess the adequate knowledge of raw material, manufacturing process, use of decorative designs and colour along with operation and maintenance of machines and tools used in these industries.

There is present and projected job potential in the field of glass and ceramics. The industry can no doubt flourish if diploma holders in glass and ceramic engineeing are put to jobs in place of conventional untrained personnel engaged in the industries of this field.

Corrected and Approved by B.T.E. On Dated 27.05.2015

PROFILE DEVELOPMENT

The following procedure has been adopted in the revision of curriculum for diploma course in ceramic and glass engineering.

1. Personal contacts have been made with the industry people to assess job potential job activities and man power required in these industires.
2. Activities have been analysed in the workshop by mutual interaction between experts from higher institutions, industry people and teachers of the polytechnic.
3. Course objectives have been decided by activity analysis.
4. Subjects of study and skill to be developed has been derived from course objectives.
5. Horizontal and vertical organisation of subjects was carried out.
6. Study and evaluation scheme was prepared.
7. Detailed course contents were finalised in a workshop by mutual interaction among experts of the related field.
8. List of equipments, space and staff required for implementing the curriculum was finalised by experts.

It is hoped that this curriculum will be implemented in the right spirit for training competent diploma holders in ceramic and glass engineering.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1. JOB OPPORTUNITIES

1.1 Production Supervisor/Foreman in Glass and Ceramic Industry.

1.2 Ceramic Engineer/Ceramic/Glass Technologist in small and medium industries.

1.3 Quality Control and Inspection Supervisors.

1.4 Inplant Laboratory Supervisor/R & D Supervisor.

1.5 Stores Officer.

1.6 Purchase Officer.

1.7 Sales or Marketing Officer.

1.8 Self employement.

Corrected and Approved by B.T.E. On Dated 27.05.2015

2. JOB ACTIVITIES

2.A Production and Related Activities.

2.1 Conducts tests on raw materials and ascertain their suitability.

2.2 Supervises processing of raw materials.

2.3 Supervises milling operations, glaze preparation, body preparation, shaping, drying and firing of ceramic goods.

2.4 Selects appropriate processes and machines for manufacture of ceramic goods and glassware.

2.5 Makes batch calculations.

2.6 Plans men, materials and machines for achieving target production.

2.7 Conducts quality control tests from raw materials and finished products.

2.8 Detects common faults in processes, equipment and furnaces and suggests remedial measures.

2.9 Organises labour, handles grievances and ensures safety.

2.10 Make cost calculations of ceramic goods.

2.11 Keep record of production.

2.12 Manages stores.

2.13 Conducts market survey and promotes sales.

2.B Developmental Activities.

2.14 Assist in testing laboratories.

2.15 Assist in R & D laboratories.

Corrected and Approved by B.T.E. On Dated 27.05.2015

3. ACTIVITY ANALYSIS

Sl.No.	Activity	Knowledge	Skill
1	2	3	4
3.1	Conduct tests on raw materials and ascertain their suitability.	Raw materials, their properties, uses, testing and evaluation.	Laboratory and inplant training.
3.2	Makes batch calculations	Raw materials, their properties, uses, testing. chemical calculations.	
3.3	Supervises processing of raw materials	Raw materials, their properties and uses, testing and methods of processing.	Inplant training and practical lab. training in various unit operations.
3.4	Supervises milling operations, glaze preparation, body preparation, shaping, drying and firing of ceramic goods and malting of glass.	Raw materials, machine for crushing grinding/ milling; Machines for body preparation and shaping; Theory and Practice of Drying and Dryers; Theory and Practice of fuel combustion, Burners control & Kilns/ furnaces.	Operational experience of milling machine body preparation and shaping machine Dies. Burning of fuels and kiln/furnace operation.
3.5	Selects appropriate machines and process for manufacturing of ceramic goods and glassware.	Same as in 3.1 to 3.4 Plant Layout, different ceramic processes, properties and value of the finished product.	Same as above from 3.1 to 3.4 operational experience in different ceramic/glass making processes.
3.6	Plans men, materials and machines for achieving target production.	Same as in 3.1 to 3.5 AND Time work study, production, planning & control, Productivity of men, machine. industrial relations, human relations & principles of management.	Same as in 3.1 to 3.5

Corrected and Approved by B.T.E. On Dated 27.05.2015

1	2	3	4
3.7	Conducts quality control tests on raw materials and finished goods.	3.1 and methods testing of raw materials and finished goods, ISI & other International Specifications, Elementary statistics and quality control charts. common faults in finished goods, reasons and remedies.	Operational experience in testing and quality control of raw material and finished goods.
3.8	Detects common faults in processes, equipment and furnaces and suggests remedial measures.	Sames as in 3.1 to 3.5	Same as in 3.1 to 3.5.
3.9	Makes cost calculations of ceramic and glass products.	Costing of various inputs, methods of costing and cost reduction.	--
3.10	Organises labour, handles grievances and ensures safety of men and machines.	Elementary idea of labour laws, communication, Human relations, Factory safety rules, First Aid Fire-fighting.	First Aid, Fire-fighting.
3.11	Keeps record of production	Bar charts histogram etc. Book-keeping.	--
3.12	Conduct market survey and promotes sales	Sales promotion and marketing management.	--
3.13	Manages Stores	Same as in 3.1 to 3.11 and Inventory control methods.	--
3.14	Assists in developmental activities.	Same as in 3.1 to 3.5.	Same as in 3.1 to 3.5.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4. COURSE OBJECTIVES

1. Read and interpret mechanical engineering drawing.

2. Plan, schedule, orgainse direct, control and coordinate men, materials and machines for the production of ceramic/glass products.

3. Knowledge of physical, chemical and thermal properties of raw materials, additives and finished product.

4. Select appropriate raw materials, processes, machines and make cost calculations for production of ceramic/glass products.

5. Knowledge of work measurement and materials handling techniques.

6. Detect faults in equipments/processes/product and suggest remedial measures.

7. Undertake quality control tests on raw materials, materials in the process and finished products.

8. Assist in developmental activities.

9. Knowledge of marketing and sales promotion of ceramic/glass products.

10. Ability to manage stores.

11. Knowledge of labour laws, factory safety rules, and handling of labour problems.

12. Establish and run a small enterprise.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5. DERIVING CURRICULUM AREAS FROM COURSE OBJECTIVES

	Course Objectives	Curriculum Areas			
		Engg. Specialities	Engg. Sciences	Basic Skills	Humanities & basic sciences
1.	Read & Interpret mechanical Engg. Drawing.			Engg. Drawing	
2.	Plan, schedule, organise, direct, control and coordinate men, material and machine for production of ceramic/glass products.	Production technology for Pottery, Refractories glass, enamels.	Production/Industrial management.		App. Physics App. Chemistry App. Maths
3.	Knowledge of physical, chemical and thermal properties of raw materials, additives and finished products.	Raw materials for glass, ceramics/refractory	Chemistry of materials Elements of Geology Applied Mechanics & Strength of materials.		Physics Chemistry
4.	Select appropriate raw materials, processes machines and make cost calculations for production of Ceramic/glass products	Production Technology, Machines and furnaces	Elements of Civil, Elect., & Mech. Engg. Pyrometry, Fuel, furnace, Busness & control.		-do-
5.	Know work measurement & material handling techniques.	Material handling equipment		Basic work-shop Practice Engg. Maths	-do-
6.	Detect fault in equipment, processes, product and suggest remedial measures.	-do-	-do-	--	-do-
7.	Undertake quality control test on raw materials, materials in process and finished goods.	Quality control specially for testing and inspection & assessment. Analytical testing techniques.	Instrumental analysis		Mathematics (S.Q.C.) Physics Chemistry
8.	Assists in developmental activities.	All the above areas S.No. 1 to 5			
9.	Knowledge of marketing & sales promotion of ceramic/glass products.	Marketing & Sales management.	--	--	--
10.	Knowledge of labour laws, factory safety rules & handling of labour problems.	Production management	Labour laws	--	Human Psycho-logy Communication Technique
11.	Ability to manage stores.	Stores management			
12.	Establish and run a small eterprese	Entrprenuership Project work			

Corrected and Approved by B.T.E. On Dated 27.05.2015

I Semester

1.1 PROFESSIONAL COMMUNICATION

[Common to All Engineering/Non Engineering Courses]

L	T	P
5	-	3

Rationale:

Communication forms an important activity of diploma holder. It is essential that he/she should be in a position to communicate in writing and orally with superiors,equals and subordinates. This subject aims at providing working knowledge of languages like Hindi and English so as to train the students in the art of communication. It is suggested that maximum attention should be given in developing Communication abilities in the students while imparting instructions by giving maximum emphasis on practice.

Sr.No.	Units	Coverage time L	T	P
1.	Introduction to communication methods meaning,channels & media written and verbal.	5	-	-
2.	Development of comprehension of English & Hindi through study of text material& language exercises.	10	-	-
3.	Development of expression through			
	A. Letters(English & Hindi)	10	-	-
	B. Report writing (English) Note making and minutes writing	10	-	-
4.	Paragraph writing, Essey writing, Proposal writing	10	-	-
5.	Composition	10	-	-
6.	Remecial Grammer & Vocabulary Building	15	-	-
		70	-	42

1. PART I : COMMUNICATION IN ENGLISH (40 Marks)

1.1 Concept of communication, importance of effective communication, types of communucation, formal, informal, verbal and nonverbal, spoken and written. Techniques of communication, Listening, reading, writting and speaking, Barriers in communication, Modern tools of communication- Fax, e-mail, Telephone, telegram, etc.

1.2 Technical communication Vs. General Communication : Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

1.3 Development of expression through:

1.3.1 Paragraph writing, Essay writing, Proposal writing.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.3.2 Business and personal correspondence (Letters) :
Kinds of letters:-
Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters. Application for a job, Resume.

1.3.3 Report writing and Note making and minutes writing.

1.4 Functional Grammer : Study of sentences and parts of speech (word class), Preposition, Verb, Articles, Abbreviations.

1.5 Vocabulary Building : Homophones, One word substitution, Idioms and Phrases.

1.6 Composition on narrative, descriptive, imaginative, argumentative, discussion and factual topics.

2. PART II : COMMUNICATION IN HINDI (10 Marks)

2.1 Development of comprehension and knowledge of Hindi usage through rapid reading and language exercises based on prescribed text material developed by IRDT.

2.2 Development of expression through ;

Letter writing in Hindi:
Kinds of letters:-
Official, demi-offical, unofficial , for reply or in reply, quotation, tender and order giving letters, Application for a job, Press release in Hindi, Report writing.

Note: Paper should be in two parts, part I - English and part II Hindi.

REFERENCE BOOKS

1. Bookshelf worksheet of Professional Communication, New Delhi : Bookshelf 2008

2. Functional Skills in language and literature by R. P. Singh, New Delhi : Oxford University Press.

3. Oxford Engilsh Hindi English Dictionary, New Delhi : Oxford 2008

LANGUAGE LAB PRACTICE

For the practice/exercise the following is suggested :-

1.A. Phonetic transcription
B. Stress and intonation :
(At least 10 word for writting and 10 word for pronunciation)

2. ASSIGNMENT : (Written Communication)

Two assignment of approximately 400 word each decided by the teacher concerned.

THE FOLLOWING MODEL IS PROPOSED :

1. a picture/photograph
2. an opening sentence or phrase

Corrected and Approved by B.T.E. On Dated 27.05.2015

3. a newspaper/magzine clipping or report
4. factual writting which should be informative or argumentative.

(The students may refer to "Bookshelf worksheet" for technical communication)

3. Oral Conversation:

1. Short speeches/declamation : Bid farewell, Felicitate somebody, Celebrate a public event, Offer condolences
2. Debate on current problems/topics
3. MockInterview : Preparation, Unfolding of personality and Expressing ideas effectively
4. Group discussion on current topics/problems
5. Role Play/ general conversation : Making polite enquiries at Railway Station, Post Office, Banks and other Public places, Replying to such enquiries, enquiring about various goods sold in the market and discussing their prices. Complaining about service at Hotel, restaurant, Offering apologies in reply to such complaints, complain to a company about a defective product you have brought, reply to such complaints.
6. Presentation skill, Use of OHP and LCD.
7. Through drilling of model words involving different phonetic symbols (Vowels, Consonants, Difthongs).

4. Aural :

Listening to conversation/talk/reading of short passage and then writting down the relevant or main points in the specified number of words and answering the given questions

The assignments/project work are to be evaluated by the internal/ external examiner. The distribution of 30 marks e.g.

10 marks for assignment (Given by subject teacher as sessional marks)
10 marks for conversation and viva-voce
10 marks for phonetic transcription

STRUCTURE OF THE PAPER OF PROFESSIONAL COMMUNICATION

Distribution of Marks

Theory Paper : 50 Marks
Sessional : 20 Marks
Pratices : 30 Marks

Q1. Question based on the topics of the prescribed syllabus will be set for testing candidates ability to understand the content, explain words and phrases, making sentence of given words and ability to summarise will be included. All questions will have to be answered.

A.	from English Text Book	10 Marks
B.	from Hindi Text Book	5 Marks

Q2. Candidates will be required to write one letter (English) and one letter in (Hindi) from a choice of two -

A.	English Letters	5 Marks
B.	Hindi Letters	5 Marks

Corrected and Approved by B.T.E. On Dated 27.05.2015

Q3. Report Writting on given outlines 5 Marks

Q4. There will be a number of short answer questions to test the candidates knowledge of functional grammer, structure and usage of the language. All the items in this question will be compulsory. The grammar questions has four parts -

(Total Part: A For 5 Marks, B For 3 Marks, C For 3 Marks and D For 4 Marks)

A. This part of the question has to do with the transformation of sentences. English uses several patterns of sentence formation and the same meaning can be expresed by several patterns e.g. Active to Passive voice and vice versa, Direct to Indirect and vice versa, Reframing sentences by changing part of speech e.g Noune to Adjective, Interchanging degree of comparison.

Interchanging Moods - Affirmative to Negative, Assertive to Interrogative or to exclamatory

B. The second part usually requires blanks in a sentence to be filled in with a suitable preposition and articles.

C. The third part is usually an exercise on tenses.

D. The fourth part concerns with one word substitution and abbrevation, uses of idioms and Phrases, Homophones.

Q5. COMPOSITION : (About 300 Words) (5 marks)

Candidates will be required to select one composition topic from a choice of five. The choice will normally include narrative descriptive, argumentative, discussion and factual topics. The main ceteria by which the composition will be marked are as follows

A. the quality of the language employed, the range and appropriateness of vocabulary and sentence structure the correctness of grammatical construction, punctuation and spelling.

B. The degrees to which candidate have been successfully in organising both the composition as a whole and the individual paragraphs.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.2 APPLIED MATHEMATICS I(A)
[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Coverage Time L	T	P
1.	Algebra- I	8	3	-
2.	Algebra- II	8	3	-
3.	Trignometry	6	2	-
4.	Differential Calculus-I	10	3	-
5.	Differential Calculus-II	10	3	-
		42	14	-

DETAILED CONTENTS:

1. ALGEBRA-I : (10 Marks)

1.1 Series : AP and GP; Sum, nth term, Mean

1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

2. ALGEBRA-II:(10 Marks)

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number.

Complex numbers, Representation, Modulus and amplitud Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties..

3. TRIGONOMETRY :(8 Marks)

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relation ship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I : (12 Marks)

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and

differentiability.

4.2 Methods of finding derivative, - Function of a function, Logaritimic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :(10 Marks)

5.1 Higher order derivatives, Leibnitz theorem.

5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.

5.3 Application - Finding Tangants, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.3 APPLIED PHYSICS-I

[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Units & Dimensions	3	1	-
2.	Errors in Measurement	3	1	-
3.	Circular Motion	4	1	-
4.	Motion of Planets	4	1	-
5.	Dynamics of rigid body (Rotational Motion)	5	1	-
6.	Fluid Mechanics and Friction	4	1	-
7.	Friction	4	1	-
8.	Harmonic Motion	5	2	-
9.	Heat & Thermodynamics	6	4	-
10.	Acoustics	4	1	-
		42	14	-

DETAILED CONTENTS:

1. Units and Dimensions (4 Marks)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogenity of dimensions and applications of homogenity principle to:

i) Checking the correctness of physical equations,

ii) Deriving relations among various physical quantities,

iii) Conversion of numerical values of physical quantities from one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measuremnts, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement(Combination of erros in addition, substraction, multipication and powers). Significant figures, and order of accuracy in respect to instruments,

3. Circular Motion (5 Marks)

Central forces. Uniform Circular motion (Horizental and Vertical cases),angular velocity,angular acceleration and centripetal acceleration.Relationship between linear and angular velocity and acceleration. Centripetal and

Corrected and Approved by B.T.E. On Dated 27.05.2015

centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES :(5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kapler's Law, Escope and orbital velocity, Time period of satellite, Geo-stationary, Polar satellites (Concept Only)

5. Dynamics of Rigid Body (Rotational Motion) (6 Marks)

Rigid body,Rotational motion, Moment of inertia,Theorems(Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindercal),Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane . Concept of Fly wheel.

6. Fluid Mechanics :(5 Marks)

Surface tension, Capillary action and determination of surface tension from capilary rise method, Equation of continuity (A1V1=A2V2), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. Friction :(4 Marks)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by stoke's method.

8. Harmonic Motion (6 Marks)

Periodic Motion , characterstics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. Heat & Thermodynamics: (6 Marks)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. Acoustics (5 Marks)
Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Accoustics of building defects and remedy.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.4 APPLIED CHEMISTRY

[Common to All Engineering Courses]

L	T	P
6	-	4

Rationale:

Engineering Chemistry has profound and deep relationship with the industrial and environmental technology. This curriculum intends to impart technical knowledge alongwith productive practice to the students of the diploma engineering. The teachers are expected to guide the students in the classroom and the laboratories according to the curriculum by demonstrations and by showing relevant materials and equipments to inculcate interests in learning among students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Atomic Structure	4	-	-
2	Chemical Bonding	6	-	-
3.	Classification of Elements	4	-	-
4.	Electro Chemistry-I	7	-	-
5.	Electro Chemistry-II	8	-	-
6.	Chemical Kinetics	4	-	-
7.	Catalysis	4	-	-
8.	Solid State	4	-	-
9.	Fuels	4	-	-
10.	Water Treatment	6	-	-
11.	Colloidal State	4	-	-
12.	Lubricants	4	-	-
13.	Hydrocarbons	7	-	-
14.	Organic Reactions & Mechanism	8	-	-
15	Polymers	4	-	-
16	Synethetic Materials	6	-	-
		84	-	56

DETAILED CONTENTS:

1. ATOMIC STRUCTURE :(3 MARKS)

Basic concept of atomic structure, Matter wave concept, Quantum number, Haisenberg's Uncertainty Principle, Shaples of orbitals.

2. CHEMICAL BONDING :(4 MARKS)

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory.

3. CLASSIFICATION OF ELEMENTS :(3 MARKS)

Modern classification of elements (s,p,d and f blcok elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4. ELECTRO CHEMISTRY-I:(3 MARKS)

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II:(3 MARKS)

Redox reactions, Electrode potential(Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various method.

6. CHEMICAL KINETICS :(3 MARKS)

Law of mass action, order and molecularity of rection. Activation energy, rate constants, Ist order reactions and 2nd order reactions.

7. CATALYSIS :(2 MARKS)

Definition Characteristics of catalytic reactions, Catalytic promotors and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE :(2 MARKS)

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS :(3 MARKS)

Definition, its classification, high & low Calorific value.Determination of calorific value of solid and liquid fuels by Bomb calorimeter.

Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Disel and Petrol), Benzol and Power alchol. Knocking, Anti-knocking agents, Octane number and Cetane number.

Cracking and its type, Gasoling from hydrogenation of coal (Bergius process and Fischer tropsch's process)

Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG.

Numerical Problems based on topics

10. WATER TREATMENT :(3 MARKS)

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embritlement, primming and

Corrected and Approved by B.T.E. On Dated 27.05.2015

foarming in biolers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER :(3 MARKS)

Concept of collidal and its types, Different system of colloids, Dispersed phase and dispersion medium.
Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian Movement, tyndal effect, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation,properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS :(3 MARKS)

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:(4 MARKS)

A. Classification and IUPAC nomeuclature of organic compounds hamologous series (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:(4 MARKS)

1. Fundamental auspects -

   A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
   B. Inductive effect, Mesomeric effect, Electromeric effect.

2.A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect),

B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehyrohalogenation of primary alkyl halide.

15. POLYMERS :(3 MARKS)

1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)

Corrected and Approved by B.T.E. On Dated 27.05.2015

2. Thermosetting and Thermoplastic resen -

A. Addition polymers and their industrial application- Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.

B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Decron, Polyurethanes.

3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers(Silicon)

16. SYNETHETIC MATERIALS :(4 MARKS)

A. Introduction - Fats and Oils
B. Saponification of fats and oils , Manufacturing of soap.
C. Synthetic detergents, types of detergents and its manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals :

NH4+, Pb++, Cu++, Bi+++, Cd++, As+++, Sb+++,

Sn++, Al+++, Fe+++, Cr+++, Mn++, Zn++, Co++

Ni++, Ba++, Sr++, Ca++, Mg++

B. Acid Radicals :

CO3--, S--, SO3--, CH3COO-, NO2-,

No3- , Cl-, Br_ , I- , So4--

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCo3 by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hard ness of water sample by O-Hener's method.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.5 INTRODUCTION TO COMPUTER

[Common with Civil Engg., Civil (Spl. With Rural), Mechanical Engg.,(Specialisation in Production, Automobile, Refrigeration and Air conditioning), Electronics Engg.,Instumentation and Control Engg., Dairy Engg., Leather Technology, Footwear and Leather Goods Tech., Cermics, Chemical Engg.(Four year Sandwitch), Chemical Tech. (Rubber & Plastic), Chemical Tech. (Fertilizer)]

L	T	P
2	-	5

Rationale:

Computers are being used for design and information processing in all branches of engineering. An exposure to fundamentals of computer programming is very essential for all diploma holders. this subject has been included to introduce students in the use and application of computers in engineering.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage L	T	Time P
1.	Introduction to Computer	4	-	-
2.	Introduction To Operating System (MS DOS/Windows)	3	-	-
3.	Word Processing	4	-	-
4.	Worksheet	4	-	-
5.	Presentation	4	-	-
6.	Data Base Operation	3	-	-
7.	Introduction to Internet	2	-	-
8.	Introduction to advance tools	4	-	-
		28	-	70

DETAILED CONTENTS

1. Introduction to Computer:

   A. Block Diagram of Computer.
   B. Types Of Computer
   C. Types of Input and Output devices
   D. Memories Devices (Its Types and Basic).

2. INTRODUCTION TO OPERATING SYSTEMS (MS-DOS/MS-WINDOWS:)

   What is operating system, its significance, Commands of DOS, Features/Application of window.

3. WORD PROCESSING:

   File : Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page Setup
   Edit : Cut, Copy,Paste, Office Clipboard, Select All, Find, replace, Goto, etc.
   View : Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.
   Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.

Corrected and Approved by B.T.E. On Dated 27.05.2015

Format: Font, Paragraph, Bullets & Numbering, Borders & Shading, Column, Change case, Back ground, etc.
Tools : Spelling & Grammer, Language, Word Count, Letters & Mailing, Options, Customize, etc.
Table : Draw, Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.
Mail Merge

4. WORKSHEET:

Introduction, Use of Tools/Icons for preparing simple Mini Project.

5. PRESENTATION :

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

6. DATABASE OPERATION :

Create database using MS Access, Create Table and Creating Reports.

7. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending./replying emails.

8. INTRODUCTION TO ADVANCE TOOLS :

I. Steps requires to solving problems.
A. Flow Chart
B. Algroithm
C. Programming

II. Use of advance Tools such as Skype, Teamviewer, Installation of Modem, use of WiFi, Etc.

Corrected and Approved by B.T.E. On Dated 27.05.2015

INTRODUCTION TO COMPUTER LAB

List Of Practicals

1. Practice on utility commands in DOS.

2. Composing, Correcting, Formatting and Article (Letter/Essay/ Report) on Word Processing tool Word and taking its print out.

3. Creating, editing, modifying tables in Database tool.

4. Creating labels, report, generation of simple forms in Database tool.

5. Creating simple spread sheet, using in built functions in Worksheet tool..

6. Creating simple presentation.

7. Creating mail ID, Checking mail box, sending/replying e-mails.

8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/ MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

Corrected and Approved by B.T.E. On Dated 27.05.2015

1.6 ENGINEERING DRAWING

[Common to Three years Diploma Course in Civil Engg., Electrical Engg., Chemical Engg., Dairy, Ceramic, Textile Technology, Textile Chemistry]

[Also Common to Four year Part-time Diploma Course in Electrical Engineering, Mechanical Engineering (Specilization in Production Engineering)]

[Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology]

L	T	P
4	-	10

Rationale

Drawing, which is known as the language of engineers, is a widely used means of communication among the designers, engineers, technicians, draftmen and craftmen in the industry. The translation of ideas into practice without the use of this graphic language is really beyond imagination. Thus, for the effective and efficient communication among all those involved in an industrial system, it becomes necessary that the perosonnel working in different capacities acquire appropriate skills in the use of this graphic language in varying degrees of proficiency in accordance with their job requirements.

Generally speaking, an engineering technician working at the middle level of the threetier technical manpower spectrum, is required to read and interpret the designs and drawings, providedto him by technologists and subsequently to translate them to the craftsmen for actual execution of the job.

This course in Engineering Drawing has been designed, keeping in view, the above refered job functions of a technician in the industry. This preliminary course aims at building a foundation for the further courses in drawing and other allied subjects. The contents of the course have been selected as to form a core for the various deversified fields of engineering. It is expected that at the end of this session, the students acqures sufficient skill drafting and some ability in spetial visualization of simple objects.

Sl.N.		Units	Coverage Time L	T	P
1.		Drawing Instruents and their use	5	-	4
2.	A.	Lettering techniques	3	-	16
	B.	Introduction to scales	2	-	8
3.		Conventional Presentation	5	-	8
4.	A.	Principles of projections	3	-	12
	B.	Point Line, Plane	2	-	28
5.		Orthographic projection of simple geometrical solids	5	-	12
6.		Section of Solids	5	-	20
7.		Isometric Projection	5	-	20
8.		Free Hand Sketching	5	-	8
9.		Development of surfaces	5	-	24
10.		Orthographics Projection of Machine Parts	5	-	12
11.		Practice on Auto Cad	6	-	24
			56	-	140

Corrected and Approved by B.T.E. On Dated 27.05.2015

C O N T E N T S

Corrected and Approved by B.T.E. On Dated 27.05.2015

(c) Exercises on missing surfaces and views

6. Section of Solids 2 Sheet

Concept of sectioning

Cases involving cutting plane parallel to one of the reference planes and prependicular to the others.

Cases involving cutting plane perpendicular to one of the reference planes and inclind to the others plane, true shape of the section

7. Isometric Projection. 2 Sheet

Isometric scale

Isometric projection of solids.

8. Free hand sketching 1 Sheet

Use of squared paper

Orthographic views of simple solids

Isometric views of simple job like

carpentary joints

9. Development of Surfaces 2 Sheet

Parallel line and radial line methods of developments.

Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 2 Sheet

Nut and Bolt, Locking device, Wall bracket

11. PRACTICE ON AUTO CAD : 2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode.Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. The drawiang should include dimension with tolerence whereever necessary, material list according to I.S. code. 25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.

Corrected and Approved by B.T.E. On Dated 27.05.2015

II Semester

2.1 APPLIED MATHEMATICS I (B)

[Common to All Engineering Courses]

L	T	P
3	2/2	-

Rationale:

The study of mathematics is an important requirement for the understanding and development of any branch of engineering. The purpose of teaching mathematics to diploma engineering students is to impart them basic knowledge of mathematics which is needed for full understanding and study of engineering subjects.

S.N.	Units	Time Coverage L	T	P
1.	Integral Calculus-I	12	4	-
2.	Integral Calculus-II	12	4	-
3.	Coordinate Geometry (2 Dimensional)	10	3	-
4.	Coordinate Geometry (3 Dimensional)	8	3	-
		42	14	-

DETAILED CONTENTS:

1. INTEGRAL CALCULUS - I : (14 Marks)

Methods of Indefinite Integration :-

1.1 Integration by substitution.

1.2 Integration by rational function.

1.3 Integration by partial fraction.

1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :(14 Marks)

2.1 Meaning and properties of definite integrals, Evaluation of definite integrals. Integration of special function.

2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.

2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):(14 Marks)

3.1 CIRCLE :

Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

3.2 Standard form and simple properties

Parabola x2=4ay, y2=4ax,

Corrected and Approved by B.T.E. On Dated 27.05.2015

Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):(8 Marks)

4.1 Straight lines and planes in space -

Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),

4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz = d$ (Radius, Centre and General Equation)

Corrected and Approved by B.T.E. On Dated 27.05.2015

2.2 APPLIED PHYSICS-II

[Common to All Engineering Courses]

L	T	P
3	2/2	4

Rationale:

Engineering physics is a foundation Course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. While teaching the subject,teachers should make maximum use of demonstrations to make the subject interesting to the students.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Topics	L	T	P
1.	Optics	4	1	-
2.	Introduction To Fiber Optics	4	1	-
3.	Laser & its Application	4	1	-
4.	Electrostatics	4	1	-
5.	D.C. Circuits	4	1	-
6.	Magnetic Materials & Their Properties	4	1	-
7.	Semi Conductor Physics	4	1	-
8.	Introduction Diode & Transistors	4	2	-
9.	Introduction To Digital Electronics	4	2	-
10.	Non-conventional energy sources	6	3	-
		42	14	56

1. Optics (4 Marks)

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Deotructive), Diffraction and Polarization (Concept Only), Law of Mallus and Polaroids.

2. Introduction To Fibre Optics :(5 Marks)

Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications (4 Marks)

Absorbtion and Emission of energy by atom, Spontaneous and Stimulated Emission, Poluation inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :(4 Marks)

Coutomb's Law, Electric field, Electric potential, Potential energy, Capacator, Energy of a charged capacitor, Effect of dielectric on capacators.

5. D.C. Circuits (5 Marks)

Corrected and Approved by B.T.E. On Dated 27.05.2015

Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties: (5 Marks)

Dia, Para and Ferro-magnetism, Ferrites, Magnatic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics (4 Marks)

Concept of Energy bands in soldis, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister : (6 Marks)

Majority and Minority charge carriers,P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics : (6 Marks)

Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT, OR).

10. Non-conventional energy sources: (7 Marks)

(a) Wind energy : Introduction, scope and significance, measurement of wind velocty by anemometer, general principle of wind mill.

(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

Corrected and Approved by B.T.E. On Dated 27.05.2015

PHYSICS LAB

Note: Any 4 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.

2. Determination of 'g' by plotting a graph T2 verses l and using the formula g=4n2/Slope of the graph line

3. Determine the force connstant of combinationof springs incase of 1. Series 2. Parallel.

4. To verify the series and parallel combination of Resistances with the help of meter bridge.

5. To determine the velocity of sound with the help of resonance tube.

6. Determination of viscosity coefficient of a lubricant by Stoke's law.

7. Determination of E1/E2 of cells by potentio meter.

8. Determination of specific resistance by Carry Foster bridge.

9. Determination of resitivity by P.O.Box.

10. Verification of Kirchoff's Law.

11. To draw Characteristics of p-n Junction diode.

12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

NOTE :

Students should be asked to plot a graph in experiments (where possible) and graph should be used for calculation of results. Results should be given in significant figures only.

Corrected and Approved by B.T.E. On Dated 27.05.2015

2.3 APPLIED MECHANICS

[Common to three years Diploma Course in Civil Engg., Agriculture, Dairy, Ceramic, Civil & Rural Engg., Chemical Engineering, Architecture Assistantship, Computer Science & Engineering]

[Also Common to Mechanical Engineering (Spacialization In Production Engineering]

[Also common to First year Diploma Course in Chemical Technology : (1) Fertilizer Technology, (2) Rubber and Plastic Technology]

L	T	P
5	1	2

RATIONALE

The subject Applied Mechanics deals with fundamental concepts of mechanics which are useful for the students for further understanding of the second & final year subjects like S.O.M. and theory and design of steel & masonry structures as well as RCC designs. The subject enhances the method ability of the students.

TOPIC WISE DISTRIBUTION OF PERIODS

SL.No.	Topic	L	T	P
1.	Introduction	4	1	
2.	System of Forces & General Condition of Equilibrium	18	4	
3.	Moment and Couple	8	1	
4.	Friction	8	1	
5.	Machines	8	1	
6.	Center of Gravity	8	2	
7.	Moment of Inertia	8	2	
8.	Beam & Trusses	8	2	
	Total	70	14	28

DETAILED CONTENTS

1. Introduction:

Mechanics and its utility. Concept of scaler and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

2.A. System of Forces :

Concept of coplaner and non-coplaner forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a praticle,conditions of equilibrium of coplaner concurrent

Corrected and Approved by B.T.E. On Dated 27.05.2015

force system.

B. General Condition of Equilibrium:

General condition of equilibrium of a rigid body under the action of coplaner forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

3. Moment & couple:

Concept of Varignon's theorem. Generalised theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

4. Friction:

Types of friction:statical,limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on eqilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

5. Machines:

Definition of a machine. Mechancial advantage, velocity ratio, input, output, mechanical efficiency and relation between them for ideal and actual machines. Law of a machine Lifting machines such as levers, single pulley, three system of pulleys. Weston differential pulley, simple wheel and axle, differential wheel and axle. Simple screw jack, differential screw jack, simple worm and worm wheel.

6. Centre of Gravity:

Concept, definition of centroid of plain figures and center of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion. Determination of center of 'gravity' of solid bodies - cone, cylinder, hemisphare and sphere, composite bodies and bodies with portion removed.

7. Moment of Inertia:

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical section : rectangle, triangle, circle (without derivations). Second moment of area for L, T, I and channel section, section of modulus.

8. Beams & Trusses:

Definition of statically determinate and indeterminate trusses. Types of supports. Concept of tie & strut, Bow's notation, space diagram, polar diagram, funicular polygon; calculation of reaction at the support of cantilever and simply supported beams and trusses graphically and

analytically; graphical solution of simple determinate trusses with reference to force diagram for determining the magnitude and nature of forces in its various members. Analytical methods: method of joints and method of sections.(simple problems only)

Applied Mechanics Lab : Practicals

1. To verify the law of Polygon of forces.
2. To verify the law of parallelogram and triangle of forces.
3. To verify the law of principle of moments.
4. To find the coefficient of friction between wood,steel, copper and glass.
5. To find the reaction at supports of a simply supported beam carrying point loads only.
6. To find the forces in the jib & tie of a jib crane
7. To find the forces in the members of a loaded roof truss. (King / Queen post truss)
8. To find the mechanical advantage, velocity ratio and efficiency of any three of the following machines:
   - (i) Simple wheel & axle
   - (ii) Differential wheel & axle
   - (iii) Differential pulley block
   - (iv) Simple Screw jack
   - (v) Simple Worm & worm wheel
   - (vi) System of Pulleys (any type).
9. To find out center of gravity of regular lamina.
10. To find out center of gravity of irregular lamina.

Corrected and Approved by B.T.E. On Dated 27.05.2015

2.4 INTRODUCTION TO GLASS & CERAMIC ENGINEERING

L	T	P
8	2	-

Rationale:

The study of the subject is required to introduce the students with the materials used in ceremic engineering i.e. glass, enamel, pottery, refrectory & cement. The only elementry knowledge of the raw materials used in different fields of ceramic industry and their applications is kept in the subject.

Sl. No.	Units	L	T
1.	Glass	30	8
2.	Enamel	25	6
3.	Pottery	25	6
4.	Refractory	20	5
5.	Cement	12	3
		112	28

1. Glass

History,Elementry knowledge of raw materials,Types of glass - container, glass sheet and plate glass, bulbs,laboratory wares.

2. Enamel

Elementary knowledge of raw materials .Types of enamels and their applications.

3. Pottery

Elementary knowledge of raw materials.Types of pottery wares- Porcelain,stone ware,earthen ware ,terracotta sanitary wares. White wares

4. Refractory

Elementry knowledge of materials considered as refractories,types of refractory acid refractory ,basic refractory,neutral refractory.

5. Cements

Elementary idea of types of cements,raw materials used in the manufacture of cement,applications.

Corrected and Approved by B.T.E. On Dated 27.05.2015

2.5 WORKSHOP PRACTICE

[Common with Civil Engg., Civil Engg. (sp. in Rural Engg.), Electrical, Ceramic, Dairy, Agriculture, Chemical Technology (Rubber & Plastic), Chemical Technology (fertilizer), Four year chemical Engg.]

[Four year Past time Mechanical Engg. (sp. in Production Engg.)]

L	T	P
-	-	14

Rationale

A diploma holder in any branch of engineering has to work in between a skilled workman and an Engineer. In order to have effective control over skilled workmen it is necessary that the supervisory staff must have adequate knowledge and skill. For development of skills workshop practice is very essential.

Sl.No.	Units	Coverage L	T	Time P
1.	Carpentry shop	-	-	20
2.	Painting & polishing shop	-	-	16
3.	Sheet metal and soldering shop	-	-	56
4.	Fitting shop, Plumbing & Fastening Shop	-	-	24
5	Foundry shop			20
6.	Smithy shop	-	-	24
7.	Welding shop	-	-	20
8.	Machine shop	-	-	16
		-	-	196

DETAILED CONTENTS

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

Ex-5 Making of any one utility article such as wooden-picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantange of painting, other method of surface coating i.e. electroplating etc.

EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare french polish for wooden surface and polish the other side.

Ex-3 To prepare metal surface for painting, apply primer and paint the same.

EX-4 To prepare a metal surface for spray painting,first spray primer and paint the same by spray painting gun and compressor system.

Corrected and Approved by B.T.E. On Dated 27.05.2015

* The sequence of polishing will be as below:
i) Abrassive cutting by leather wheel.
ii) Pollishing with hard cotton wheel and with polishing material.
iii) Buffing with cotton wheel or buff wheel.

3. Sheet Metal and Soldering Shop :

EX-1 Introduction and Types of sheets, measuring of sheets
EX-2 Study and sketch of various types of stakes/anvil.
EX-3 Introduction & demonstration of tools used in Sheet metal working shop.
EX-4 Cutting, shearing and bending of sheet.
EX-5 To prepare a soap case by the metal sheet.
EX-6 To make a funnel with thin sheet and to solder the seam of the same.
EX-7 To make a cylinder and to solder the same.
EX-8 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.
EX-9 To braze small tube/conduit joints.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

EX-1 Study of materials, limits, fits and toterances.
EX-2 Introduction & demonstration of tools used in Fitting Shop.
EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.
EX-4 Making bolt & nut by tap and die set and make its joints
Ex-5 To drill a hole in M.S. Plate and taping the same to creat threads as per need.
EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.
EX-8 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.
EX-9 Practice of bolted joints
EX-10 To prepare a rivetted joint
EX-11 To make a pipe joint
EX-12 To make a threaded joint
EX-13 Practice of sleeve joint

5. Foundry Work

Ex-1 Study of metal and non metals
Ex-2 Study & sketch of the foundry tools.
Ex-3 Study & sketch of cupula & pit furnace.
Ex-4 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)
Ex-5 Casting of non ferous (lead or aluminium) as per exercise 3.

6. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.
EX-2 To prepare square or rectangular piece by the M.S. rod.
EX-3 To make a ring with hook for wooden doors.

Corrected and Approved by B.T.E. On Dated 27.05.2015

EX-4 Utility article-to preapre a ceiling fan hook.

7. Welding Shop :

EX-1 Introduction to welding, classinfication of welding, types of weld joints.
EX-2 Welding practice-gas and electric.
EX-3 Welding for lap joint after preparing the edge.
EX-4 Welding of Butt joint after preparation of the edge.
EX-5 'T' joint welding after preparation of edge.
EX-6 Spot welding, by spot welding machine.

8. Machine Shop

EX-1 Study & sketch of lathe machine.
EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines
Ex-2 Plain and step turning & knurling practice.
Ex-3 Study and sketch of planning/Shaping machine and to plane a Ractangle of cast iron.

2.6 FIELD EXPOSURE

Corrected and Approved by B.T.E. On Dated 27.05.2015

III Semester

3.1 APPLIED CHEMISTRY -II

L	T	P
4	-	-

RATIONALE:

Chemistry has intricate and profound relationship with technology. This curriculum includes those topics of chemistry which enable a technician for better application of technology. Metals and compounds related to ceramic & glass technology are included in the subject to give better understanding of the technology.

A. TOPICWISE DISTRIBUTION OF PERIODS:

NO.	TOPIC	LECT.	TUTO.	P
1.	Unit-I	8	-	-
2.	Unit-II	8	-	-
3.	Unit-III	8	-	-
4.	Unit-IV	8	-	-
5.	Unit-V	8	-	-
6.	Unit-VI	8	-	-
7.	Unit-VII	8	-	-
	TOTAL	56	-	-

B. Syllabus:

I. Compounds of:-
(a) Li, Na, K, Cu, Ag, Au.
(b) Mg, Ca, Sr, Ba, Pb, Cd, Zn.
(With special referance to their oxides, nitrates, helides, sulphats). their propoerties and application in ceramic industry.

II. Compound of Al and B with special reference to aluminates and Borates and oxides.

III. Compounds of:-

(a) Ti, V, Cr, Mn, Fe, Co, Ni.
(b) Si, Ti, Zn.
(With special reference to their oxides and other compounds related to ceramic industry)

IV. Oxides of As and Sb.

V. Selenium and sulpher and their compounds used in ceramic industry.

VI. Compound of Ce, Nd and Pr.

VII. Phase rule, one component system (SiO_2, Al_2O_3, ZrO_2),two component systems (Al_2O_3-SiO_2, Na_2O-SiO_2, CaO-SiO_2, CaO-Al_2O_3

Corrected and Approved by B.T.E. On Dated 27.05.2015

3.2 ELEMENTARY ELECTRICAL, MECHANICAL & CIVIL ENGG.

L	T	P
4	-	4

RATIONALE

Ceremic & Glass Engineering Diploma holder has to interact with engineering and technicians in the Field of mechanical, electrical & civil engineering. This subject has been kept in the curiculam to provide a general introduction to mechanical, electircal & civil engineering elements. Teachers should lay more emphasis on basic concept while teaching the subject.

A. TOPICWISE DISTRIBUTION OF PERIODS

SL.NO.	TOPIC	L	T	P
	Electrical Engineering			
1.	D.C. Machines	3		
2.	Fundamentals of A.C.	9		
3.	Transfomer	2		
4.	A.C. Machines	9		
5.	Electrical Measuring Instruments	9		
	Mechanical engineering			
1.	Unit-I	6		
2.	Unit-II	3		
3.	Unit-III	3		
	Civil Engineering			
1.	Unit-I	12		
	TOTAL	56	-	56

B. Syllabus:

Electrical Engineering:

1. D.C. Machines

Working, Principle, types and applications.

2. Fundamentals of A.C.

Definition of Alternating current: Instantaneous value, maximum value, time periods, frequency, R.M.S. value, average value, phase and phase differeance, leading and lagging power factor. Concept of 3-phase system: KVA, KVAr, KW, calculation of power consumed in single phase and three phase circuits. Star and delta connection (Line voltage, Line current, phase voltage and phase current only).

3. Transformers

Working principle of a signle phase transformer and its applications.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4. A.C. Machines:

Motors: Brief idea about construction, starting methods and applications (excluding winding details of single phase induction motors), three phase induction motors (squirrel cage & slip ring type).

5. Electrical Measuring Instruments:

Ammeter, voltmeter, wattmeters and induction type energy meters (single phase only), meggars, multimeters.Temperature measuring thermo couple, Resistance thermometer, Furnace Electrification.

Mechanical Engineering:

Internal combustion engines, classificationn of I.C. engines, mechanism of I.C. engine. Classification of control systems: mechanical, hydraulic, pneumatic and electrical, working and uses of simple machines- loaders and lift trucks, conveyors, Excavaters,mixing and placing equipements. Combustion table in MM and Inch.

II. Bearing & Lubricants:

Types of Bearings, lubrication of Machines, types of lubricants, basic rules of lubrication. Properties of a good lubricant.

III. Safety and Accident Prevention:

Safety organization, prevention of accidents due to mechanical cuases, safety in operation of electrical equipments, fire precaution of storage of lubricants.

Civil Engineering

Selection of site for location of a factory, orientation of a factory building, nature of soils and bearing capacity, Improving bearing capacities, Foundation materials for the construction of furnaces and kilns. Construction of kilns and furnace walls. Arches and domes etc. Estimation for construction of kilns and furnaces. Sketches showing the different views of kilns.Machine foundation.

C. PRACTICALS
(Elementary Elect. & Mech. Engg.)

NOTE: Do any eight. Atleast four from each section.

Sec. A. Electrical

1. To study the constructional details of a DC machine.

2. To measure power & calculate powerfactor of single phase load using ammeter, voltmeter and wattmeter.

3. To start a 3 phase induction motor with the help of star-

delta starter.

4. To study the constructional details of (a) Moving iron (b) Moving coil measuring instruments.

5. Connect ammeter, voltmeter, wattmeter and energy meter to a single phase load and measure current voltage, power and energy for a given time.

6. Simple C.T.S. wiring up to 2 points only.

Sec. B. Mechanical

1. To study the various types of lubrication system used in machines.

2. To study and sketch different types of bearings.

3. To study and sketch 4-stroke and 2-stroke engines.

4. Calibrate pressure gauge by using dead weight tester.

5. To study the working of "on-off" level controller and plot the time response chart and calculate time constant.

6. To draw the charactaristics curve of proportional temerature control.

7. To study closed loop automatic control setup and draw its block or circuit diagram.

Corrected and Approved by B.T.E. On Dated 27.05.2015

3.3 INDUSTRIAL OPERATIONS

L	T	P
4	-	-

A. TOPICWISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Introduction	8		
2.	Size reduction	16		
3.	Handling of solids & slurry	16		
4.	Mechanical Operations	16		
	TOTAL	56	-	-

B. Syllabus:

1. Introduction:

Concept and rule of unit operation in process industries and House Keeping.

2. Size reduction:

Theory of crushing,Rittinger's law and Kicks law, crushing and grinding machines, classification and their general discription, jaw crushers, gyratory crushers, roll crushers, hammer mills, ball mills, tube mills, vibrating mills, Raymod mill,operation of machinery, open circuit and closed circuit operations, field control, mill discharges.To decide optimum speed of ball mill for best grinding and Introduction of types of Lining of ball mill.

3. Handling of Solids & Slurries:

Screening and grinding of solid particles. Standard screening equipments and standard sieves. Conveying equipments, classfication, their general construction, industrial application and operation, belt conveyors, chain conveyors, screw conveyors, bucket conveyors, pneumatic conveying system, pumping and transportation of slurry and their flow control.

4. Mechanical Operation:

Type of filtration apparatus their general construction, application and operation of filter press and rotary, filters, filter aids centrifugal filteration. Types of mixing equipments used in ceramic industry. Introduction for moderization of ceramic machineries

Corrected and Approved by B.T.E. On Dated 27.05.2015

3.4 POTTERY & REFRACTORY

L	T	P
6	-	16

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
	SEC. A - POTTERY			
1.	Introduction	4		
2.	Raw Material	12		
3.	Body Preparation	12		
4.	Mould Materials	6		
5.	Firing	6		
6.	Quality Control Checks	6		
	SEC. B - REFRACTORY			
1.	Raw Materials	8		
2.	Making of Refrectory Bricks	12		
3.	Manufacturing of crucible & saggers	12		
4.	Quality Control Checks	6		
	TOTAL	84	-	224

B. SYLLABUS

SEC. A - POTTERY

1. Introduction:

2. Raw Materials:

Origin of clay, Principle of formation and classification. Primary and secondary clays,washing methods of clays.Winning and mining of clays. Behaviour, functions and physical properties of the important pottery raw materials - china clay, ball clay, fire clay, Red burning clay, quartz, felspar, nepheline syenite, whitening ,talc, pyrphylite, silimanite group minerals and bone ash, places of occurance of important raw materials in India.

3. Body Preparation & Shaping:

Unloading and storage, batch claculations, batching, blunging, ball milling, screening, dewatering clay slips, casting slip, plastc forming, dry press bodies.

Jiggering,i.e.Jigger and rotary Table type jiggering the casting process,different types of casting- 1. Ordinary or Natch casting 2. Bench casting 3. Battery casting 4 Capillary casting, extrusion, dry pressing different types of dry pressing finishing, drying.

4. Mould Materials:

Mould materials and their properaties. (Different Types of

dies and mould), Process of mould making using POP.

5. Firing:

Firing of pottery wares, kiln furnitures and placing of wares in kiln and firing scheldules.

6. Quality Control Checks:
Quality checks/control methods at various stages.

SEC. B - REFRACTORIES

1. Raw Materials:

Classification of refractory materials, clay minerals, alumina silica, magnesite, dolomite, chromite, and other refractory oxides. Synthetic raw materials - Fused alumina, sintered alumina.

2. Making of Refractory Bricks:

Moulding methods, drying, effect of heat on clay, Manufactrure and properties of silica and semi-silica refractories, fire clay and other alumino silicate refractories, application of phase diagrams related to the manufacture of above refractoires.

3. Manufacturing of Crucibles & Saggers:
A detailed study of the manufacture of crucibles, furnace blocks, saggers and muffles used in different industries.

4. Quality Control Checks:

Quality Checks/Control methods at various stages.

Corrected and Approved by B.T.E. On Dated 27.05.2015

POTTERY & REFRACTORY LAB

Emphasis should be given to Testing and quality Control wherever applicable.

A. POTTERY PRACTICALS:

(a) Model and mould making.

(b) Preparation of different bodies and their glazes. Fabrication of test specimans by different process

(c) Bisuciting and ghost firing of test peices.

(d) Moisture content in china clay/given sample.

(e) Determination of dry and fired shrinkage of china clay/ test speciman of body.

(f) Water of plasticity of clays and particle size distribution.

(g) Determination of setting time of plaster of paris.

(h) Density of casting slip.

(i) Water of plasticity determination of body for jiggering.

(j) Flow and rolling limit of clay bodies.

(k) Prepration of plaster models moulds, free hand drawings and stencilling.

(l) Fired characteristics of test specimens (such as colour, W.A., Applied porosity, B.D., Thermal expansion and MOR (Strength).

B. REFRACTORY PRACTICALS:

1. Particle size determination of refractory raw materials by sieve analysis.
2. Density and specific gravity of refractory raw materials by vacuum treatment.
3. Porosity of fired test specimen.
4. Preparation of refractory sample by dry press.
5. Firing of sample at appropriate temperature.
6. Determination of properties by water absorption test:

    a. Apparant porosity
    b. Bulk density and packing density
    c. Apparant specific gravity
    d. Percentage of water absorption.
    e. Flexural strength (MOR)

Note :- Those practicals which are not possible at institute level, can be demostrated/performed in Industrial Training/field exposure.

Corrected and Approved by B.T.E. On Dated 27.05.2015

3.5 MODELLING AND MOULD LAB

L	T	P
-	-	10

Basic principles of Design- study of forms through nature, ornamentation in design.Designing of ceramic products.Stancelling & screen printing designs.

Methods of making various regular and irregular ceramic models by clay modelling ,preparation of various types of moulds with plaster of paris.

Note :- 1.Students should get a complete idea about the operations involved in transferring the design of paper to the actual ceramic product, while preparing the job.

2.Emphasis should be made on demonstration of actual shapes of ceramic products.

Corrected and Approved by B.T.E. On Dated 27.05.2015

IV Semester

4.1 GLASS AND ENAMELS

L	T	P
6	2	8

A. TOPIC WISE DISTRIBUTION OF PERIODS.

SL.NO.	TOPIC	L	T	P
	SEC. A GLASS			
1.	Raw Materials	12	4	
2.	Batch Calculation	12	4	
3.	Typical Commercial Glasses	8	4	
4.	Melting & Refining	8	2	
5.	Decoration	4	1	
6.	Quality & Control Test	8	2	
	SEC. B ENAMELS			
1.	Unit I	24	10	
2.	Unit II	8	2	
	TOTAL	84	28	112

B. SYLLABUS

SECTION A - GLASS

1. Raw Materials:

Chemical and Physical Characteristics of principal glass making batch materials, their stroage, mixing and coveying, minor ingredients and their function, factor influencing choice of batch materials..

2. Batch Calculation:

Calculation of batch from glass composition and vice versa typical commerical glasses.

3. Typical Commerical Glasses:

Types of glass and their chemical composition, container glass, sheet and plate glass, scientific laboratyory glass.

4. Melting and Refining:

Essential requirements of glass melting, mechanisation of melting, thermal currents, production of homogeneous liquid, refining, shaping and moulding.

5. Decoration:

Different Methods of Decoration.

6. Quality Control & Test:
Quality control/methods of testing.

Corrected and Approved by B.T.E. On Dated 27.05.2015

SEC. B - ENAMEL

1. Unit I -

History of enamelling, raw materials for enamels, metal and metal preparation, preparation of enamel frit milling and mill addition, application and control, firing, decoration, defects, their casues and remedies.

2. Unit II -

Quality Control and Testing.

GLASS AND ENMAL LAB

A. GLASS PRACTICALS:

(a) Compounding of glass batches.

(b) Melting of simple coloured glasses.

(c) Simple decoration processes e.g. etching, silvering staining, sand-blasting, lustering, cutting and polishing.

(d) Sieve analysis of glass sand.

(e) Density of glass by float and sink method.

B. ENAMEL PRACTICALS:

(a) Cleaning and pickling of small mild steel plates for enamelling.

(b) Preparation of frit and its application for making sign paltes.

(c) Firing and fusion of applied enamel.

(d) Density of enamel frit using specific gravity bottle.

(e) Fineness test of enamel slip.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4.2 GLASS & CERAMIC ENGINEERING DRAWING-I

L	T	P
-	-	14

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	LAB/DRG.	NO. OF PLATES
1.	UNIT I - a	16	1
	- b	12	1
	- c	12	1
2.	Unit II	48	2
3.	Unit III	32	2
4.	Unit IV	32	2
5.	Unit V	44	4
	TOTAL	196	13

B. SYLLABUS

Unit I

(a) Detail use of abvriviation in electrial drawing symbols for simple equipment used in circuit, lamp, switches, condenser, resistance, reactors, transformer and motor.
Sheet 1

(b) Simple domestic wiring circuit diagram.
Sheet 1

(c) Wiring diagrams of simple switch board(lab), general electrical layout for substation.
Sheet 1

Unit II

Types of pulleys, bush bearing, foot step bearing, plumber block, wall brackets.
Sheet 2

Unit III

Sectional views of cotter-joint, knuckle joint, Jib and cotter joint, flange coupling.
Sheets 2

Unit IV

Pictorial views of the following ceramic machinary.
(a) Ball Mill)
(b) Edge runner mill)
(c) Jaw Crusher) Sheets 2
(d) Plunger)
(e) Filter press)

Unit V - CAD 4

1. To Study the basis of Auto Cad
2. To draw 2 D ceramic drawing of block diagram, plot layout, machine and lilne
3. To draw simple 3 D ceramic Product (i) Procelain Insulator (ii) Refractory Product

Corrected and Approved by B.T.E. On Dated 27.05.2015

4.3 INDUSTRIAL CALCULATION & ENVIRONMENTAL POLLUTION

L	T	P
6	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL NO.	TOPIC	L	T	P
1.	Introduction	5		
2.	Dimension, Units	6		
3.	Stoichiometric relationship	12		
4.	(a) Ideal gas, PVT	12		
	(b) Dalton and Anagat's Law	4		
5.	Humidity and saturation	6		
6.	Material Balance	12		
7.	Combustion process	12		
8.	Environmental Pollution	15		
	TOTAL	84	-	-

B. SYLLABUS:

1. UNIT I

   Introduction for material and Energy Balances.

2. Unit II

   Dimensions, units and their conversion factors, S.I Units.

3. Unit III

   Stoichiometric and composition relationships - conservation of mass, mass and volume relationships in chemical reactions, concept of gram-mole and gram-atom, mass and volume relationship for gaseous substance, use of molal units, choice of basis of calculation.

4. Unit IV

   Behaviour of ideal gases - P & T relationship, standard condition, gauge pressure, Dalton and Amagat's laws, average molecular weight of a gaseous mixture.

5. Unit V

   Humidity and saturation-simple problem using chart.

6. Unit VI

   Material Balance- Drying and firing problems.

7. Unit VII

   Combustion processes, analysis of the products of combustion.

8. Unit VIII Ceramic industry aud its influence on the environment. How to make it environment friendly. Major pollutants and their remedies. Industrial waste disposal.Pollution control Acts and Legislation, waste minimization adn recycling. Reduction of GHS (Green House Gases), Control of combustion by improved process (Reduction in fuel consumption)

Corrected and Approved by B.T.E. On Dated 27.05.2015

4.4 FUELS, FURNACESS AND PYROMETRY

L	T	P
6	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS.

SL.NO.	TOPIC	L	T	P
1.	Fuels			
	a- Solid Fuels	8		
	b- Liquid Fuels	8		
	c- Gaseous Fuels	8		
2.	Furnaces	12		
3.	Continuous Kilns	10		
4.	Tank Furnaces	10		
5.	Other Furnaces	10		
6.	Other Equipements	10		
7.	Pyrometery	10		
	TOTAL	84	-	-

B. SYLLABUS

FUEL

1. Solid Fuel:

Coal and its formation, theories of formation of coal,nature and occurance, impurities in coal, grading of coal, coal washing, hardness and grindeability of coal, agglomeration and swething of coal, calorfic value of coal, coal ash and clinkering. Spontaneous combustion, its causes and remedy.

2. Liquid Fuels:

Nature of oil, its origin and composition,refining process for the production of liquid petroleum products - petrol, kerosene, fuel oil and coke (brief outlines) storage and handling practices in industry.

3. Gaseous Fuels:

Producer gas; design and description of producer gas plant, chemical reactions, composition and calorfic value in relation to operating conditions and quality of coal.
Water Gas, Carburetted water gas.
Coke oven Gas; low and high temperature carbonisation, Tar and Gas and their nature.
Blast Furnace Gas, Refinery Gases, Natural Gas-Composition and calorific value.

2. Furnaces

Definition, classifcation of furnaces- periodic kilns, scove kiln - setting and firing, updraft kiln - flues, wall, crown, bag wall, vents, stack. Down Draft Kilns: Round and rectangular down draft kiln, foundation and flue

construction, wall-crown-bag wall, dampers, stack, crown, wedge and scew blucks, fire boxes, kiln bandages. Horizontal draft kiln, muffle furnaces, chamber kiln - construction and working. Muffle kilns: Muffle tunnel kiln, principle of working, Dressler Treft Muffle kiln and other muffle kilns, advantages of muffle type tunnel kiln. Modern muffle kilns for enamel industries.

3. Continuous Kilns:

Fundamentals of continuous kilns - Hoffman's Kiln, construction, working and firing circuits of tunnel kiln, roller kiln, shaft kiln rotary kiln, chamber kiln. Methods of setting in continuous kilns.

4. Tank Furnaces:

Day tank, continuous tank, bridge wall tank, super structure, refractories used in different parts of tank furnaces, up takes and chimney construction, draught presure and chimny draught.

5. Other Furnaces:

Description and operation of shuttle kiln, tophat kiln, chamber kiln, Hoffman's/Belgian/Zig-Zag kiln, Pushar kiln, decoration kiln, fast firing kiln, box type furnaces.

6. Other Equipments

Design and operation of Burners, Burner efficiency, blowers, heater regenerator, recuperator etc.

7. Pyrometry

Definition, classification of pyrometers, Deniel's pyrometer, seger cones - classification of cones, Behaviour of cones etc. Thermo electric pyrometers - general principle, Material used for thermal junction - chromel - Alomel, Platinum - Rhodiun etc., Indicators, recorders, Advantage of thermo electric method of measuring tampreature.
Optical pyrometers: General Prinicple, Lien's law of Ferry's optical pyrometer, Le -Chateleir's optical pyrometer, colour extinction pyrometer.
Resistance Pyrometers, Radiation Pyrometers: Ferry's mirror pyrometer, Ferry's spiral radiation pyrometer, indicators for radiation pyrometers.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4.5 ELEMENTS OF GEOLOGY

L	T	P
3	1	2

RATIONALE:

The knowledge of geology is essential for the students of ceramic and glass engineering with related to the raw materials used in the industry. It will help them to understand the industrial map of industry in the country and sources of raw materials used in the industry.

A. TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	L	T	P
1.	Chapter I	15	5	-
2.	Chapter II	12	4	-
3.	Chapter III	15	5	-
		42	14	28

1. Utility of geology specially for ceramic industries.Elementary and general idea of rocks and minerals,classification of rocks,industrial minerals.Occurence of ceramic raw materials in India.

II Economic geology with reference to ceramic raw materials distribution of ceramic industry in India.

III Petrological microscope,study of physical and optical properties with special reference to the following minerals-Quartz, china clay, ball clay, felspar, mica, basalt, calcite, lime stone,gypsum, corondum.

GEOLOGY PRACTICALS

1. Identification of hand specimen of the following rocks and minerals-

   Graphite,Besalt,Sand Stone,Kaolinite,Quartz,Felspar, Calcite, Baryte, Bauxite,Lime stone,Hematite,Magnetite and Magnesite.

2. Determination of specific gravity of minerals

3. Hardness test of minerals by Moh's scales.

4. Microscopic identification of minerals.

Corrected and Approved by B.T.E. On Dated 27.05.2015

V Semester

5.1 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

L	T	P
6	**2**	**-**

RATIONALE

The knowledge of this subject is required for all engineers/technicians who wish to choose industry/field as their career. This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge about industrial and tax laws.

TOPIC WISE DISTRIBUTION OF PERIODS

Sl.No.	Units	Coverage Time L	T	P
1.	Principles of Management	8	-	-
2.	Human Resource Development	10	-	-
3.	Wages and Incentives	4	-	-
4.	Human and Industrial Relations	6	-	-
5.	Professional Ethics	2	-	-
6.	Sales and Marketing management	10	-	-
7.	Labour Legislation Act	10	-	-
8.	Material Management	8	-	-
9.	Financial Management	8	-	-
10.	Entrepreneurship Development	8	-	-
11.	Fundamental of Economics	5	-	-
12.	Accidents and Safety	5	-	-
		84	-	-

DETAILED CONTENTS

1. **Principles of Management**
   - 1.1 Management, Different Functions: Planning, Organising, Leading, Controlling.
   - 1.2 Organizational Structure, Types, Functions of different departments.
   - 1.3 Motivation: Factors, characteristics, methods of improving motivation, incentives, pay, promotion, rewards, job satisfaction, job enrichment.
   - 1.4 Need for leadership, Functions of a leader, Factors for accomplishing effective leadership, Manager as a leader, promoting team work.
2. **Human Resource Development**
   - 2.1 Introduction, objectives and functions of human resource development (HRD) department.
   - 2.2 Recruitment, methods of selection, training strategies and career development.
   - 2.3 Responsibilities of human resource management – policies and functions, selection – Mode of selection – Procedure – training of workers, Job evaluation and Merit rating.
3. **Wages and Incentives**
   - 3.1 Definition and factors affecting wages, methods of wage payment.
   - 3.2 Wage incentive – type of incentive, difference in wage, incentive and bonus; incentives of supervisor.
   - 3.3 Job evaluation and merit rating.
4. **Human and Industrial Relations**
   - 4.1 Industrial relations and disputes.
   - 4.2 Relations with subordinates, peers and superiors.
   - 4.3 Characteristics of group behaviour and trade unionism.
   - 4.4 Mob psychology.
   - 4.5 Grievance, Handling of grievances.

Corrected and Approved by B.T.E. On Dated 27.05.2015

4.6 Agitations, strikes, Lockouts, Picketing and Gherao.
4.7 Labour welfare schemes.
4.8 Workers' participation in management.

5. **Professional Ethics**
5.1 Concept of professional ethics.
5.2 Need for code of professional ethics.
5.3 Professional bodies and their role.

6. **Sales and Marketing management**
6.1 Functions and duties of sales department.
6.2 Sales forecasting, sales promotion, advertisement and after sale services.
6.3 Concept of marketing.
6.4 Problems of marketing.
6.5 Pricing policy, break even analysis.
6.6 Distribution channels and methods of marketing.

7. **Labour Legislation Act (as amended on date)**
7.1 Factory Act 1948.
7.2 Workmen's Compensation Act 1923.
7.3 Apprentices Act 1961.
7.4 PF Act, ESI Act.
7.5 Industrial Dispute Act 1947.
7.6 Employers State Insurance Act 1948.
7.7 Payment of Wages Act, 1936.
7.8 Intellectual Property Rights Act

8. **Material Management**
8.1 Inventory control models.
8.2 ABC Analysis, Safety stock, Economic ordering quantity.
8.3 Stores equipment, Stores records, purchasing procedures, Bin card, Cardex.
8.4 Material handling techniques.

9. **Financial Management**
9.1 Importance of ledger and cash book.
9.2 Profit and loss Account, Balance sheet.
9.3 Interpretation of Statements, Project financing, Project appraisal, return on investments.

10. **Entrepreneurship Development**
10.1 Concept of entrepreneur and need of entrepreneurship in the context of prevailing employment conditions.
10.2 Distinction between an entrepreneur and a manager.
10.3 Project identification and selection.
10.4 Project formulation.
10.5 Project appraisal.
10.6 Facilities and incentives to an entrepreneur.

11. **Fundamental of Economics**
11.1 Micro economics.
11.2 Macro economics.

12. **Accidents and Safety**
12.1 Classification of accidents based on nature of injuries, event and place.
12.2 Causes and effects of accidents.
12.3 Accident-prone workers.
12.4 Action to be taken in case of accidents with machines, electric shock, fires and erection and construction accidents.
12.5 Safety consciousness and publicity.
12.6 Safety procedures.
12.7 Safety measures – Do's and Don'ts and god housing keeping.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.2 POTTERY AND PORCELAIN-I

L	T	P
5	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL. NO.	TOPIC	L	T	P
1.	Chapter I	12		
2.	Chapter II	12		
3.	Chapter III	12		
4.	Chapter IV	9		
5.	Chapter V	10		
6.	Chapter VI	2		
7.	Chapter VII	3		
8.	Chapter VIII	4		
9.	Chapter IX	6		
	TOTAL	70	-	-

B. SYLLABUS:

NOTE: Recapituation of main topics from II year.

I. A study of the various ceramic fabrication process (for manufacture of bodies).

II. A detailed study of the manufacture of floor and wall tiles, sanitary ware, table ware, parian art ware, semi-vitreous bone china, chemical stone ware, chemical porcelain, refractory porcelain.

III. High and low tension insulators : High voltage low frequency application Procilain Insulator, Low voltage hight frequency application procelains, Steatile, Magnusium titanate, co-ordierite, Forstenrite.

IV. Ceramic glazes - Diffrent types of glazes, their composition preparation and application.

V. Ceramic Stains - Their composition, preparation, application & use.
Decoration with stains.

VI. Ceramic Transfer - Their preparation, application and firing.

VII. Lithography :

(A) Lithium Compunds
(B) Prepare and Design For making Lithograph transfer.

VIII. Machenisation in pottry works - Introduction to simple hand tools,equipments & Machines.

IX. Quality Control & Testing

A. Residue on different sieve range and particle size

distribution below 25 micron.

B. Green and dry properties of body mixes such as shrinkage, bulk density, strength.

C. Fired charactertics such as fired shrinkage, fired strength (MOR and Compressive strength), water absorption, apparent porosity, bulk density, fired colour at different temperatures.

D. Pressing effect on the fired and green bodies.

E. Thermal expansion of body and glass.

F. Testing - Physical testing : Jbermal behaviour, MOR, Porosity, Density, Craxing, etc.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.3 REFRACTORY TECHNOLOGY

L	T	P
5	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO	TOPIC	L	T	P
1.	Chapter I	9		
2.	Chapter II	9		
3.	Chapter III	9		
4.	Chapter IV	9		
5.	Chapter V	9		
6.	Chapter VI	5		
7.	Chapter VII	5		
8.	Chapter VIII	5		
9.	Chapter IX	10		
	TOTAL	70	-	-

B. SYLLABUS:

NOTE: Recapituation of main topics from II year.

I. Manufacture of :
Silica, Alumino silicate, alumina, Magnesite, Dolomite, Kyanite, Sillimanite, chrome and chrome-magnesite, insulation refracteries & carbon refractories. Super refrectries, Refractory castables, Synthetic raw materials, Cordienite refactory, Monolithic, Cordienite Milline Refectory

II. Properties :

a. Physical : Porosity, bulk density, permeability, cold crushing strength, modulus of rupture, abrasion.

b. Thermal : Pyrometric Cone Equivalent (PCE), expansion, thermal conductivity.

c. Thermal Mechanical: Refractoriness under load (RUL). Hot modulus of rupture (MOR), Hot crushing strength.

d. Thermochemical - corrosion.

III. Refractoriness : Refractoriness under load, role of vitrification, change in volume sensitiveness to sudden change in temperature, crushing strength, porosity-apparant porosity, specific gravity, permeability, resistance to corrosion and abrasion. Resistance to weather and frost conductivity.

IV. Application of Refractories : Blast furnace, basic and acid open hearth furnace and bessember converters, electric furnace for steel melting. Refractories in aluminium furnace, Nozzle, Stoppers and Sleves.

V. Testing and Quality control of refractory articles : Chemical analysis micropetrological examination.

Corrected and Approved by B.T.E. On Dated 27.05.2015

VI. Crucibles, Muffles, Saggers adn Glass Pots.

VII. Refractory cement and Mortars

VIII. Monolithic Refractries - Castables, Plastic masses, Ramming, Gunning, Spraying, Patching Masses.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.4 GLASS TECHNOLOGY-I

L	T	P
5	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Chapter I	6		
2.	Chapter II	6		
3.	Chapter III	8		
4.	Chapter IV	8		
5.	Chapter V	6		
6.	Chapter VI	6		
7.	Chapter VII	6		
8.	Chapter VIII	9		
9.	Chapter IX	9		
10.	Chapter X	6		
	TOTAL	70	-	-

B. SYLLABUS:

NOTE: Recapituation of main topics from II year.

I. Storage of raw materials, batch house, melting furnace, fabrication-machines, annealing lehr, sorting and packaging section, ware house.

II. Properties of glass : Origin of thermal stresses, generation and release of stresses, strain viewer. Chemical durability of glass measurement of chemical durability by A.S.T.M & I.S.I Method, effect of glass compesition and its significance in glass processes & its measurements.

III. Viscosity, variation with temperature and composition, transformation range.

IV. Defects in glass, their causes and remedies. Types of defects : Cords, Blister, Seeds and Bad colours, etc.

V. Decolourising : Theory of decolorisation, decolorising agents.

VI. Refining: Refining mechanism, refining agents, factors affecting refining.

VII. Manufacture of glass bottles and other hollow wares by fully automatic machine.

VIII. Manufacture of sheet, plate and rolled glass, toughened glass, laminated safety glass.

IX. Optical Glass- Composition,manufacture of opptical glass, quality control measures.

X. Glass Furnaces : Direct fired furnace, Semi direct fired furnace, Producer gas fired furnace, Glass pot furnace and Taule Furnace, Regerative and Recuperative gas fired furnace, Efficiency of furnace, Annealing lehr.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.5 MODERN CERAMICS & ITS APPLICATIONS

L	T	P
6	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Chapter I	15		
2.	Chapter II	15		
3.	Chapter III	15		
4.	Chapter IV	15		
5.	Chapter V	12		
6.	Chapter VI	12		
	TOTAL	84	-	-

B. SYLLABUS:

I. Introduction To Low loss ceramics: The importance of low dielectric losses in high frequency work, steatite and cordierite bodies and their composition, manufacturing methods, properties and uses.

II. Introduction To High permittivity ceramics: Electrical condensors, advantage of ceramic condensors, rutile bodies, Titenates ceramics. Ferro electric and Piezo electric ceramics

III. Introduction To Magnetic ceramics: Soft spinel ferrites and hard hexagonal ferrites.

IV. Special Ceramics: High temperature ceramics, Berillia, Magnesia, alumina and zirconia.

V. Recent developments in the field of ceramics (lectures to be delivered by eminent ceramic engineers) in kilns, materials, energy efficiency

VI. Ceramic raw materials, Chemical analysis and Physical Testing, Investegations of Clay firing properties, Glaze and Process control.

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.6 POTTERY & REFRACTORY LAB

L	T	P
-	-	10

(A) POTTERY PRACTICALS:

1. Shaping of pottery wares by different processes e.g. throwing. Jigger & Jolleying, pressing and slip castings etc.

2. Preparation of different types of glazes and strains.

3. Preparation of different types of colours and strains.

4. Decoration of wares e.g. glazing, printing, painting spraying etc.

5. Drying finishing and firing of pottery wares and furnace control.

6. To prepare verification curve of a ceramic body mixure.

(B) REFRACTORY PRACTICALS :

1. Shaping of refractoies by :
   a. Slip costing
   b. Extrusion
   c. Pressing

2. Firing of refractory sample at different temperature and determination of its fired properties (B.D., Shrinkage, Applied Porosity, Warpage, MOR, Thermal expansition).

Corrected and Approved by B.T.E. On Dated 27.05.2015

5.7 GLASS & CERAMIC WORKSHOP PRACTICE

L	T	P
-	-	9

(A) GLASS PRACTICALS :

1. Compounding of glass batches.
2. Melting of special glasses, ruby glass, opaque glass, aventury glasses such as chromium, copper.
3. Grinding, polishing and powering of lenses.
4. Decoration of Glass by different processes such as screen painting, spraying, brush painting.

(B) ENAMEL PRACTICALS:

1. Compounding of different enamel batches.
2. Printing and Milling.
3. Cleaning and pickling of metal sheets.
4. Application and fusion of enamels on cast iron, steel and coppers.
5. Stencil cutting.
6. Decoration.
7. Furnace control.

(C) CEMENT PRACTICALS :

1. Setting time test of cements.
   a. Initial setting b. final setting
2. C.C.S.
3. Tensile strength
4. Workability

5.8 INDUSTRIAL TRAINING (4 WEEKS)

Corrected and Approved by B.T.E. On Dated 27.05.2015

VI SEMESTER

6.1 ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

L	T	P
4	-	-

RATIONALE:

A diplima student must have the knowledge of different types of pollution caused due to industrialisation and construction activities, so as he may help in balancing of eco-system and control pollution by providing controlling measures. They should be also aware of the environmental laws for effectively controlling the pollution of environment. The topics are to be taught in light of legislation Para-3.

TOPIC WISE DISTRIBUTION OF PERIODS:

SL. NO.	TOPIC	L	T	P
1.	Introduction	6		
2.	Pollution	4		
2.1	Water Pollution	8		
2.2	Air Pollution	8		
2.3	Noise Pollution	4		
2.4	Radio Active Pollution	6		
2.5	Solid Waste Management	6		
3.	Legislations	4		
4.	Environmental Impact Assessment	4		
5.	Disaster Management	6		
	TOTAL	56	-	-

DETAILED CONTENTS

1. INTRODUCTION :

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigration, urbanization, road development and other engineering activities and their effects on ecology and eco system, Mining and deforestation and their effects.

- Lowering of water level , Urbanization.

- Biodegradation and Biodegradibility, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides.

- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain,etc.

2. POLLUTION :

Sources of pollution, natural and man made, their effects on living environments and related legislation.

2.1 WATER POLLUTION :

- Factors contributing water pollution and their effect.

- Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.

- Physical, Chemical and Biological Characteristics of waste water.

- Indian Standards for qulity of drinking water.

- Indian Standards for quality of treated waste water.

- Treatment methods of effluent (domestic waste water and industrial/ mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION :

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.

A. Settling chambers
B. Cyclones
C. Scrubbers (Dry and Wet)
D. Multi Clones
E. Electro Static Precipitations
F. Bog Fillers.

- Ambient air qulaity measurement and their standards.

- Process and domestic emission control

- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

2.3 NOISE POLLUTION :

Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION :

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT :

Municipal solid waste, Biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION :

Preliminary knowledge of the following Acts and rules made thereunder-

- The Water (Prevention and Control of Pollution) Act - 1974.

- The Air (Prevention and Control of Pollution) Act - 1981.

Corrected and Approved by B.T.E. On Dated 27.05.2015

- The Environmental Protection (Prevention and Control of Pollution) Act -1986. Rules notified under EP Act - 1986 Viz.

  # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000

  # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003.

  # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.

  # The Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.

  # Municipal Solid Wastes (Management and Handling) Rules, 2000.

  # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA) :

- Basic concepts, objective and methodology of EIA.

- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT :

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of Tsunami Disaster, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers, Case studies of various Disaster in the country, Meaning and benifit of vulnerability reduction, Factor promoting vulnerability reduction and mitigation, Emergency support function plan.

Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.2 CEMENT AND LIME

L	T	P
6	-	-

A. TOPICWISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Chapter I	3		
2.	Chapter II	3		
3.	Chapter III	3		
4.	Chapter IV	3		
5.	Chapter V	3		
6.	Chapter VI	3		
7.	Chapter VII	6		
8.	Chapter VIII	6		
9.	Chapter IX	12		
10.	Chapter X	18		
11.	Chapter XI	12		
12.	Chapter XII	12		
	TOTAL	84	-	-

B. SYLLABUS:

LIME.

I. Origin of lime stones.

II. Varieties of lime stones, chemical composition of lime stone.

III. Burning of lime stone.

IV. Type of lime kilns.

V. Composition of commercial limes, lime slaking.

VI. Effect of the presence of magnesia and use of lime mortar.

VII. Preparation of hydrated lime, grinding the quick lime, mixing with water.

VIII. Test of hydrated lime.

IX. Building limes, classification of building lime, hydraulic and fat lime, lime saturation factor and lime standards.

CEMENT:

X. Chemistry of anhydrous and hydrated cement compounds. The constitution of portland cement. Method of manufacture of port land cement, and testing. Action of acid and sulphate water on port land cement, the physical and chemical properties of port land cement, defects causes and remedies.

XI. Different types of cements, e.g. quick setting cement, pozzolanas and pozzolanic cement, high alumina cement, water proof cement, oil well cement, hydrophobic cement, masonry cement, white cement, coloured cement, rapid hardening cement, castable refractories, low and ultra low cement castables.

Additives - accelerators, retarders, waterproofers, pigments, dispersing agents.

XII. Testing of Cement : Consistency of cement, Initial and final setting of cement, Expansion of cement, Compressive and tensile strangth, Particle of cement, Impurities in cement, Specific gravity of cement, Chemical analysis of cement

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.3 CERAMIC MACHINERY & FURNACE DESIGN

L	T	P
6	-	-

A. TOPIC WISE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Chapter I	12		
2.	Chapter II	15		
3.	Chapter III	4		
4.	Chapter IV	12		
5.	Chapter V	12		
6.	Chapter VI	12		
7.	Chapter VII	5		
8.	Chapter VIII	12		
	TOTAL	84	-	-

B. SYLLABUS:

I. Plant design, plant location, layout of the factory building, selection, operation and maintenance of ceramic machinery and equipment (for pottery, refractory, glass, enamel and cement).

II. Furnace Design: study of common types of furnaces in use in ceramic industries i.e. glass melting tank furnaces including unit melters, tunnel kiln, chamber kiln and down draft kiln, rotary cement kiln, muffle kiln and annealing lehrs. Environment friendly gas fired Kiln for glass beeds making.

III. Chimney and chimney calculation.

IV. Essential operations of a furnace i.e. firing, charging, melting and reversal etc.

V. Preheating of air, gas, fuel and oil, Flame-system, preheating of batch.

VI. Furnace life and selection of refractories, Heating up and cooling down of a furnace. Combustion calculation, Solid adn Liquid Fuel, gaseous Mixture.

VII. Furnace capacity, fuel efficiency and firing efficiency.

VIII. Elementery idea of design, construction and thermal calculation of at least one of the above mentioned furnaces.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.4 GLASS & CERAMIC ENGINEERING DRAWING-II

L	T	P
-	-	8

A. TOPIC WSIE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Unit I (12 Plates)			75
2.	Unit II (4 Plates)			25
3.	Unit III (1 Plate)			12
	TOTAL			112

B. SYLLABUS

I. Sectional views of the following ceramic machinary (Assembly and dissembly where possible)

1. Ballmill, Tube Mill
2. Edge runner mill
3. Jaw crusher
4. Plunger
5. Filter press
6. Vibrating screen
7. Sieve shaker
8. Muffle furnace
9. Jigger jolley
10. Down draft furnace
11. Hand press
12. Pugmill
13. Pc furnace
14. Glass melting furnace, Tank and Pot Furnace
15. Frit furnace
16. Chimneys for glass and pottery furnace
17. Ratary Kiln

II. Layouts of ceramic plant:

a. Pottery
b. Refractory
c. Glass
d. Enamel
e. Cement

III. Dimensioned drawing of Insulator.

Corrected and Approved by B.T.E. On Dated 27.05.2015

ELECTIVE

6.5 I. GLASS TECHNOLOGY-II

L	T	P
6	-	-

TOPIC WSIE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Topic 1	10	-	-
2.	Topic 2	15	-	-
3.	Topic 3	15	-	-
4.	Topic 4	12	-	-
5.	Topic 5	10	-	-
6.	Topic 6	10	-	-
7.	Topic 7	12	-	-
	TOTAL	84	-	-

1. GLASS CERAMICS :

Introduction on Nucleation and crystrallization in glasses, Controlled heat treatment for crystrallization, Ultra low thermal expansion glass ceramics, Machinable glass ceramics.

2. ORNAMENTAL GLASS:

Raw materials of ornamental glass i.e. Soda Lime, Silica Glass, Borosilicate Glass. Types of ornamental products i.e. Glass beads, Glass Pendants, Different techniques of decoration i.e. Silvering, Fuming, Lustering, Feathering, Dating, Banding, Dichroic, Millefiori, Different techniques of glass beads making. History of glass beeds making. Tools and apparatues for glass beads making.

3. FLOAT GLASS :

Theory of float process, construction of float tank, Control of glass ribbon thickness.

4. OPTHELMIC GLASSES :

Refractive and dispersion in glass, Design of glass lens.

5. GLASS AND REFECTORY TECHNOLOGY :

Different types of refractories used in glass industriy, Properties, Behaviour, Conditions in the different zones of glass. Melting furnace and selection of refractory accordingly.

6. GLASS DECORATION :

Different methods of decoration- Cutting and polishing, Sand blasting, Engraving, Screen printing, Hand painting and Stained glasses.

6. GRAIN SIZE DETERMINATION :

Corrected and Approved by B.T.E. On Dated 27.05.2015

Size grading, Sieving by sieve shaker, Particle size determinations by elutriation, Schoue elutriator, Schulze hard kort elutriator apparatus, Andrews kinetic elutriator, Andreasen pippet, ICI sedimentation apparatus.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.5 II. POTTERY & PORCELAIN-II

L	T	P
6	-	-

TOPIC WSIE DISTRIBUTION OF PERIODS:

SL.NO.	TOPIC	L	T	P
1.	Topic 1	15	-	-
2.	Topic 2	15	-	-
3.	Topic 3	10	-	-
4.	Topic 4	10	-	-
5.	Topic 5	10	-	-
6.	Topic 6	10	-	-
7.	Topic 7	9	-	-
8.	Topic 8	5	-	-
	TOTAL	84	-	-

1. Raw material for whitewares. Thermal effect, high temperature reactions in raw materials and their chemical change. Properties effect on ceramic whitewares, Texture and other physical properties. Influence of size and shape of particles. Particles size of ceramic materials and their determination. Changes in volume factors which influence the change. Defects in whiteware bodies caused by thermal expansion effects. Factors which influence changes in porosity and water absorption. Factors involved in the strength of whiteware bodies. Factor affecting colour. Processing of the grain growth. sintering and vitrfication. Microstructure of whitewares.

2. Triaxial and other whitewares and compositions with their calcualtions.

3. Mechanism of firing and control : Modern trends in firing of whitewares.

4. Strength of porcelain insulators. Factors effecting breakdown of high and low voltage insulators.

5. Whitewares bodies : bone china, chemical procelain, sanitary wares, electrical procelain manufacture, properties and uses.

6. Ceramic glazes and their properties and uses.

7. Ceramic colours and decoration.

8. Recent development and control techniqes ad applied to the whitewares processes- Kilns, Roller Head Jigger, Digital Printing.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.6 SILICATE ANALYSIS LAB

L	T	P
-	-	8

i. Determination of purity of chemicals used in Ceramic industry.

ii. Analysis of ceramic raw materials and glass raw materials such as lime, glass-sand, felspar, clay and quartz.

iii. Colorimetric estimation of iron in China clay, glass sand and quartz.

iv. Analysis of Soda-lime glass.

v. Determination of alkali by conventional method and by flame photometer.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.7 PHYSICAL TESTING LAB

L	T	P
-	-	8

(A) POTTERY:

1. Particle size determination of ceramic raw materials by sedimeation e.g. Anderencen pippete, sedimantation balance.
2. Strenght of green and fired bodies.
3. pH-measurement of casting slip.
4. Viscosity of slurry.
5. Thickness of weight, per unit area of glaze applied.
6. P.C.E. test for clays.

(B) REFRACTORY :

7. P.C.E. test for refractories.
8. Refractoriness under load test.
9. Spolling test. (upto 1000 C.)
10. Thermal expansion test (upto 1000 C.)
11. Thermal conductivity (upto 1000 C.)
12. Slag or glass resistance test (corrosion test)
13. Permanent linear change.
14. Permeability test.
15. Cold crushing strenght.
16. Packing Density
17. Grading of Grog
18. Warpage of Refractory Slab

(C) GLASS :

19. Softening point by littinton methods.
20. Low temperature viscosity.
21. Chemical durability by
    a. I.S.I. method
    b. ASTM Method
22. Thermal expansion test upto 1000 C.
23. Thermal Shock test
24. Annealing test by strain viewer.
25. Wall thickness test
26. Light absorption of coloured glass at different wave length by spectro photometer.

(D) ENAMEL:

28. Fusion test.
29. Alkali Resistance Test
30. Acid Resistance Test
31. Inpact Resistance Test
32. Water Resistance Test
33. Metal Gauge and Dimension

(E) FUEL AND PYROMETRY :

34. Proximate analysis of coal.
35. Gas analysis.
36. Viscosity of fuel oil.
37. Flash point of fuel oil.
38. sulphur determination of coal.
39. Study of different types of pyrometers and Thermocouples.
40. Calorific value of coal by Bomb calorimeter.

Corrected and Approved by B.T.E. On Dated 27.05.2015

6.8 PROJECT

L	T	P
-	-	2

In the final year of the course, student can be divided in groups of 3 to 5 to take up a project for setting up a small scale industry to produce glass wares, white wares, electrical insulating items,refractory bricks etc.

The project report will include selection of site, market survey , list of equipments & machinery, raw materials,power, human resources, and investment involved. These things be rationally determined by the basis of actual data collected during survey. They are expected to visit existing industry for the purpose.

The project will also clearly mention amount of raw material wanted for 3 months working and yearly turn over and expected profit.

Prepare at least a few samples of the product, intended for manufacture, at institute level for producing before the examiner.

The project should have a table of the results of test and quality control of the product.

There should be a brief consideration of enviornment pollution due to this unit and measures to achieve & maintain the minimum permissible level of pollution.

The project will be evaluated by an external examiner for 120 marks whose brakeup is as follows:

Presentation on given project in 10 - 15 slides

(i) Documentation of the project report - 30 marks

(ii) Viva Voce - 50 marks

(iii)Sessional - 40 marks

6.9 INDUSTRIAL TOUR

Corrected and Approved by B.T.E. On Dated 27.05.2015

DIPLOMA IN GLASS & CERAMIC ENGINEERING
STAFF STRUCTURE

	Intake of the course	60
	Pattern of the course	3yrs(Six Semester)
1.	Principal	1
2.	H.O.D.	1
3.	Lecturer Ceramic.Engg.	6
4.	Lecturer Maths	1 | Part time or
5.	Lecturer Physics	1 | common with
6.	Lecturer Chemistry	1 | other discipline
7.	Lecturer Language	1 | if the intake is
8.	Lecturer Computer	1 | more than 180.
9.	Steno typist	1
10.	Accountant/Cashier	1
11.	Student/Library Clerk	1
12.	Store Keeper	1
13.	Class IV	6
14.	Sweeper	Part time as per requirement.

The posts of Choukidar and Mali will be sanctioned according to the justification of institution. Services for existing staff in other disciplines of the institute may be utilised if possible.

The posts at serial number 4,5,6,7,8,9,10 and 11 are minimum common staff in the institute.

The qualifications of the staff will be as given in the service rules.

Corrected and Approved by B.T.E. On Dated 27.05.2015

SPACE REQUIREMENT

	A. Total Land Area	No	M2
	B. Administrative Block		
1.	Prinicipals Room	1	30
2.	Steno Room	1	6
3.	Confidential Room	1	10
4.	Office room	1	80
5.	Library (Common with other disciplines)	1	150
6.	Common Room	1	80
7.	Class Rooms	2	150
8.	Store	1	100
9.	Model Room	1	90
	C. Laboratories/Workshops		
1.	Computer Lab	1	30
2.	Applied mehanics Lab	1	60
3.	Drawing Hall	1	120
4.	Ceramic Engg.Lab.	1	120
5.	Ceramic Lab	1	120
6.	Modelling & Moulding Lab.	1	120
7.	Silicate Analysis Lab	1	60

Note: Labs of physics, Chemistry and computer science will be common for all disciplines in the institute.

	D. Common Facilities		
1.	Dispensary	1	40
2.	Canteen & Tuck shop	1	50
3.	Parking space/cycle stand	1	200% student
	with Garrage		50% student
4.	N.C.C. Block	1	70
5.	Guest Room	1	30
	E. Residential Facilities		
1.	Hostel for Students	1	for 40% student
2.	Staff Quarters		
	Principle	1	Type IV
	HOD/Warden	2	Type IV
	Sr. Lect./Lect.	2	Type IV
	Technical/Ministerial staff	2	Type II
	Class IV	6	Type I
3.	Play Ground	1	

Corrected and Approved by B.T.E. On Dated 27.05.2015

LIST OF EQUIPMENTS

Only those of the equipments given below which are essentially required for the conduction of practicals mentioned in the curriculum are to be procured by the institutions.

"Machine/Equipments/Instruments of old BTE list which are not included below are to be retained in the Lab/Shop for Demonstration purpose but not to be demanded fresh for purchase."

NOTE : Equipment for different shop and lab of latest verson should be purchased.

I. APPLIED PHYSICS LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Brass ball with hook dia 1.8 Cm to 2 Cm diameter	2	50	100
2.	Stop watch least count Least Count 0.1 Sec.(non-megnetic) 0.01 sec to 0.001 sec (Electronic Desirable)	4	750	3000
3.	Wall bracket with clamping arrangement 8" to 10" length	2	50	100
4.	Meter scale Least count 0.1cm,wooden 1meter	5	40	200
5.	Meter scale Least count 0.1cm,wooden 50 Cm	5	40	200
6.	Searl's conductivity apparatus with copper & steel rods 25 cm length 4 cm.diameter with all accessaries	2 set	1500	3000
7.	Constant Level Water Flow Container of one liter capacity vertical stand & rubber tubing	2	250	500
8.	Thermometer 0-110oC(Least count 0.1oC desirable)	4	100	400
9.	Potentiometer - 10 wires (1 meter length of each wire) with jockey, sunmoical top	4	750	3000
10.	Moving coil galvenometer 30-0-30 with moving mounting	5	300	1500
11.	Rheostat 50 ohm.,100 Ohm.,150 Ohm. capacity	16	300	4800
12.	Lead Accumulator 2V,6V (1 No.Each)	2	250	500
13.	Meterbridge 1 meter length, sunmica top copper strips fitted with scale	2	300	600
14.	Resistance Coil (Standard) 1 ohm. to 10 ohm.	10	50	500
15.	Moving coil ammeter 0-1 amp., 0-2 amp., 0-5 amp. with mounting	8	250	2000
16.	Moving coil voltmeter 0-1 V.,0-2V 0-5 V., 0-10 V. with mounting	8	250	2000
17.	Denial cell with complete accessories	2	250	500

Corrected and Approved by B.T.E. On Dated 27.05.2015

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
18.	Leclaunche Cell with complete accessories	2	250	500
19.	Standard Cadmium Cell with complete accessories	2	250	500
20.	Battery Charger with complete accessories	1set	1800	1800
21.	Battery Eliminator Multi range	2set	750	1500
22.	Multimeter(Digital)	1set	800	800
23.	Carey Foster Bridge (With all accessories)	2set	4500	9000
24.	Resistance Box (2 No. Each) 0-1 Ohm, 0-100 Ohm.	4	850	3400
25.	Fractional Resistance Box 0-1 Ohm.	2	1200	2400
26.	Post office box Key type	2	1200	2400
27.	Post office box Dial type	2	1200	2400
28.	Resistance Wire(100 Gm.) (Constanton/Maganin)	1 lacchi	100	100
29.	Connecting Wire Copper(1/2 Kg.) (Cotton Insulated)	1 lacchi	700	700
30.	Screw gauge L.c 1/100 mm	5set	150	750
31.	Vernier Callipers L.c. 1/10 mm	5set	100	500
32.	Appratus for determining character-stics of P-N junction diode complete with all accessaries	2 set	1500	3000
33.	Resonance Column of steel One Meter length and 3-4 Cm diameter fitted with scale & water level arrangement	2	1600	3200
34.	App. for determining coefficient of friction on a horrizontal plane (Complete with all accessories)	2 set	700	1400
35.	Tuning Fork's Sets Set of different frequency (with rubber pad)	3set	350	1050
36.	Physical balance with weight box Complete with Fractional weight	2	800	1600
37.	Anemometer with counter cup type	1	1000	1000
38.	Spring Force Constant Apparatus with graduated mirror & pointer, weight set with hanger	2	1200	2400
39.	Viscosity Apparatus (Stock law) with steel balls and viscous liquid & timer	2set	1600	3200
40.	Thermometer of different range Mercury thermometer 0-50oC to 0-110oC	10set	100	1000
41.	Wall Thermometer Alcohal Filled 0-50oC	2set	20	40
42.	Sprit Level Technical Type	1set	60	60
43.	Drilling Machine Electric with different size bits	1set	800	800
44.	LPG Gas Burner with Cylinder	1set	800	800
45.	Tool Kit with different tools Complete	1set	800	800
46.	Lab stools	30		

Corrected and Approved by B.T.E. On Dated 27.05.2015

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
47.	Lab tables	8		
48.	Plug Keys One Way	5	50	250
49.	Plug Keys Two Way	5	100	500
50	Helical Springs - Soft, 10 cm each	6	100	600

Corrected and Approved by B.T.E. On Dated 27.05.2015

II. APPLIED CHEMISTRY LAB

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
1.	Test tube stand (Plastic/Tafflon)	30	20	600
2.	Funnel stand (Plastic/Tafflon)	30	20	600
3.	Burette stand Stainless Steel/Wooden/Iron	30	50	1500
4.	Pipette stand Stainless Steel/Wooden/Plastic	30	20	600
5.	Chemical balances with analytical weights 1gm -200gms	5	1500	7500
6.	Fractional weights set with rider 10 mg to 500 mg with rider	5sets	25	125
7.	Kipp's apparatus 1000 ml. Plastic/ Tafflon	2	500	1000
8.	Reagents bottles			
	250ml	120	20	2400
	500ml	25	25	625
	1000ml	5	30	150
9.	Wide mouth bottle 250 ml Glass	50	15	750
10.	Winchester bottle 2.5 litre Plastic/Tafflon	15	30	450
11.	Test tubes 1/4" x 6"			
	i. Corning or Borosil	200	9	1800
	ii. Glass	200	2	400
12.	Boiling tube 1" x 6"			
	i.Corning or Borosil	100	16	1600
	ii. Glass	100	5	500
13.	Pestle and morter Dia 10 cms 15 cms (Ceramics)	2	30	60
14.	Watch glass 5.0 cms,7.5 cms glass	15	5	75
15	Beakers (Glass/Brosil/Corning Plastic)			
	250 ml.	50	20	1000
	500 ml.	50	20	1000
16.	Weighing Tube 10 ml with lid (Plastic)	30	10	300
17.	Wash bottles (Plastic/Tafflon)	30	15	450
18.	Conical flask 250 ml. Glass (Brosil/Corning/Plastic) Transparnt	100	30	3000
19.	Flat bottom flask 500 ml.Glass	15	40	600
20.	Flat bottom flask 250 ml.Glass	15	25	375
21.	Burette 50 ml. (Plastic/Tafflon)	30	60	1800
22.	Pipette 25 ml. (Plastic/Tafflon)	30	20	600
23.	Measuring flask 250 ml. with stopper	30	50	1500
24.	Measring cylinder of various sizes (100 ml,250 ml,500 ml,1000 ml) 3 no. of each	12	30	360
25.	Bunsen's burner of brass	30	50	1500
26.	Gas plant petrol/LPG 10 to 20 burners automatic	1	5000	5000
27.	Spirit lamp (Brass)	30	30	900
28.	Tripod stand (Steel/Iron) Large/Medium	30	30	900
29.	Wire gauge 15 X 15 cm. with asbestos	30	15	450
30.	Test tube holder wodden	50	10	500

Corrected and Approved by B.T.E. On Dated 27.05.2015

S.No.	Name of Equipment	No.	@ Rs. Aprox.	Amt.in Rs. Aprox.
31.	Porcelain plates Ceramic	30	20	600
32.	Funnel 15 cm. Glass Borosil Corning/Plastic	60	16	960
33.	Spatula hard & nickel/steel	2 each	50	100
34.	Distilled water units (electrical)	1	10000	10000
35.	Distilled water units (solar)	1	5000	5000
36.	Open balance 1000 gms./10 mg.	1	600	600
37.	Brush for cleaning Hydro Fiber Acid & Alkali Resistant	100	10	1000
38.	Jars 20 Lit. for keeping destilled water	5	100	500
39.	Lab table 2 m. x 1.2 m. x 1 m. hight with central sink and cup boards (Teak wood) with drawers and two built in almirah on each side with reagent racks, better tile top	4	8000	32000
40.	Exhaust fans 18" (GEC make/Crompton)	4	2000	8000
41.	Side racks and selves for bench reagents made of teak wood for 24 bottels each set	4	2000	8000
42.	Digital balance electronic Electronics upto 2 decimal places	1	10000	10000
43.	Hot plates 7-1/2", 3" dia controled 2000 watts	1	1000	1000
44.	Hot air oven thermostatically controled with selves and rotary switches 350 x 350 x 25 high	1	8000	8000
45	pH Meter (Digital)	1	1000	1000
46	Glass Electrode	2	850	1700
47.	Reference Electro	2	850	1700
48.	Weight Box 1gm,2gmX2, 5gm,10 gm 20gmX2, 50gm, 100gm with for cep Miscellaneous	LS		15000

Corrected and Approved by B.T.E. On Dated 27.05.2015

III. APPLIED MECHANICS LAB

Sl.No.	Name of Equipment	No.	Rate	Amount
1.	Polygon of Forces Apparatus	4	1500	60000
2.	Universal Force Table	2	2500	5000
3.	Principle of Moment Appratus Bell Crank lever	4	1500	60000
4.	Combined Inclind plane & Friction apparatus	4	1500	60000
5.	Simple wheel and axle	2	2500	5000
6.	Differential wheel and axle	2	3500	7000
7.	Double sleave Pulley Block	1	800	800
8.	Simple Screw Jack	4	3000	12000
9.	System of pulleys (Any I,II,III)	2Set Each	4000	8000
10.	Worm & Worm wheel	2Set Each	5000	10000
11.	Simply Support Beam with different weights (2 Sets)	2	3000	6000
12.	Jib Crane	2	2500	5000
13.	Jointed Roof Truss Apparatus	2	2500	5000
	Misc.	Lum Sum		5000

Note :
1. S. No. 1,2 Acrylic/Wood material/Aluminium Cast
2. S.No. 3,4,5,8,9 working model of Acrylic/Aluminium/Cast
3. Above items are for 2 batches of 15 students each.

Corrected and Approved by B.T.E. On Dated 27.05.2015

V. WORKSHOP PRACTICE

CARPENTRY SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	60 cm.rule	10	50	500
2.	Flexible steel rule 2 metre	2	75	150
3.	T square 23 cm. steel	10	50	500
4.	Bevel square 23 cm. steel	2	100	200
5.	Marking knife 25 cm. steel	10	100	1000
6.	Marking gauge wooden & brass 25 cm.	10	150	1500
7.	Mortise gauge wooden & brass 25 cm.	10	150	1500
8.	Caliper inside,steel 20 cm.	2	200	400
9.	Caliper outside , steel 20 cm.	2	200	400
10.	Compass steel 20cm.	2	100	200
11.	Devider steel 20 cm.	2	100	200
12.	Plumb	2	75	150
13.	Wooden bench vice steel 20 cm.	10	500	5000
14.	Bench hold fast steel 30 cm.	10	300	3000
15.	Bar clamp 2 m.	2	500	1000
16.	G clamp of flat spring steel 20x30 cm.	4	150	600
17.	Rip saw 40-45 cm.	10	200	2000
18.	Cross cut saw 40-45 cm.	2	200	400
19.	Tennon saw 30-35 cm.	10	200	2000
20.	Dovetail saw 30-35 cm.	2	150	300
21.	Compass saw 35 cm.	4	150	600
22.	Key hole saw or pad saw 30-35 cm.	2	150	300
23.	Bow saw	2	200	400
24.	Frame saw	2	200	400
25.	Chisel fish brand 1" to 1/8"			
	firmer	3 set	250	750
	Dovetail	3 set	250	750
	Mortise	3 set	250	750
26.	Gauge or Golchi 1" to 1/8"	3 set	300	900
27.	Wooden jack plane complete	10	100	1000
28.	Wooden smoothing plane	10	250	2500
29.	Iron jack plane complete	10	200	2000
30.	Iron rebate plane complete	3	200	600
31.	Iron grooving plane complete	3	300	900
32.	Iron compass plane complete	3	350	1050
33.	Wooden moulding plane complete	3	500	1500
34.	Bradawl	3	350	1050
35.	Gimlet drills set	1 set	300	300
36.	Center bit	2	250	500
37.	Twist bit	2	200	400
38.	Auger bit	2	200	400
39.	Dovetail bit	2	200	400
40.	Counter shank bit	2	200	400
41.	Ratchet brace machine	2	300	600
42.	Grand drill machine 1/4"	2	600	1200
43.	Wooden hand drill burmi	5	700	3500
44.	Wooden mallet	10	100	1000
45.	Claw hammer	3	100	300
46.	Carpenters hammer	10	100	1000
47.	Cutting tool for Universal wood working machine	3 set	1500	4500
48.	Screw driver 18" & 15"	6	100	600

Corrected and Approved by B.T.E. On Dated 27.05.2015

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
49.	Adze 500 gm.	10	100	1000
50.	Pincer 175 mm.	6	250	1500
51.	Plier 150 mm.	4	200	800
52.	Oil stone 8"	4	180	720
53.	Rasp file 12"	4	200	800
54.	Half round file 12"	4	200	800
55.	Round file 12"	4	200	800
56.	Triangular file 5", 4"	8	200	1600
57.	Water stone	4	80	320
58.	Carpentry work benches	4	4000	16000
59.	Band saw machine complete	1	60000	60000
60.	Circular saw machine	1	35000	35000
61.	Double Ended Electric Bench grinder	1	15000	15000
62.	Universal wood working machine	1	30000	30000
	misc. for foundation of machines	LS		20000
	SMITHY SHOP			
1.	Anvil 150 Kg. with stand	5	5500	25500
2.	Swage block 50x30x8cm.&45x45x10cm.	2	3000	6000
3.	Hammers			
	Ball peen 0.8 Kg. (Approx.)	10	350	3500
	Cross peen 0.8 Kg. (Approx.)	10	350	3500
4.	Beak iron 25 Kg.	1	1000	1000
5.	Swages different types	6	100	600
6.	Fullers different types	6	100	600
7.	Leg vice 15 cms. opening	1	300	300
8.	Electric blower with motor	1	10000	10000
9.	Furnace chmney with exhaust pipe	5	10000	50000
10.	Sledge hammer - 5 Kg.	2	400	800
	Misc. tools		LS	5000
	SHEET METAL, SOLDERING & BRAZING			
1.	Dividers - 15cm.	5	100	500
2.	Trammel 1 m.	1	80	80
3.	Angle protector	5	100	500
4.	Try square 30 cm.	5	80	400
5.	Centre punch	5	50	250
6.	Steel rule 30 cm. , 60 cm.,	5	25	125
7.	Sheet metal gauge	1	250	250
8.	Straight snips 30 cm.	2	500	1000
9.	Curved snips 30 cm.	2	600	1200
10.	Bench shear cutter 40 cm.	1	10000	10000
11.	Chisel 10 cm.	5	200	1000
12.	Hammer	5	300	1500
13.	Bench vice 13 cm.	5	2000	10000
14.	Plier	5	100	500
15.	Nose plier	5	120	600
16.	Sheet metal anvil/stakes	5	3500	17500
17.	Shearing machine 120 cm.	1	5000	5000
18.	Solder electric	2	1000	2000
19.	Solder furnace type	2	500	1000
20.	Brazing equipments and accessories	1	10000	10000
21.	Blow lamp	2	400	800
22.	Sheet bending machine	1	20000	20000
	Misc.		LS	10000

FITTING SHOP

Corrected and Approved by B.T.E. On Dated 27.05.2015

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Bench vice jaw 10 cm.	10	600	6000
2.	Surface plate 45x45 cm.	2	4500	9000
3.	V. Block 10x7x4 cm.	5	700	3500
4.	Try square	10	100	1000
5.	Bevel protractor 30 cm.	1	250	250
6.	Combination set	1	3000	3000
7.	Divider	5	100	500
8.	Centre punch	5	80	400
9.	Calipers (Different sizes)	12	100	1200
10.	Vernier calipers 30 cm.	2	1500	3000
11.	Micrometer 0-25, 25-50 m.m.	4	1500	6000
12.	Vernier depth gauge	1	700	700
13.	Feeler gauge--15 blades	1	100	100
14.	Radius gauge	1	200	200
15.	Angle gauge	1	200	200
16.	Thread gauge	1	200	200
17.	Bench drilling machine 13 mm.	1	10000	10000
18.	Double ended electric grinder	1	8000	8000
19.	Drill set	1set	2000	2000
20.	Reamer set	1set	3500	3500
21.	Tap set	1set	3500	3500
22.	Adjustable wrenches (15 cm.,20cm. 30 cm.)	1set	1200	1200
23.	Allen key set	1set	700	700
24.	Spanners	6	100	600
25.	Work benches	6	4500	27500
26.	Power hacksaw	1	8000	8000
	Misc. Files, Dieset, Hexa frames etc.		LS	20000

WELDING SHOP

1.	Ellectric welding set oil cooled	1	20000	20000
2.	Industrial regulator type oil cooled arc welder	1	25000	25000
3.	Air cooled spot welder 7.5 KVA	1	30000	30000
4.	General accssories for air cooled spot welder of 7.5 KVA			15000
5.	Gas welding set with gas cutting torch and complete with all accessories	1	30000	30000
6.	Misc. work benches		LS	35000

PAINTING & POLISHING SHOP

1.	Air compressor complete with 2 HP motor	1set	25000	25000
2.	Spray gun with hose pipe	1	1500	1500
3.	Stoving oven	1	6000	6000
4.	Buffing machine with leather and cotton wheels	1	8000	8000
5.	Electroplating Equipment for cromium Nikle plating.	1	20000	20000
	Misc.		LS	5000

Corrected and Approved by B.T.E. On Dated 27.05.2015

PLUMBING SHOP

S.No.	Name of Equipment	No.	@ Rs.	Amt.in Rs.
1.	Pipe vice 5 cm.	4	500	2000
2.	Chain wrenches	5	500	2500
3.	Ring spanner Set	5	250	1250
4.	Wheel pipe cutter	2	600	1200
5.	Water pump plier	4	100	400
6.	Pipe die set 2" set	2 set	1200	2400
7.	Pipe bending device	1	5000	5000
8.	Work benches	4	6500	26000
9.	Set of various types of plumbing fittings e.g. Bib cock Cistern, Stop cock, Wheel volve, Gat volve etc.	LS		4000
10.	Misc. Hacksaw frame and others	LS		4000

FOUNDRY SHOP

1.	Moulding boxes	25		12000
2.	Laddles	5		2000
3.	Tool kits	10 sets		5000
4.	Quenching tanks water or oil	2		2000
5.	Permiability tester	1		2000
6.	Mould hardness tester	1		12000
7.	Sand tensile testing equipment	1		15000
8.	Portable grinders	1		6000
9.	Temperature recorders/controllers	LS		10000
10.	Pit furnace with Blower	1		10000

MACHINE SHOP

1.	Lathe machine 4.5 feet "V" bed. Height of centres 8.5 inch. Dog chuck 8 inch complete 1 H.P. motor 440v, push button starter with coolent pump,tray and with standard accessories.	4		50000
2.	Shaper machine 12 inch stroke with 2 H.P. motor 440 volts push button starter with vice 6 inch (Swivel base)	2	20000	200000

NOTE:-

1. The institutes running mechanical engg. course need not purchase these two items sepreately because they will have one complete machine shop for the course
2. Above items are for 2 batches of 15 students each.

Additional Equipments For Second Year Mechanical Engg. Only)

1.	Crucibles (10-20 Kg.)	1	5000	5000
2.	Core Boxes	1 Set	8000	8000
3.	Plate form Weighing M/C (100 Kg. Capacity)	1	15000	15000
4.	Drying Oven	1	30000	30000
5.	Sand Sieves	1 Set	1000	1000
6.	Optical Pyrometer	1	10000	10000
7.	Electrical Discharge M/C(EDM)	1	50000	50000
8.	Misc.	LS		5000

Note:

1. Above items are for 2 batches of 15 students each.

Corrected and Approved by B.T.E. On Dated 27.05.2015

INTRODUCTION TO COMPUTER (Common to all Trades)

COMPUTER CENTRE

S.No.	DESCRIPTION	QTY.	APPROX. COST (in Rs.)
1.	Core-2 Quad Processor, 4GB RAM 1 GB SATA HDD, 19" TFT Monitor/ Server of Latest Specification OS-Windows 2007/2008/Latest Version	02 Server	1,20,000=00
2.	General Desktop Computer-Intel i5 or Higher(with latest Specification Pre loaded latest Anti Virus with Life time Subscription, Licence Media and Manual with UPS 660 VA with latest window OS Including licence OR Computer of latest Specification With latest window os including licence	60 node	36,00,000=00
3.	Software :((Latest Version)		
	i. MS OFFICE 2010/Latest Version	LS	LS
	ii COMPILER 'C', C++, JAVA-7	LS	LS
4.	Hardware	4,50,000.00	LS
	i. Switch-32 Port	02	
	ii. Router	02	
	iii. Hub	04(8 Port)	
	iv. Ext. Modem	02	
	v. Wireless N/W Adaptor	02	
	vi. Series Access Point	02	
	vii.LAN Cable Meter	05	
	viii. LAN Cable Analyzer	05	
	ix. Crimping Tool and all other accessories related to Networking	15	
5.	Scanner- Flat Bed A4/Auto Lighter (Bit depth 48)	02	20,000
6.	132 Column 600 CPS or faster 9 Pin dot matrix printer with 500 million character head life	02	50,000
7.	Laser Jet-A4 All In one 20 page per min (2 Each)	04	50,000
8.	Desk Jet-A4 Photo Smart (2 Each)	04	40,000
9.	5 KVA on line UPS with minimum 30 minute battery backup along with sealed maintenance free batteries. Provision for connecting external batteries with network connectivity.(For 2 Labs)	04	8,00000

Corrected and Approved by B.T.E. On Dated 27.05.2015

10.	Split Air Conditioner 1.5 tones capacity with ISI mark along with electronic voltage stabilizer with over voltage and time delay circuit	08	35,0000
11.	Room preparation and furniture	LS	
12.	19" rack, 24-port switch. connector RJ-45 Cat-6 cabling for network	LS	10,0000
13.	2 KVA Inverter Cum UPS	02	6,0000
14.	Fire Extinguisher (2 Kg.)	04	15000
15.	Fire Extinguisher (5 Kg.)	04	25000
16.	Vacuum Cleaner	02	25000
17.	LCD Projector 3000 Lumen with all Accessories	02	350000
18.	Pen Drive 16 GB	10	10000
19.	DVD Writer External	02	10000
20.	HDD External 500 GB	02	15000
21.	PAD (Latest Configuration)	02	15000
22.	Broadband For Internet(Speed Min. 8mbps)	04	LS
23.	USB Modem	02	8000
24.	Generator 15 KVA Water Coolant	01	450000

Corrected and Approved by B.T.E. On Dated 27.05.2015

LIST OF EQUIPMENT
Pottery & Refractory Lab

Sl.No.	Item	Qty.	Price	Total Cost
1	2	3	4	
1.	Edge Runner Mill	1	250000	250000
2.	Ball Mill capacity 3 CWt.	1	40000	40000
3.	Ball Mill for glaze 51 bs.	1	22000	22000
4.	Pot Mill rotatary	1	8000	8000
5.	Screw Plunger	1	22000	22000
6.	Wooden Plunger	1	5000	5000
7.	Vibrating	1	3000	3000
8.	Filter Press	1	30000	30000
9.	Jigger Jolleys	6	2000	2000
10.	Universal Jigger Jolleys	2	5000	10000
11.	Toygle Press	1	10000	10000
12.	Down draft furnace	1	30000	30000
13.	Press for refractory Bricks	1	15000	15000
14.	Hot air oven	2	5000	10000
15.	Disintegrator	1	20000	20000
16.	Kanthal Furnace upto 10000c	2	18000	36000
17.	Thermal Expansion apparatus	1	50000	50000
18.	Permeability test apparatus upto 1600o c.	1	10000	10000
19.	High temparature furnace horizontal type upto 1500 c.	1	200000	200000
20.	Ph meter	2	5000	10000
21.	Metallic frame for cone set	1	2000	2000
22	Schoeme's Elutriator	1	5000	5000
23.	Physical Balance 250 cms.	2	1500	3000
24.	Rotory Viscosity meter	1	40000	40000
25.	Test Sieves set	2	1000	2000
26.	Adherence test Aparatus.	1	5000	5000
27.	Vernier Callipers	5	500	2500
28.	Nicholson's Hydrometer	2	1000	2000
29.	Vicats Needle. app.	5	500	2500
30.	Maduce pump	1	10000	10000
31.	Co-efficient of linear expansion app. for ref.	1	80000	80000
32.	Annealing testing app. for Glass.	1	80000	80000
33.	Softening Testing Appt. for Glass.	1	10000	10000
34.	Thermal Expansion Testing App. for Glass.	1	20000	20000
35.	Density Comparator Testing App.	1	3000	3000
36.	Permeability App.	1	6000	6000
37.	Optical Microscope	3	20000	60000
38.	Optical Microscope (Ord.)	5	800	4000
39.	Ball mill size 2"X2.5" with high alumina lining and high alumina pebbles as grinding media.	1	200000	200000
40.	Vibro finishing mill (with rubber lining and polishing media)	1	350000	350000
41.	Hydraullic press (100 MT Capacity)	1	300000	300000
42.	Copying Machine	1	80000	80000
43.	Polishing and Grinding Machine	1	100000	100000
44.	Diamond Cutter with variable dia of blade (8",10" & 12")	1	300000	300000

Corrected and Approved by B.T.E. On Dated 27.05.2015

GLASS & ENAMEL WORKSHOP

Sl.No.	Item	Qty.	Price	Total Cost
1	2	3	4	
1.	Strain Viewer	2	7500	15000
2.	Auto clave	1	15000	15000
3.	Thermal baths for thermal shack	1	15000	15000
4.	High Temp. furnace	1	250000	250000
5.	Lens Grinding & Polishing m/c.	2	25000	50000
6.	Sand blasting m/c.	1	15000	15000
7.	Electric Furnace Small size 1000oc	1	20000	20000
8.	Electric furnace 30x30x30cm.Temp.1000oc	1	25000	25000
9.	Enamel slip Spray gun	2	1500	3000
10.	Hot plate 2 KW.	3	1000	3000
11.	Worker's tool and Moulds for glass set	15	1500	22500
12.	Pressure Testing M/c. for Bottels	1	60000	60000
13.	Tickness Viewer	1	10000	10000
14.	Suction & Blowing M/c.	1	10000	10000
15.	Glass melting Furnace (Gas fired)	1	80000	80000
16.	Pit Furnace coal fired	2	25000	50000
17.	Blow Lamp System For Glass Beeds Making	1		
18.	LPG Gas Fired Glass Beads Making Kiln Size (1.25Feet X 2 Feet X 1.25 Feet)	1	20000	20000
19.	Ultra Voilet Glass Viewer	1	25000	25000
20.	Glass Fusing Furnace For Glass Pendants and other decorative items making	1	60000	60000
21.	Screw Hot Press Size	2	50000	50000
22.	Round Shape Glass Beeds Making Plant - Cut of machine - Breaking Device - Vibro Polisher - Assorting Machnie - Misc. Tools	1	1000000	1000000
23.	Crystal Glass Beeds Making Plant - Grinding Machine - Polishing Machine - Fixing Machine - Transfer Machine - Brushing Machine - Moulding Machine - Multiple Stau Bearers	1	2000000	2000000

SILICATE LAB.

1.	Platinum Crushible with lid 25 ml.	5	40000	200000
2.	Platinum dish with lid 10 cm dia	5	35000	165000
3.	Hydro Flourication Ohamber	2	10000	20000
4.	Chemical Balance	2	5000	10000
5.	Hot air Oven	1	20000	20000
6.	Mataler Balance	1	150000	150000
7.	Calorimeter for determination of Iron titanium content in clay	1	60000	60000
8.	Lovibond comporotor with test tube.	1	500	500
9.	Speedy moisture test for direct reading	1	25000	25000
10.	Chemical Balance	1	5000	5000
11.	Hot air oven 14"x14"x14"	1	20000	20000
12.	Flame Photometer	1	40000	40000
13.	Water Bath	3	45000	45000
14.	Water De-ioniser Plant	1	250000	250000
15.	Platinum Grushible with lid	3	300000	300000
16.	Platonum Disc	3	400000	400000

Corrected and Approved by B.T.E. On Dated 27.05.2015

POTTERY & REFRACTORY WORKSHOP

1.	Jaw Crusher Capacity 1/4 to 1/2 ton per hour	1	40000	40000
2.	Double Roller crusher 10"x8" Roller size.	1	20000	20000
3.	Permanent Magnet for casting slip	1	5000	5000
4.	De-airing pug mill	1	350000	350000
5.	Painters Wheel	6	1000	6000
6.	Screw Cutting M/c.	1	10000	10000
7.	Muffle furnace	1	25000	25000
8.	Extrusion mill for Pipes	1	80000	80000
9.	Hot Plate	1	3000	3000
10.	Optical pyrometer	1	20000	20000
11.	P.C.E. Furnace	1	500000	500000
12.	Under load furnace	1	300000	300000
13.	Thermo couples upto 1500oc	1	10000	10000
14.	Potentiometer	1	10000	10000
15.	Travelling Microscope	1	22000	22000
16.	Horizontal High Temp. furnace	2	150000	300000
17.	Ultrasonic Drilling Machine	1	50000	50000
18.	3D Facating Machine	1	50000	50000
19.	Concave Machine	1	50000	50000
20.	Convex Facating Machine	1	50000	50000
21.	Gas Fired gold Decoratio Furnace (1000oc)	1	100000	100000
22.	Gas Fired Raku Kiln (1200oc)	1	200000	200000
23.	Gas Fired Bench Busher	1	20000	20000
24.	Graphite Paddles For Glass Beeds Making	1	50000	50000
25.	Ploter with Computer	1	700000	700000
26.	Optic Moulds for millefiori Glass rods	10	100000	100000

Corrected and Approved by B.T.E. On Dated 27.05.2015

CERAMIC ENGG. LAB.

Sl.No.	Item	Qty.	Price	Total Cost
1	2	3	4	
1.	Physical Balance 250 cms.	1	20000	20000
2.	Apparatus for testing c.c.e. of refractory	1	40000	40000
3.	Stop watchs	2	5000	10000
4.	Ofset apparatus for Gas Analisis	1	25000	25000
5.	Bomb calorimeter	1	50000	50000
6.	Viscometer for full	1	25000	25000
7.	Flash point Apparatus	1		
8.	Tensile strenth testing machine	1	40000	40000
9.	Piling resistance test apparatus	1	100000	100000
10.	Radiation Pyrometer	1	80000	80000
11.	Softenning point apparatus			
	i. Vertical tubler furnace upto 1000o c.	1	10000	10000
	ii. Thermocouple	1	3000	3000
	iii. Temperature indicator	1	5000	5000
	iv. Vertical Graduated Telescope	1	40000	40000
12.	Low temperature viscosity appratus			
	i. Tubler furnace upto 1000o C.	1	25000	25000
	ii. Termocouple			
	iii. Temperature indicator	1	3000	3000
	iv. Vertical graduated telescope	1	10000	10000
	v. 1/2 kg. weight	1	100	100
13.	Thermal Expansion Apparatus upto 1000 C.	1	100000	100000
14.	Spectrophotometer 300-900 mu	1	350000	350000
15.	Halfman Scratch hardness tester (Imported)	1	15000	15000
16.	Thickness Tester (Imported)	1	15000	15000
17.	Dimond wheel cutting M/c.	1	60000	60000
18.	Mending Strength Testing Machine			
	(a) Green Sample	1	450000	450000
	(b) Fired Sample	1	550000	550000
19.	Electronic Digital Plysical Balance	2	200000	200000
20.	High Temperature Furnace (1400oc)	1	400000	400000
21.	Moisture Balance	2	80000	80000
22.	Non Contact Thermometer upto 1400oc	1	200000	200000
23.	Refractometer & Glossy Meter	1	350000	350000
24.	Red Wood Viscometer	2	50000	50000

GEOLOGY LAB.

1.	Mineralogical Microscope	6	20000	120000
2.	Steel Books Shelves	2	6000	12000
3.	Steel Yard balance	3	1500	4500
4.	Moh's Scale for hardness	10	500	5000
5.	Rockwel Hardness Tester with computer Programming	1	1200000	1200000
6.	Grinding & Polishing Machines for sample preparation	1	300000	300000

Corrected and Approved by B.T.E. On Dated 27.05.2015

7.	LEARNING RESOURCE MATERIALS			
1.	LCD Projector with Screen	1	--	20000
2.	Handicam	1	--	30000
3.	Cutting, Binding & Stitching equipment.	1	--	30000
4.	Desk Top Computer with Internet Core i5/i7- 760, Processor, Genuine Windiw 7, Professional 18 inch HD, Flat Panel Monitor Optical Mouse, Key Board & all related media or latest version	1	--	40000
5.	Home Theater Support Disc type CD. CDR/CDRW DVDR/DVDRW, VCD Supported with USB Port Support-DIVX/JPEG/MP3	1	--	25000
6.	Commerical P A System 16 W-220W output, AC & 24V DC Operated, 5 Mic. & 2 Auxilary input, Speaker output 4 Ohm, 8 Ohm, 17 V & 100 V	1	--	20000
7.	Interactive Board	1	--	50000

Note :

1. This center will be only one at the institute level irrespective of all branches.

Corrected and Approved by B.T.E. On Dated 27.05.2015

ANNEXURE - I

FIELD EXPOSURE

Ceramic Engg. students will undergo a two week Industrial Exposure, (in small scale units atleast) after II semester arranged and supervised by the iunstitute staff. They may try their hands on simple tools and machines and will incorporate following points in their reports.

1. Name & Address of the unit

2. Date of

   i. Joining.

   ii. Leaving.

3. Nature of Industry

   i. Product.

   ii. Services.

   iii. Working Hrs.

4.

   i. Names of the sections of the unit visited.

   ii. Number of person engaged.

   iii. Activities in the section.

   iv. Name of tools/machines/ instruments used.
   simple sketch of tools & instruments.

   v. Source of power.

5.

   i. What is learnt. (Give on separate field)

   ii. What interested him most. (Give details)

Corrected and Approved by B.T.E. On Dated 27.05.2015

ANNEXURE - II
INDUSTRIAL TRAINING

After IV semester exam. in the summer vacation students of ceramic Engg. will have a four week Industrial Training in units not less than small scale industries. It should preferably be arranged in manufacturing (producing ceramic products e.g. white wares,Refractory bricks, Glass wares etc.).They will work and focus their attention there on following points to incorporate them in their reports.

1. Name & Address of the unit

2. Date of

   i. Joining.
   ii. Leaving.

3. Nature of Industry

   i. Product.
   ii. Services.
   iii. Working Hrs.

4. Sections of the unit visited and activities there in.

5. Details of machines/Tools & instruments used in working in the section of the unit visited.

6. Work procedure in the section visited.

7. Specifications of the product of the section and materials used.

8. Work of repair and maintenance cell.

9. Details of the shops (welding, Foundary, Machines shop etc) related to repair and maintenance work.

10. Name of checking and Inspecting Instruments and their details. Quality controls measures taken.

11. Details of hadraulics/pneumatic/ thermal units or appliances used if any.
12. Discripton of any breakdown and its restoring.
13. Use of computer - if any.
14. Visit of units store, Manner of keeping store items, Their receiving & distribution.
15. Safety measures on work place & working conditions in general - comfortable, convenient & hygeinic.

Corrected and Approved by B.T.E. On Dated 27.05.2015

ANNEXURE - III

TRAINEES ASSESSMENT

This Institution invites the comments on the training of its students (work & behaviour) from their immediate supervisors on the following points.

1. Name of the trainee

2. Date of
   i. Joining.
   ii. Leaving.

3.
   i. Regularity & Punctuality

   ii. Sense of responsibility

   iii. Readiness to work/learn

   iv. Obedience

   v. Skill aquired

4. Name of the sections of the unit he attended during his stay. His activities/worth of being there.

5. Any thing specific

Sinnature of the Assessor

Date :- Designation

Corrected and Approved by B.T.E. On Dated 27.05.2015

COMMUNITY DEVELOPMENT WORK

For Community Development work two 15 days camps shall be organised during the session in the identified villages. The students shall stay in the camps and under the supervision of the concerned faculty members shall undertake/execute the assigned works in the following fields.

1. To launch and sustain funtional literacy programmes.

2. To train the rural youth in different trades/skills.

3. Training by innovating and improving the efficiency of house hold gadgets.

4. To control and reduce pollution effecting the social fabric of rural life i.e.

   - Construction of Soak Pits and Sanitary Latrines, Tree Plantation, Social Forestry, Installation of Smokeless Chulhas.

5. To disseminate information on sources of non conventional energy. Installation and maintenance of Solar Street Lights, Solar Photovoltaic Pumps, Wind Mills, Bio Gas Plants etc shall be undertaken.

6. Transfer of appropriate Technology/Demonstration of cheap houses by use of locally available material, treatment of mud walls innovation of mud floor, treatment of thatch roofs etc shall be taken with provisions for training to the villagers.

7. Training and demonstration of new agricultural implements, house hold gadgets and appliances of non conventional energy.

8. To help the rural youth in preparing project reports to set up industrial units and entrepreueurial development.

9. All community polytechnics shall render, repair and maintain agricultural implements, appliances of non conventional energy, household gadgets, etc. and train the rural youth in such skills.

Corrected and Approved by B.T.E. On Dated 27.05.2015

ANNEXURE V-QUESTIONNAIRE

INSTITUTE OF RESEARCH,DEVELOPMENT AND TRAINING U.P.KANPUR -208024

SUBJECT: Questionnaire for ascertaining the job potential and activities of diploma holder in Glass & Ceramic Engg.

PURPOSE: To design and develop Three Year (Six Semester) diploma curriculum in Glass & Ceramic Engg.

NOTE: 1.Please answer the questions to the points given in the questionnaire.
2.Any other point or suggestion not covered in this questionnaire may be written on a separate paper and enclosed with the questionnaire.

1.Name of the organisation:_____
_____

2.Name & Designation of the officer filling the questionnaire _____
_____

3.Name of the department/section/ shop _____
_____

4.Important functions of the department/section/shop _____
_____

5.Number of diploma holder employees under your charge in the area of Glass & Ceramic Engg. _____

6.Please give names of modern equipments/machines handled by a diploma holder in Glass & Ceramic Engg.

1. 2. 3.

4. 5. 6.

7.What proficiencies are expected from a diploma holder in Glass & Ceramic Engg.

1. 2. 3.

4. 5. 6.

8.Mention the approximate percentage of the following desired in Diploma teaching.

1. Theoretical knowledge ----------%
2. Practical knowledge ----------%

Corrected and Approved by B.T.E. On Dated 27.05.2015

3. Skill Development ----------%

9.Do you think " on the job training" / Industrial training should form a part of curriculum. (Yes/ No)
if yes then

(a) Duration of training ----------
(b) Mode of training 1. Spread over different semesters

2. After completion of course

3. Any other mode

10.What mode of recruitment is followed by your organisation.

1. Academic merit
2. Written test
3. Group discussion
4. Interview
5. On the job test.

11. Mention the capabilities/ Qualities looked for while recruiting diploma holder in Glass & Ceramic Engg.

(a) Technical knowledge ----------
(b) Practical skill ----------
(c) Etiquettes and behaviour ----------
(d) Aptitude ----------
(e) Health habit and social background ----------
(f) Institution where trained ----------

12. Does your organisation have any system for the survey of Home articles of different countries/States. Yes/No

13. Does your organisation conduct field survey to know users views regarding. Yes/No

1. Home Articles for different age groups and sex.
2. Effect of climatic conditions
3. Any other
If yes ; Please give brief account of each.

14. Which type of assignment do you suggest for an entrepreneur in Glass & Ceramic Engg.

15. In which types of organisations can a diploma holder in Glass & Ceramic Engg.

1 2 3

4 5 6

16. Job prospects for the diploma holder in Chemical Engg. the next ten years in the state / country.

Corrected and Approved by B.T.E. On Dated 27.05.2015

17. In your opinion what should be the subjects to be taught to a diploma student in Glass & Ceramic Engg.

Theory Practical

18. Kindly mention particulars regarding topics/areas which should be given more emphasisin the curriculum .

Theory Practical

19. Kindly state whether your organisation can contribute towards improvement of curriculum in above field. Yes/ No
If yes : Please give names of experts in your organisation to whom contact.

20. Kindly give your valuable suggestions for being considered at the time of finilisation of curriculum.

21. What changes in technologies are to be incorporated in the development of curriculum in Glass & Ceramic Engg.

(Signature)

Kindly mail the above questionnaire duly filled to:-

Lal Ji Patel
Text Book Officer
Institute of Research,Development & Training,U.P.
Govt. Polytechnic Campus
Kanpur-208024

(Please note that all information in this survey is confidential for the use of curriculum design only)

Corrected and Approved by B.T.E. On Dated 27.05.2015

SUGGESTED BOOKS

1. DISCIPLINE : APPLIED PHYSICS

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ANUPRAYUKT BHAUTKI	GUPTA & GUPTA	HINDI	1995	75.00	ASIAN PUBLISHERS, 85-C NAI MANDI, MUZAFFAR NAGAR
2.	ENGINEERING BHAUTKI	Dr. BHARGAVA	HINDI	1995	60.00	DHANPAT RAI & SONS
3.	ANUPRAYUKT BHAUTKI	KUMAR & TYAGI	HINDI	1995	75.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD,MEERUT
4.	ANUPRAYUKT BHAUTKI	Dr. R.C.PANDEY	HINDI	1994	75.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD, MEERUT
5.	APPLIED PHYSICS-I (Vol - I)	Dr. H.H.LAL	ENGLISH	1993	45.00	TATA McGRAW HILL
6.	APPLIED PHYSICS-II(Vol - II)	Dr. H.H.LAL	ENGLISH	1993	54.00	TATA McGRAW HILL
7.	MODERN COLLEGE PHYSICS	WHITE	ENGLISH	1995	110.00	C. B. S.
8.	PHYSICS Vol - I & II	HOLLIDAY AND RESNIC	ENGLISH	1993	100.00	WILEY EASTERN

1. DISCIPLINE : APPLIED MATHEMATICS

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	APPLIED MATHEMATICS (Math-I & Math-II)	KAPOOR & TARAMAN	HINDI	1994	75.00	NAV BHARAT PRAKASHAN, MEERUT
2.	APPLIED MATHEMATICS (Math-I & Math-II)	Dr KAILASH SINHA	HINDI	1994	60.00	BHARAT BHARATI PRAKASHAN, MEERUT
3.	APPLIED MATHEMATICS (I & II)	LUTHERA	HINDI	1994	65.00	B. Tec. PRAKASHAN, LUCKNOW
4.	APPLIED MATHEMATICS (I & II)	P. GUPTA	HINDI	1994	65.00	ASIAN PUBLISHERS, MUZAFFAR NAGAR
5.	ADVANCE Engg. MATHS	H. K. DAS	ENGLISH	1994	125.00	S. CHAND & COo., RAM NAGAR NEW DELHI

1. DISCIPLINE : PROFESSIONAL COMMUNICATION

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ENGLISH FOR COMMUNICATION	V. SHASHIKUMAR M. N. K. BOSE	ENGLISH	1987	21.00	I. R. D. T. U. P., KANPUR
2.	SAMPRESHAN TAKNIK	Prof. R. PAL Dr. Smt NEERAJ SHUKLA Dr.SUBHASH GARG	HINDI	1989	15.00	I. R. D. T. U. P., KANPUR

1. DISCIPLINE : APPLIED CHEMISTRY

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ANUPRAYUKT RASAYAN	KHANNA & KHANNA & BOUNTRA	HINDI	1994	60.00	BHARAT BAARTI PRAKASHAN, MEERUT
2.	PRAYUKT RASAYAN	MAHENDRA AND SRIVASTAVA	HINDI	1994	58.00	B.TECH. PUBLISHERS,AMMINABAD LUCKNOW
3.	PRAYUKT RASAYAN SHASTRA	S. CHANDRA	HINDI	1994	60.00	NAV BHARAT PRAKASHAN, BEGUM BRIDGE ROAD,MEERUT
4.	APPLIED CHEMISTRY	V. P. MEHITA	HINDI	1993	60.00	ASIAN PUBLISHERS, 85-C NAI MANDI, MUZAFFAR NAGAR
5.	ENGINEERING RASAYAN	Dr. LALIT	HINDI	1994	45.00	DHANPAT RAI & SONS, 1682 NAI SARAK, DELHI
6.	ENGINEERING CHEMISTRY	P. C. JAIN	ENGLISH	1994	100.00	DHANPAT RAI & SONS, 1682 NAI SARAK, DELHI

Corrected and Approved by B.T.E. On Dated 27.05.2015

1. DISCIPLINE : CERAMIC ENGINEERING

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
1.	ELEMENTS OF CERAMICS VOL. I & II	Dr. S. KUMAR	ENGLISH	LATEST		INDIAN INSTITUTE OF CERAMIC C/O CENTRAL GLASS & CERAMIC RESEARCH INSTITUTE,CALCUTTA
2.	CEMENT INDUSTRY IN INDIA VOLUME I & II	V. PODDERMAR	ENGLISH	LATEST		
3.	CEMENT ENGINEERS HAND BOOK	OTTO LEBAHER	ENGLISH	LATEST		
4.	PORTLAND CEMENT TECHNOLOGY	J. C. WITT	ENGLISH	LATEST		
5.	CHEMISTRY OF CEMENT & CONCRETE	F. M. LEE	ENGLISH	LATEST		
6.	CHEMISTRY OF CEMENTS	H.F. W. TAYLER	ENGLISH	LATEST		
7.	ELEMENTS OF CEMENT & CONCRETE	S. N. GHOSH	ENGLISH	LATEST		
8.	REFRACTORIES	M. L. MISHRA	ENGLISH	LATEST		LAXMI PRAKASHAN
9.	HAND BOOK OF REFRACTORIES	D. N. NANDI	ENGLISH	LATEST		TATA Mc GRAW HILL
10.	REFRACTORIES	NORTON	ENGLISH	LATEST		Mc GRAW HILL
11.	HEAT PROCESSES OF SILICATES	ADHHA AND I. BULAVIN	ENGLISH	LATEST		MIR PUBLICATION, MOSCOW
12.	MODERN CERAMICS	HOVA J. E.	ENGLISH	LATEST	250.00	DINTER SCIENCE PUB.
13.	GLASS SCIENCE & TECHNOLOGY VOLUME I TO VI	D. R. UHLMANN	ENGLISH	LATEST		
14.	HAND BOOK OF CRUSHING AND GRAINDING	C. L. PRASHER	ENGLISH	LATEST		
15.	CERAMICS VOL. I TO VI	E.P.Mc NAMARA	ENGLISH	LATEST		
16.	ELEMENT OF CERAMICS	F. H. NORTON	ENGLISH	LATEST		
17.	CERAMIC GLAZES	KOEHIG	ENGLISH	LATEST		INDUSTRIAL PUBLICATION Inc.
18.	HAND BOOK OF GLASS MANUFACTURE VOLUME I	F. V. TOLLEY	ENGLISH	LATEST		Mc GRAW HILL
19.	HAND BOOK OF GLASS MANUFACTURE VOLUME II	F. V. TOLLEY	ENGLISH	LATEST		Mc GRAW HILL
20.	GLASS ENGINEERING HAND BOOK	E. B. SHAND	ENGLISH	LATEST		
21.	DEFECTS IN GLASS	C. J. PADDLE	ENGLISH	LATEST		
22.	COLOURED GLASSES	W. A. WEYL	ENGLISH	LATEST		
23.	KANCH UDYOG	R. CHARAN	ENGLISH	LATEST		
24.	A TEXT BOOK OF POTTERY	H. N. BOSE	ENGLISH	LATEST		CERAMIC PUB. HOUSE
25.	MODERN POTTERY MANUFACTURER	H. N. BOSE	ENGLISH	LATEST		CERAMIC PUB. HOUSE
26.	MRITTRKA UDYOG POTTERY	H. N. BOSE	HINDI	LATEST		CERAMIC PUB. HOUSE
27.	INTRODUCTION TO CERAMICS	KINGERY W. D.	ENGLISH	LATEST		
28.	INDUSTRIAL FURNACES VOL I & II	W. TRINKD	ENGLISH	LATEST		
29.	A TEXT BOOK GEOLOGY	P. SINGH	ENGLISH	LATEST		S. K. KATARIA & SONS
30.	PROPERTIES OF GLASS	G. W. MOREY	ENGLISH	LATEST		
31.	ENAMELS	A. I. ANDREWS	ENGLISH	LATEST		
32.	TECHNOLOGY OF ENAMELS	V. I. VARGIN	ENGLISH	LATEST		
33.	GLASS MELTING TANK FURNACES	GUNTHER	ENGLISH	LATEST		
34.	GLASS- CERAMICS	M. C. MILLAN	ENGLISH	LATEST		
35.	GLASS CERAMICS AND PHOTO SITALLS	A. I. BREZHNOI	ENGLISH	LATEST		
36.	ADVANCED CERAMICS	E. C. SUBBARAO	ENGLISH	LATEST		
37.	PHASE DIAGRAMS FOR CERAMICS	LEVIN	ENGLISH	LATEST		AMERICAN CERAMIC SOCIETY, NEW YORK
38.	SPECIAL CERAMIC	POPPER P.	ENGLISH	LATEST	200.00	ACADEMIC
39.	DOWN DRAFT BHATIYON ME USHMA SAN RA KHSHAN	K. S. MATHEE	ENGLISH	LATEST	50.00	C.G.C.R.I. KHURJA
40.	POTTERY MANAGEMENT	BOSE H. N.	ENGLISH	LATEST	55.00	CERMAIC PUB. HOUSE
41.	GLASS MELTING TANK FURNACES	GUNTHER	ENGLISH	LATEST		

Corrected and Approved by B.T.E. On Dated 27.05.2015

Sl.No.	TEXT BOOK	AUTHOR	MEDIUM	EDITION YR	COST	FULL ADDRESS OF PUBLICATION
42.	CERAMIC WHITEWARE	REPORT NEW COMBTRI	ENGLISH	LATEST		PITMAN
43.	INDUSTRIAL CERAMICS	SINGAL & SINGH	ENGLISH	LATEST		
44.	ENGINEERING APPLICATORS OF CERAMIC MATERIALS	SCHWELTZ M. M.	ENGLISH	LATEST		M. C. GRAWHILLS
45.	SET OF CERAMIC NOTE FOR AIII CERAMIC		ENGLISH	LATEST		INSTITUTE OF CERAMIC C/O C.G.C.R.I., JADAVPUR UNI., CALCUTTA
45.	CERAMIC SCIENCE VOL-I & II		ENGLISH	LATEST		KUMAR & ASSOCIATE, 20 B DOVER PLACE, CALCUTTA
46.	POTTERY VIGYAN PARICHAY		HINDI	LATEST		C. G. C. R. I., KHURJA
47.	CHEMICAL ANALYSIS OF CERAMIC RAW MATERIAL & ALLIED PRODUCT		ENGLISH	LATEST		INSTITUTE OF CERAMIC C/O C.G.C.R.I., JADAVPUR UNI., CALCUTTA
48.	GATE WAY TO CERAMIC	S. MATIRA & A.K. BANDOPADHYA	ENGLISH	LATEST		S.M.D. VOLYOG, 9/4A/1Q SOUTH SINTHEE ROAD, CALCUTTA
49.	PROPERTIES OF GLASSES	G.W. MOOREY	ENGLISH	LATEST		REINHOLD PUBLISHING CO.
50.	CHEMISTRY OF GLASSES	AMAL PAUL	ENGLISH	LATEST		CHAPMAN HALL
51.	GLASS	G.O. JONES	ENGLISH	LATEST		
52.	MODERN GLASS PRACTICE	S.R. SCHOLZE	ENGLISH	LATEST		
53.	ELEMENTS OF MINEROLOGY	H.H. READ	ENGLISH	LATEST		
54.	GLASS	R.P. CHARAN	ENGLISH	LATEST		
55.	REFRACTORY	M.L. MISRA	ENGLISH	LATEST		
56.	ELEMENTS OF CERAMICS	S. KUMAR	ENGLISH	LATEST		
57.	POTTERY	H.N. BOSE	ENGLISH	LATEST		
58.	STEEL, PLANT & REFRACTORY	CHASTER	ENGLISH	LATEST		
59.	REFRACTORY	F.H. NORTON	ENGLISH	LATEST		
60.	ELEMENTS OF CERAMICS	F.H. NORTON	ENGLISH	LATEST		
61.	FUEL FURNESS & PYROMETRY	GILLCHRIST	ENGLISH	LATEST		

Corrected and Approved by B.T.E. On Dated 27.05.2015